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0CAN121102

December 1, 2011

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Proposed Emergency Action Levels Using
NEI 99-01 Revision 5 Scheme
Arkansas Nuclear One – Units 1 and 2
Docket Nos. 50-313 and 50-368
License Nos. DPR-51 and NPF-6

References:

1. Letter from Christopher G. Miller (U.S. Nuclear Regulatory Commission) to Alan Nelson (Nuclear Energy Institute) – "*U.S. Nuclear Regulatory Commission Review and Endorsement of NEI 99-01, Revision 5, dated February 2008*", dated February 22, 2008 (ML080430535)

2. Entergy letter dated July 18, 2011, *"Proposed Emergency Action Levels Using NEI 99-01 Revision 5 Scheme,"* TAC Nos. ME6719 and 6720 (ML112000124) (0CAN071102)

3. Entergy letter dated July 27, 2011, *"Supplement to Proposed Emergency Action Levels Using NEI 99-01 Revision 5 Scheme,"* TAC Nos. ME6719 and ME6720 (ML112082804) (0CAN071105)

Dear Sir or Madam:

Pursuant to 10 CFR 50, Appendix E, Section IV.B(1), Entergy Operations, Inc. (Entergy) hereby requests NRC review and approval of the Arkansas Nuclear One (ANO) proposed revision to the Emergency Plan (EP) Emergency Action Levels (EALs). The proposed changes involve revisions to ANO's current EP EAL scheme which is based on NUREG 0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants" (the current "implemented" version of the EALs at ANO). Entergy is proposing to adopt the EAL scheme based on the guidance provided in NEI 99-01, Revision 5, which has been endorsed by the NRC in Reference 1 above.

By Reference 2, as supplemented by Reference 3, Entergy submitted a request for NRC review and approval of the ANO proposed revision to the EP EALs. Following these submittals, ANO began development of Operator training modules that would be used to familiarize station Operators with the new EAL schemes. In so doing, changes were identified with regard to the

original ANO submittal (Reference 2) that were found to be necessary to support proper implementation of the new EAL schemes, once approved. This submittal, therefore, supersedes the previous submittals described in References 2 and 3 above, and includes the changes identified during the aforementioned development of Operator training modules.

Based on the above, Entergy requests the Reference 2 and 3 submittals be withdrawn from NRC review. Upon NRC approval of the EP EAL changes included in this submittal, Entergy requests a period of 6 months to implement the change.

This letter contains no new commitments. If you have any questions or require additional information, please contact me.

Sincerely,

Original signed by Stephenie L. Pyle

SLP/dbb

Attachments:
1. NEI 99-01 Revision 5 Deviation-Difference Document
2. Proposed Technical Basis Document (Markup)
3. Proposed Technical Basis Document (Clean)
4. Proposed EAL Matrix Chart and Review Table (for information)
5. Supporting Referenced Document Pages

cc: Mr. Elmo Collins
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Attachment 1 to

0CAN121102

NEI 99-01 Revision 5 Deviation-Difference Document

ARKANSAS NUCLEAR ONE

DEVIATIONS AND DIFFERENCES

FROM

NEI 99-01, REV 5

EMERGENCY ACTION LEVELS

NEI 99-01 Revision 5 EAL Deviation-Differences Document

INTRODUCTION

This document presents the Arkansas Nuclear One (ANO) site-specific deviations and differences from the Nuclear Energy Institute (NEI) 99-01, Revision 5, Emergency Action Levels (EALs).

The following definitions from Supplements 1 and 2 to Regulatory Information Summary (RIS) 2003-18 were used when determining the categorization of differences between the NEI 99-01, Revision 5, Initiating Conditions (ICs) and example EALs, and the proposed ANO ICs and EALs:

Deviation: An EAL change where the basis scheme guidance (NUREG, Nuclear Management and Resources Council, NEI) differs in wording and is altered in meaning or intent, such that the classification of the event could be different between the basis scheme guidance and the site-specific proposed EAL. Examples of deviations include the use of altered mode applicability, altering key words or time limits, or changing words of physical reference (protected area, safety-related equipment, etc.).

There are no deviations in the ANO proposed EAL scheme.

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

Administrative changes that do not actually change the text are neither differences nor deviations. Likewise, any format change that does not alter the wording of the IC or EAL is considered neither a difference nor a deviation.

Formatting such as ALL CAPS, **bold**, and <u>underline</u> is utilized to aid the user in applying these EALs, particularly to set apart units, time frames, or quality of a value or data (such as the term “valid”). Such formatting is neither a deviation nor a difference in accordance with the definitions provided above because it does not alter the wording of the IC or EAL.

In addition, due to the nature of this submittal acronyms in the EALs are not necessarily defined.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

The following differences are generic in nature and apply throughout the proposed ANO EALs:

1. In general, NEI 99-01, Revision 5, bases developer notes are not included in the ANO bases, but were used in their development. NEI 99-01, Revision 5, developer note bases information was selectively provided in the ANO bases where it was viewed that the developer notes would provide useful training information or aid the decision maker in evaluating the event. In some cases, these developer notes are reworded from the NEI 99-01 EALs, but the intent is retained.

2. Formatting choices may also involve minor grammatical differences between the ANO EALs and NEI 99-01 such as “that exceeds” vice “exceeding,” use of “If, then” statements for conditional statements, or the use of symbols (>, <). Such formatting differences between the ANO EALs and NEI 99-01 are not noted in this document as differences or deviations when they represent format choices alone and do not change the intent or materially change the content of NEI 99-01 ICs or EALs.

3. At ANO, the emergency classification of Notification of Unusual Event is indicated by “Notification of Unusual Event” or the abbreviation “NUE.”

4. At ANO, the Radiological Effluent Technical Specifications (RETS) are included in the Offsite Dose Calculation Manual (ODCM); therefore, “ODCM” is used in place of references to RETS.

5. “Shift Manager (SM)/Technical Support Center (TSC) Director/Emergency Operations Facility (EOF) Director” or “SM” is used instead of “Emergency Director”.

6. “Safeguards Contingency Plan” is the term used to encompass all security plans/documents.

7. At ANO the “refueling canal” performs the functions of the “reactor refueling cavity” and “fuel transfer canal.”

8. The term “reactor vessel” was used in place of “reactor pressure vessel (RPV).”

9. The term “release permit” was used in place of “radioactivity discharge permit.”

10. In the Fission Product Barrier EALs, the EAL numbers are preceded by “FCB” for the Fuel Clad Barrier EALs, “RCB” for the Reactor Coolant System (RCS) Barrier EALs, and “CNB” for the Containment Barrier EALs.

11. The term “threshold” is not used in every case as it is used in NEI 99-01. Replacement terms such as “EAL” are used as necessary based on context.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: AU1

Any release of gaseous or liquid radioactivity to the environment greater than 2 times the RETS/ODCM for 60 minutes or longer

Operating Mode Applicability: All

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

Note: The Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the release duration has exceeded or will likely exceed, the applicable time. In the absence of data to the contrary, assume that the release duration has exceeded the applicable time if an ongoing release is detected and the release start time is unknown.

1. VALID reading on ANY of the following radiation monitors greater than the reading shown for 60 minutes or longer:

   (site-specific monitor list and threshold values)

2. VALID reading on any effluent monitor reading greater than 2 times the alarm setpoint established by a current radioactivity discharge permit for 60 minutes or longer.

3. Confirmed sample analyses for gaseous or liquid releases indicates concentrations or release rates greater than 2 times (site-specific RETS values) for 60 minutes or longer.

4. VALID reading on perimeter radiation monitoring system greater than 0.10 mR/hr above normal* background for 60 minutes or longer. [for sites having telemetered perimeter monitors]

5. VALID indication on automatic real-time dose assessment capability indicating greater than (site-specific value) for 60 minutes or longer. [for sites having such capability]

   * Normal can be considered as the highest reading in the past twenty-four hours excluding the current peak value.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: AU1

Any release of gaseous or liquid radioactivity to the environment > 2 times the ODCM limits for ≥ 60 minutes

Operating Mode Applicability: All

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

Note: *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the release duration has exceeded, or will likely exceed, the applicable time. In the absence of data to the contrary, assume that the release duration has exceeded the applicable time if an ongoing release is detected and the release start time is unknown.*

1. VALID reading on Channel 7 on any of the following radiation monitors > the reading shown for ≥ 60 minutes:

	MONITORS – UNIT 1	**LIMIT**
RX-9820	Containment Purge	5.90E-2 µCi/cc
RX-9825	Radwaste Area	5.36E-2 µCi/cc
RX-9830	Fuel Handling Area	4.54E-2 µCi/cc
RX-9835	Emergency Penetration Room	9.56E-1 µCi/cc
	MONITORS – UNIT 2	**LIMIT**
2RX-9820	Containment Purge	4.46E-2 µCi/cc
2RX-9825	Radwaste Area	3.32E-2 µCi/cc
2RX-9830	Fuel Handling Area	4.46E-2 µCi/cc
2RX-9835	Emergency Penetration Room	8.84E-1 µCi/cc
2RX-9840	Post Accident Sampling Building	4.42E-1 µCi/cc
2RX-9845	Aux. Building Extension	1.26E-1 µCi/cc
2RX-9850	Low-Level Radwaste Storage Building	1.77E-1 µCi/cc

OR

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: AU1 (Cont'd)

2. VALID reading on any of the following radiation monitors > 2 times the alarm setpoint established by a current release permit for ≥ 60 minutes:

EFFLUENT MONITORS – Unit 1	
RX-9820	Containment Purge (Channel 7 or 9)
RE-4830	Waste Gas Radiation Monitor
RE-4642	Liquid Radwaste Monitor
EFFLUENT MONITORS – Unit 2	
2RX-9820	Containment Purge (Channel 7 or 9)
2RE-2429	Waste Gas Decay Tank Vent Line Radiation Monitor
2RE-2330	Regenerative Waste Discharge Monitor
2RE-4423	Radwaste Liquid Discharge Monitor
2RE-4425	SG Blowdown to Flume Radiation Monitor

OR

3. Confirmed grab sample analyses for gaseous or liquid releases indicates concentrations or release rates > 2 times the applicable values of the ODCM for ≥ 60 minutes.

Deviations:

None.

Differences:

The second (superfluous) "reading" is deleted in ANO EAL #2.

The radiation monitor channel is identified in EAL #1 in order to provide site-specific detail.

A table is provided in the EAL document that lists the applicable radiation monitors for EAL #2.

ANO has installed telemetered perimeter monitoring devices. These devices, however, are neither qualified nor intended to provide an accurate indication of the dose rate at the perimeter of the site. They are only intended to provide early indication of a potential unmonitored offsite release. Therefore, ANO has not included an EAL comparable to NEI 99-01 Revision 5 AU1 EAL #4.

The Radiological Dose Assessment Computer System (RDACS) is ANO's current real-time dose assessment system, but is out-dated. RDACS is currently scheduled to be replaced prior to implementation of the new EALs with a system that is not a "real-time" system; therefore, an EAL comparable to NEI 99-01, Revision 5, AU1 EAL #5 has not been included.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: AU2

UNPLANNED rise in plant radiation levels

Operating Mode Applicability: All

Example Emergency Action Levels: (1 or 2)

1. a. UNPLANNED water level drop in a reactor refueling pathway as indicated by (site-specific level or indication).

   AND

   b. VALID Area Radiation Monitor reading rise on (site-specific list).

2. UNPLANNED VALID Area Radiation Monitor readings or survey results indicate a rise by a factor of 1000 over normal* levels.

   * Normal can be considered as the highest reading in the past twenty-four hours excluding the current peak value.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: AU2

UNPLANNED rise in plant radiation levels

Operating Mode Applicability: All

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

1. a. UNPLANNED lowering of water level in the refueling canal or spent fuel pool as indicated by:

   - Personnel observation, refueling crew report, indication on area security camera, borated water source (BWST or RWT) level drop due to makeup demands.

   AND

   b. VALID Area Radiation Monitor reading rise on any of the following:

Unit 1	
RE-8009	Spent Fuel Area
RE-8017	Fuel Handling Area
Unit 2	
2RE-8914	Spent Fuel Area
2RE-8915	Spent Fuel Area
2RE-8916	Spent Fuel Area
2RE-8912	Containment Incore Instrumentation

OR

2. UNPLANNED VALID Area Radiation Monitor readings or survey results indicate a rise by a factor of 1000 over normal* levels

   NOTE: *For area radiation monitors with ranges incapable of measuring 1000 times normal* levels, classification shall be based on valid full scale indication unless surveys confirm that area radiation levels are below 1000 times normal* within 15 minutes of the Area Radiation Monitor indications going to full scale indication.*

   * Normal can be considered as the highest reading in the past twenty-four hours excluding the current peak value.

Deviations:

None.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: AU2 (Cont'd)

Differences:

A note is added to EAL #2 to address the condition where 1,000 times normal levels may provide a value beyond the upper range of the applicable Area Radiation Monitor.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: AA1

Any release of gaseous or liquid radioactivity to the environment greater than 200 times the RETS/ODCM for 15 minutes or longer

Operating Mode Applicability: All

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

Note: The Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the release duration has exceeded, or will likely exceed, the applicable time. In the absence of data to the contrary, assume that the release duration has exceeded the applicable time if an ongoing release is detected and the release start time is unknown.

1. VALID reading on **ANY** of the following radiation monitors greater than the reading shown for 15 minutes or longer:

   (site-specific monitor list and threshold values)

2. VALID reading on any effluent monitor reading greater than 200 times the alarm setpoint established by a current radioactivity discharge permit for 15 minutes or longer.

3. Confirmed sample analyses for gaseous or liquid releases indicates concentrations or release rates greater than 200 times (site-specific RETS values) for 15 minutes or longer.

4. VALID reading on perimeter radiation monitoring system reading greater than 10.0 mR/hr above normal* background for 15 minutes or longer. [for sites having telemetered perimeter monitors]

5. VALID indication on automatic real-time dose assessment capability indicating greater than (site-specific value) for 15 minutes or longer. [for sites having such capability]

   * Normal can be considered as the highest reading in the past twenty-four hours excluding the current peak value.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: AA1

Any release of gaseous or liquid radioactivity to the environment > 200 times the ODCM limits for ≥ 15 minutes

Operating Mode Applicability: All

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

Note: *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed but should declare the event as soon as it is determined that the release duration has exceeded, or will likely exceed, the applicable time. In the absence of data to the contrary, assume that the release duration has exceeded the applicable time if an ongoing release is detected and the release start time is unknown.*

1. VALID reading on Channel 7 on any of the following radiation monitors > the reading shown for ≥ 15 minutes:

	MONITORS – UNIT 1	**LIMIT**
RX-9820	Containment Purge	5.90E0 µCi/cc
RX-9825	Radwaste Area	5.36E0 µCi/cc
RX-9830	Fuel Handling Area	4.54E0 µCi/cc
RX-9835	Emergency Penetration Room	9.56E+1 µCi/cc
	MONITORS – UNIT 2	**LIMIT**
2RX-9820	Containment Purge	4.46E0 µCi/cc
2RX-9825	Radwaste Area	3.32E0 µCi/cc
2RX-9830	Fuel Handling Area	4.46E0 µCi/cc
2RX-9835	Emergency Penetration Room	8.84E+1 µCi/cc
2RX-9840	Post Accident Sampling Building	4.42E+1 µCi/cc
2RX-9845	Aux. Building Extension	1.26E+1 µCi/cc
2RX-9850	Low-Level Radwaste Storage Building	1.77E+1 µCi/cc

OR

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: AA1 (Cont'd)

2. **EITHER** VALID reading on any of the following radiation monitors > 200 times the alarm setpoint established by a current release permit for ≥ 15 minutes **OR** VALID reading greater than the value listed for ≥ 15 minutes:

	MONITORS – UNIT 1	LIMIT
RX-9820	Containment Purge (Channel 7 or 9)	N/A
RE-4830	Waste Gas Radiation Monitor	9.5E7 cpm
RE-4642	Liquid Radwaste Monitor	9.5E7 cpm
	MONITORS – UNIT 2	**LIMIT**
2RX-9820	Containment Purge (Channel 7 or 9)	N/A
2RE-2429	Waste Gas Decay Tank Vent Line Radiation Monitor	9.5E5 cpm
2RE-2330	BMS Liquid Discharge Monitor	9.5E5 cpm
2RE-4423	Regenerative Waste Discharge Monitor	9.5E5 cpm
2RE-4425	SG Blowdown to Flume Radiation Monitor	9.5E5 cpm

OR

3. Confirmed grab sample analyses for gaseous or liquid releases indicates concentrations or release rates > 200 times the applicable values of the ODCM for ≥ 15 minutes.

Deviations:

None.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

Differences:

The radiation monitor channel is identified in EAL #1 in order to provide site-specific detail.

The second (superfluous) “reading” is deleted in the ANO EAL #2.

EAL #2 and its associated basis information are revised and a table added to provide site-specific information for radiation monitors that may not be capable of providing values within the calibrated range of the monitor at or above the 200 multiple for an alarm setpoint established by a radioactivity discharge permit.

ANO has installed telemetered perimeter monitoring devices. These devices, however, are neither qualified nor intended to provide an accurate indication of the dose rate at the perimeter of the site. They are only intended to provide early indication of a potential unmonitored offsite release. Therefore, ANO has not included an EAL comparable to NEI 99-01, Revision 5, AA1 EAL #4.

The Radiological Dose Assessment Computer System (RDACS) is ANO’s current real-time dose assessment system, but is out-dated. RDACS is currently scheduled to be replaced prior to implementation of the new EALs with a system that is not a “real-time” system; therefore, an EAL comparable to NEI 99-01, Revision 5, AU1 EAL #5 has not been included.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: AA2

Damage to irradiated fuel or loss of water level that has resulted or will result in the uncovering of irradiated fuel outside the reactor vessel

Operating Mode Applicability: All

Example Emergency Action Levels: (1 or 2)

1. A water level drop in the reactor refueling cavity, spent fuel pool or fuel transfer canal that will result in irradiated fuel becoming uncovered.

2. A VALID alarm or (site-specific elevated reading) on **ANY** of the following due to damage to irradiated fuel or loss of water level.

   (site-specific radiation monitors)

ANO: AA2

Damage to irradiated fuel or loss of water level that has resulted or will result in the uncovering of irradiated fuel outside the reactor vessel

Operating Mode Applicability: All

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

1. A water level drop in the refueling canal or spent fuel pool that will result in irradiated fuel becoming uncovered.

   OR

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: AA2 (Cont'd)

2. VALID alarm on any of the following radiation monitors due to damage to irradiated fuel or loss of water level:

Unit 1	
RX-9820	Containment Purge (Channel 7 or 9)
RX-9825	Radwaste Area (Channel 7 or 9)
RX-9830	Fuel Handling Area (Channel 7 or 9)
RE-8060	Containment High Range Radiation Monitors
RE-8061	Containment High Range Radiation Monitors
RE-8009	Spent Fuel Area
RE-8017	Fuel Handling
Unit 2	
2RX-9820	Containment Purge (Channel 7 or 9)
2RX-9825	Radwaste Area (Channel 7 or 9)
2RX-9830	Fuel Handling Area (Channel 7 or 9)
2RE-8905	Containment Equipment Hatch Area
2RE-8909	Containment Personnel Hatch Area
2RE-8925-1	Containment High Range Radiation Monitors
2RE-8925-2	Containment High Range Radiation Monitors
2RE-8914	Spent Fuel Area
2RE-8915	Spent Fuel Area
2RE-8916	Spent Fuel Area
2RE-8912	Containment Incore Inst.

Deviations:

None.

Differences:

Site-specific elevated readings for EAL #2 are not provided for ANO but instead multiple radiation monitors for each unit on which an alarm could be received are provided.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: AA3

Rise in radiation levels within the facility that impedes operation of systems required to maintain plant safety functions

Operating Mode Applicability: All

Example Emergency Action Levels:

1. Dose rate greater than 15 mR/hr in **ANY** of the following areas requiring continuous occupancy to maintain plant safety functions:

   (site-specific area list)

ANO: AA3

Rise in radiation levels within the facility that impedes operation of systems required to maintain plant safety functions

Operating Mode Applicability: All

Emergency Action Level(s):

1. Dose rate > 15 mR/hr in any of the following areas requiring continuous occupancy to maintain plant safety functions:

   - Unit 1 Control Room
   - Unit 2 Control Room
   - Central Alarm Station

Deviations:

None.

Differences:

None.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: AS1

Off-site dose resulting from an actual or IMMINENT release of gaseous radioactivity greater than 100 mrem Total Effective Dose Equivalent (TEDE) or 500 mrem Thyroid Committed Dose Equivalent (CDE) for the actual or projected duration of the release

Operating Mode Applicability: All

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

Note: The Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time. If dose assessment results are available, declaration should be based on dose assessment instead of radiation monitor values. Do not delay declaration awaiting dose assessment results.

1. VALID reading on **ANY** of the following radiation monitors greater than the reading shown for 15 minutes or longer:

   (site-specific monitor list and threshold values)

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

3. VALID perimeter radiation monitoring system reading greater than 100 mR/hr for 15 minutes or longer. [for sites having telemetered perimeter monitors]

4. Field survey results indicate closed window dose rates greater than 100 mR/hr expected to continue for 60 minutes or longer; or analyses of field survey samples indicate thyroid CDE greater than 500 mrem for one hour of inhalation, at or beyond the site boundary.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: AS1

Offsite dose resulting from an actual or imminent release of gaseous radioactivity > 100 mR TEDE or 500 mR child thyroid CDE for the actual or projected duration of the release

Operating Mode Applicability: All

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

Note: *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time. If dose assessment results are available, the classification should be based on EAL #2 instead of EAL #1. Do not delay declaration awaiting dose assessment results.*

1. VALID reading on Channel 9 on any of the following radiation monitors > the reading shown for ≥ 15 minutes:

	MONITORS – UNIT 1	LIMIT
RX-9820	Containment Purge	5.90E+1 µCi/cc
RX-9825	Radwaste Area	5.36E+1 µCi/cc
RX-9830	Fuel Handling Area	4.54E+1 µCi/cc
RX-9835	Emergency Penetration Room	9.56E+2 µCi/cc
	MONITORS – UNIT 2	**LIMIT**
2RX-9820	Containment Purge	4.46E+1 µCi/cc
2RX-9825	Radwaste Area	3.32E+1 µCi/cc
2RX-9830	Fuel Handling Area	4.46E+1 µCi/cc
2RX-9835	Emergency Penetration Room	8.84E+2 µCi/cc
2RX-9840	Post Accident Sampling Building	4.42E+2 µCi/cc
2RX-9845	Aux. Building Extension	1.26E+2 µCi/cc
2RX-9850	Low-Level Radwaste Storage Building	1.77E+2 µCi/cc

OR

2. Dose assessment using actual meteorology indicates doses > 100 mR TEDE or 500 mR child thyroid CDE at or beyond the site boundary.

OR

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: AS1 (Cont'd)

3. Field survey results indicate closed window dose rates >100 mR/hr expected to continue for ≥ 60 minutes; or analyses of field survey samples indicate child thyroid CDE > 500 mR for one hour of inhalation, at or beyond the site boundary.

Deviations:

None.

Differences:

Child thyroid CDE is used in place of adult thyroid CDE in the IC and EALs #2 and #3 because the State of Arkansas uses the child thyroid in the dose assessment methods. This difference provides consistency with dose assessment methods used by the State of Arkansas.

The references to dose assessment and plant monitoring data are replaced in the EAL section note with the corresponding specific EAL numbers. This change is provided for ease of use only and does not change the intent of the note.

The radiation monitor channel is identified in EAL #1 in order to provide site-specific detail.

ANO has installed telemetered perimeter monitoring devices. These devices, however, are neither qualified nor intended to provide an accurate indication of the dose rate at the perimeter of the site. They are only intended to provide early indication of a potential unmonitored offsite release. Therefore, ANO has not included an EAL comparable to NEI 99-01 Revision 5 AS1 EAL #3.

Additional information is provided in the bases for field monitoring team surveys (ANO EAL #3).

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: AG1

Off-site dose resulting from an actual or IMMINENT release of gaseous radioactivity greater than 1000 mrem TEDE or 5000 mrem Thyroid CDE for the actual or projected duration of the release using actual meteorology

Operating Mode Applicability: All

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

Note: The Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time. If dose assessment results are available, declaration should be based on dose assessment instead of radiation monitor values. Do not delay declaration awaiting dose assessment results.

1. VALID reading on **ANY** of the following radiation monitors greater than the reading shown for 15 minutes or longer:

   (site-specific monitor list and threshold values)

2. Dose assessment using actual meteorology indicates doses greater than 1000 mrem TEDE or 5000 mrem thyroid CDE at or beyond the site boundary.

3. VALID perimeter radiation monitoring system reading greater than 1000 mR/hr for 15 minutes or longer. [for sites having telemetered perimeter monitors]

4. Field survey results indicate closed window dose rates greater than 1000 mR/hr expected to continue for 60 minutes or longer; or analyses of field survey samples indicate thyroid CDE greater than 5000 mrem for one hour of inhalation, at or beyond site boundary.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: AG1

Offsite dose resulting from an actual or imminent release of gaseous radioactivity > 1000 mR TEDE or 5000 mR child thyroid CDE for the actual or projected duration of the release using actual meteorology

Operating Mode Applicability: All

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

Note: *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time. If dose assessment results are available, the classification should be based on EAL #2 instead of EAL #1. Do not delay declaration awaiting dose assessment results.*

1. VALID reading on Channel 9 on any of the following radiation monitors > the reading shown for ≥ 15 minutes:

	MONITORS – UNIT 1	LIMIT
RX-9820	Containment Purge	5.90E+2 (µCi/cc)
RX-9825	Radwaste Area	5.36E+2 (µCi/cc)
RX-9830	Fuel Handling Area	4.54E+2 (µCi/cc)
RX-9835	Emergency Penetration Room	9.56E+3 (µCi/cc)
	MONITORS – UNIT 2	**LIMIT**
2RX-9820	Containment Purge	4.46E+2 (µCi/cc)
2RX-9825	Radwaste Area	3.32E+2 (µCi/cc)
2RX-9830	Fuel Handling Area	4.46E+2 (µCi/cc)
2RX-9835	Emergency Penetration Room	8.84E+3 (µCi/cc)
2RX-9840	Post Accident Sampling Building	4.42E+3 (µCi/cc)
2RX-9845	Aux. Building Extension	1.26E+3 (µCi/cc)
2RX-9850	Low-Level Radwaste Storage Building	1.77E+3 (µCi/cc)

OR

2. Dose assessment using actual meteorology indicates doses > 1000 mR TEDE or 5000 mR child thyroid CDE at or beyond the site boundary.

OR

3. Field survey results indicate closed window dose rates >1000 mR/hr expected to continue for ≥ 60 minutes; or analyses of field survey samples indicate child thyroid CDE > 5000 mR for one hour of inhalation, at or beyond the site boundary.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: AG1 (Cont'd)

Deviations:

None.

Differences:

Child thyroid CDE is used in place of adult thyroid CDE in the IC and EALs #2 and #3 because the State of Arkansas uses the child thyroid in their dose assessment methods. This difference provides consistency with dose assessment methods used by the State of Arkansas.

The references to dose assessment and plant monitoring data are replaced with the corresponding specific EAL numbers in the EAL section note. This change is provided for ease of use only and does not change the intent of the note.

The radiation monitor channel is identified in EAL #1 in order to provide site-specific detail.

ANO has installed telemetered perimeter monitoring devices. These devices, however, are neither qualified nor intended to provide an accurate indication of the dose rate at the perimeter of the site. They are only intended to provide early indication of a potential unmonitored offsite release. Therefore, ANO has not included an EAL comparable to NEI 99-01, Revision 5, AG1 EAL #3.

Additional information is provided in the bases for field monitoring team surveys (ANO EAL #3).

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: CU1

RCS leakage

Operating Mode Applicability: Cold Shutdown

Example Emergency Action Levels:

Note: The Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.

1. RCS leakage results in the inability to maintain or restore RPV level greater than (site-specific low-level RPS actuation setpoint) for 15 minutes or longer. [*BWR*]

1. RCS leakage results in the inability to maintain or restore level within (site-specific pressurizer or RCS/RPV level target band) for 15 minutes or longer. [*PWR*]

ANO: CU1

RCS leakage

Operating Mode Applicability: Cold Shutdown (Mode 5)

Emergency Action Level(s):

Note: *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. RCS leakage results in the inability to maintain or restore level within Pressurizer or RCS level target band for ≥ 15 minutes.

Deviations:

None.

Differences:

None.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: CU2

UNPLANNED loss of RCS/RPV inventory

Operating Mode Applicability: Refueling

Example Emergency Action Levels: (1 or 2)

Note: The Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.

1. UNPLANNED RCS/RPV level drop as indicated by either of the following:

   - RCS/RPV water level drop below the RPV flange for 15 minutes or longer when the RCS/RPV level band is established above the RPV flange.

   - RCS/RPV water level drop below the RCS level band for 15 minutes or longer when the RCS/RPV level band is established below the RPV flange.

2. RCS/RPV level cannot be monitored with a loss of RCS/RPV inventory as indicated by an unexplained level rise in (site-specific sump or tank).

ANO: CU2

UNPLANNED loss of RCS / reactor vessel inventory

Operating Mode Applicability: Refueling (Mode 6)

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

Note: *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. UNPLANNED RCS / reactor vessel level drop as indicated by either of the following:

   a. RCS / reactor vessel water level drop below the reactor vessel flange for ≥ 15 minutes when the RCS / reactor vessel level band is established above the reactor vessel flange.

      OR

   b. RCS / reactor vessel water level drop below the RCS / reactor vessel level band for ≥ 15 minutes when the RCS / reactor vessel level band is established below the reactor vessel flange.

      OR

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: CU2 (Cont'd)

2. RCS / reactor vessel level cannot be monitored with a loss of RCS / reactor vessel inventory as indicated by an unexplained level rise in the Reactor Building Sump, Reactor Drain Tank, Aux. Building Equipment Drain Tank, Aux. Building Sump, or Quench Tank.

Deviations:

None.

Differences:

None.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: CU4

UNPLANNED loss of decay heat removal capability with irradiated fuel in the RPV

Operating Mode Applicability: Cold Shutdown
Refueling

Example Emergency Action Levels: (1 or 2)

Note: The Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.

1. UNPLANNED event results in RCS temperature exceeding the Technical Specification cold shutdown temperature limit.

2. Loss of all RCS temperature and RCS/RPV level indication for 15 minutes or longer.

ANO: CU3

UNPLANNED loss of decay heat removal capability with irradiated fuel in the reactor vessel

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

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

Note: *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. UNPLANNED event results in RCS temperature exceeding 200 °F.

   OR

2. Loss of all RCS temperature and RCS/reactor vessel level indication for ≥ 15 minutes.

Deviations:

None.

Differences:

NEI 99-01 **CU4** is renumbered to ANO **CU3** for formatting purposes based on site preference for order of ICs alone.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: CU3

AC power capability to emergency busses reduced to a single power source for 15 minutes or longer such that any additional single failure would result in station blackout

Operating Mode Applicability: Cold Shutdown
Refueling

Example Emergency Action Level:

Note: The Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.

1. a. AC power capability to (site-specific emergency busses) reduced to a single power source for 15 minutes or longer.

   AND

   b. Any additional single power source failure will result in station blackout.

ANO: CU5

AC power capability to Vital 4.16 KV busses reduced to a single power source ≥ 15 minutes such that any additional single failure would result in station blackout

Operating Mode Applicability: Cold Shutdown (Mode 5
Refueling (Mode 6)

Emergency Action Level(s):

Note: *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. a. AC power capability to Vital 4.16 KV busses reduced to a single power source ≥ 15 minutes.

   AND

   b. Any additional single power source failure will result in station blackout.

Deviations:

None.

Differences:

NEI 99-01 **CU3** is renumbered to ANO **CU5** for formatting purposes based on site preference for order of ICs alone.

The site-specific term “Vital 4.16 KV” is used in the IC and EAL to define emergency busses.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: CU7

Loss of required DC power for 15 minutes or longer

Operating Mode Applicability: Cold Shutdown
Refueling

Example Emergency Action Level:

Note: The Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.

1. Less than (site-specific bus voltage indication) on required (site-specific Vital DC busses) for 15 minutes or longer.

ANO: CU6

Loss of required DC power ≥ 15 minutes

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

Emergency Action Level(s):

Note: *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. < 105 volts on required Vital DC bus ≥ 15 minutes.

Deviations:

None.

Differences:

NEI 99-01 **CU7** is renumbered to ANO **CU6** for formatting purposes based on site preference for order of ICs alone.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: CU8

Inadvertent criticality

Operating Mode Applicability: Cold Shutdown
Refueling

Example Emergency Action Levels:

1. UNPLANNED sustained positive period observed on nuclear instrumentation. (BWR)

1. UNPLANNED sustained positive startup rate observed on nuclear instrumentation. (PWR)

ANO: CU7

Inadvertent criticality

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

Emergency Action Level(s):

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

Deviations:

None.

Differences:

NEI 99-01 **CU8** is renumbered to ANO **CU7** for formatting purposes based on site preference for order of ICs alone.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: CU6

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

Operating Mode Applicability: Cold Shutdown
Refueling
Defueled

Example Emergency Action Levels: (1 or 2)

1. Loss of all of the following on-site communication methods affecting the ability to perform routine operations:

   (site-specific list of communications methods)

2. Loss of all of the following off-site communication methods affecting the ability to perform offsite notifications:

   (site-specific list of communications methods)

ANO: CU8

Loss of all onsite or offsite communications capabilities

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)
Defueled

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

1. Loss of all **Table C2** onsite communication methods affecting the ability to perform routine operations.

   OR

2. Loss of all **Table C3** offsite communication methods affecting the ability to perform offsite notifications.

Table C2 **Onsite Communications Methods**
Station radio system
Plant paging system
In-plant telephones
Gaitronics

Table C3 **Offsite Communications Methods**
All telephone lines (commercial and microwave)
Emergency Notification System (ENS)

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: CU8 (Cont'd)

Deviations:

None.

Differences:

NEI 99-01 **CU6** is renumbered to ANO **CU8** for formatting purposes based on site preference for order of ICs alone.

Onsite and offsite communications methods in tables are presented and the tables are referenced causing a minor difference in EAL language from that in NEI 99-01.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: CA1

Loss of RCS/RPV inventory

Operating Mode Applicability: Cold Shutdown
Refueling

Example Emergency Action Levels: (1 or 2)

Note: The Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.

1. Loss of RCS/RPV inventory as indicated by level less than (site-specific level).

   [*Low-Low ECCS actuation setpoint / Level 2 (BWR)*]

   [*Bottom ID of the RCS loop (PWR)*]

2. RCS/RPV level cannot be monitored for 15 minutes or longer with a loss of RCS/RPV inventory as indicated by an unexplained level rise in (site-specific sump or tank).

ANO: CA1

Loss of RCS / reactor vessel inventory

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

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

Note: *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. Loss of RCS / reactor vessel inventory as indicated by:

   Unit 1: RVLMS Levels 1 through 8 indicate DRY

   Unit 2: RVLMS Levels 1 through 5 indicate DRY

   OR

   Unit 1: Reactor vessel level < 368 ft., 0 in. (bottom of the hot leg)

   Unit 2: Reactor vessel level < 369 ft., 1.5 in. (bottom of the hot leg)

   OR

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: CA1 (Cont'd)

2. RCS / reactor vessel level cannot be monitored for ≥ 15 minutes with a loss of RCS / reactor vessel inventory as indicated by an unexplained level rise in the Reactor Building Sump, Reactor Drain Tank, Auxiliary Building Equipment Drain Tank, Auxiliary Building Sump, or Quench Tank.

Deviations:

None.

Differences:

Site-specific bases information is provided for reactor vessel level monitoring in Mode 6.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: CA4

Inability to maintain plant in cold shutdown

Operating Mode Applicability: Cold Shutdown
Refueling

Example Emergency Action Levels: (1 or 2)

1. An UNPLANNED event results in RCS temperature greater than (site-specific Technical Specification cold shutdown temperature limit) for greater than the specified duration on table.

Table: RCS Reheat Duration Thresholds		
RCS	**Containment Closure**	**Duration**
Intact (but not RCS Reduced Inventory [PWR])	N/A	60 minutes*
Not intact or RCS Reduced Inventory *(PWR)*	Established	20 minutes*
	Not Established	0 minutes
* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, the EAL is not applicable.		

2. An UNPLANNED event results in RCS pressure increase greater than 10 psi due to a loss of RCS cooling. (PWR – This EAL does not apply in Solid Plant conditions)

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: CA3

Inability to maintain plant in cold shutdown

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

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

1. An UNPLANNED event results in RCS temperature > 200 °F > the specified duration in **Table C1**.

Table C1 **RCS Reheat Duration Thresholds**		
RCS	**Containment Closure**	**Duration**
Intact (but not RCS Lowered Inventory)	N/A	60 minutes*
Not intact or RCS Lowered Inventory	Established	20 minutes*
	Not Established	0 minutes
* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, the EAL is not applicable.		

OR

Note: EAL #2 does not apply in solid plant conditions.

2. An UNPLANNED event results in RCS pressure rise > 10 psi due to a loss of RCS cooling.

Deviations:

None.

Differences:

NEI 99-01 **CA4** is renumbered to ANO **CA3** for formatting purposes based on site preference for order of ICs alone.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: CA3

Loss of all Off-site and all On-Site AC power to emergency busses for 15 minutes or longer

Operating Mode Applicability: Cold Shutdown
Refueling
Defueled

Example Emergency Action Level:

Note: The Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.

1. Loss of all Off-Site and all On-Site AC Power to (site-specific emergency busses) for 15 minutes or longer.

ANO: CA5

Loss of all offsite and all onsite AC power to Vital 4.16KV busses ≥ 15 minutes

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)
Defueled

Emergency Action Level(s):

Note: *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. Loss of all offsite and all onsite AC power to Vital 4.16KV busses ≥ 15 minutes.

Deviations:

None.

Differences:

NEI 99-01 **CA3** is renumbered to ANO **CA5** for formatting purposes based on site preference for order of ICs alone.

The site-specific term “Vital 4.16KV” is used in the IC and EAL to define emergency busses.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: CS1

Loss of RCS/RPV inventory affecting core decay heat removal capability

Operating Mode Applicability: Cold Shutdown
Refueling

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

Note: The Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.

1. With CONTAINMENT CLOSURE not established, RCS/RPV level less than (site-specific level).

   [*6" below the bottom ID of the RCS loop (PWR)*]

   [*6" below the low-low Emergency Core Cooling System (ECCS) actuation setpoint (BWR)*]

   OR

2. With CONTAINMENT CLOSURE established, RCS/RPV level less than (site-specific level for the top of active fuel (TOAF)).

   OR

3. RCS/RPV level cannot be monitored for 30 minutes or longer with a loss of RCS/RPV inventory as indicated by **ANY** of the following:

   - (Site-specific radiation monitor) reading greater than (site-specific value).
   - Erratic Source Range Monitor Indication.
   - Unexplained level rise in (site-specific sump or tank).

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: CS1

Loss of RCS / reactor vessel inventory affecting core decay heat removal capability

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

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

Note: *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. With CONTAINMENT CLOSURE **not** established:

   Unit 1: Reactor Vessel Level Monitor System (RVLMS) Levels 1 through 9 indicate DRY

   Unit 2: RVLMS Levels 1 through 6 indicate DRY

   OR

2. With CONTAINMENT CLOSURE established, core exit thermocouples (CETs) indicate superheat.

   OR

3. RCS / reactor vessel level cannot be monitored for ≥ 30 minutes with a loss of RCS / reactor vessel inventory as indicated by any of the following:

   - Containment High Range Radiation Monitor reading >10 R/hr
   - Erratic source range monitor indication
   - Unexplained level rise in Reactor Building Sump, Reactor Drain Tank, Quench Tank, Aux. Building Equipment Drain Tank, or Aux. Building Sump.

Deviations:

None.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: CS1 (Cont'd)

Differences:

The ANO units do not have the capability to monitor reactor vessel level at or below the top of active fuel and, therefore, superheat indication on core exit thermocouples (CETs) is used for EAL #2. CET superheat is used to indicate the level below the top of active fuel and core uncovery. As level falls below the top of active fuel, CETs will begin to indicate superheat conditions. This difference of using CET superheat rather than an actual level indication corresponding to the NEI EAL is due to plant design. The treatment of this EAL provides a logic path consistent with a Site Area Emergency in that the RCS level drop indicates a loss of the RCS barrier and the superheat condition indicates a potential loss (or loss) of the fuel clad barrier. Escalation to a General Emergency occurs if containment closure is not established or other indications of containment barrier loss or potential loss exist. The plant's cold shutdown RCS level monitoring capability represents the same technical capability as that for the NEI 99-01, Revision 4, based ANO EAL scheme that was previously approved by NRC in a letter dated October 6, 2005 (ADAMS Accession No. ML052720568). The current proposed use of the CET superheat indication in CS1 is consistent with the use of this indication in CG1 in the approved EAL scheme.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: CG1

Loss of RCS/RPV inventory affecting fuel clad integrity with containment challenged

Operating Mode Applicability: Cold Shutdown
Refueling

Example Emergency Action Level: (1 or 2)

Note: The Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.

1. a. RCS/RPV level less than (site-specific level for TOAF) for 30 minutes or longer.

   AND

   b. **ANY** containment challenge indication (see Table):

2. a. RCS/RPV level cannot be monitored with core uncovery indicated by **ANY** of the following for 30 minutes or longer.

   - (Site-specific radiation monitor) reading greater than (site-specific setpoint)
   - Erratic source range monitor indication
   - UNPLANNED level rise in (site-specific sump or tank)
   - *[Other site-specific indications]*

   AND

   b. **ANY** containment challenge indication (see Table):

Table: Containment Challenge Indications
• CONTAINMENT CLOSURE not established. • (Site-specific explosive mixture) inside containment. • UNPLANNED rise in containment pressure. • Secondary containment radiation monitor reading above (site-specific value). [*BWR only*]

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: CG1

Loss of RCS / reactor vessel inventory affecting fuel clad integrity with containment challenged

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

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

Note: *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. a. Core Exit Thermocouples indicate superheat for ≥ 30 minutes.

   AND

   b. Any of the following containment challenge indications:

   - CONTAINMENT CLOSURE not established
   - Explosive mixture inside containment
   - UNPLANNED rise in containment pressure

OR

2. a. RCS / reactor vessel level cannot be monitored with core uncovery indicated by any of the following for ≥ 30 minutes:

   - Containment High Range Radiation Monitor reading > 10R/hr
   - Erratic source range monitor indication
   - Unexplained level rise in Reactor Building Sump, Reactor Drain Tank, Quench Tank, Auxiliary Building Equipment Drain Tank, or Auxiliary Building Sump

   AND

   b. Any of the following containment challenge indications:

   - CONTAINMENT CLOSURE not established
   - Explosive mixture inside containment
   - UNPLANNED rise in containment pressure

Deviations:

None.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: CG1 (Cont'd)

Differences:

The ANO units do not have the capability to monitor reactor vessel level at or below the top of active fuel and therefore uses superheat indication on CETs for EAL #1. CET superheat is used to indicate level below the top of active fuel and core uncovery. As level falls below the top of active fuel, CETs will begin to indicate superheat conditions. This difference of using CET superheat rather than an actual level indication corresponding to the NEI EAL is because of plant design. The plant's cold shutdown RCS level monitoring capability represents the same technical capability as that for the NEI 99-01, Revision 4, based ANO EAL scheme that was previously approved by NRC in a letter dated October 6, 2005 (ADAMS Accession No. ML052720568). The current proposed use of the CET superheat indication, though formatted differently, is consistent with its use in the previously approved EAL scheme.

The term "unexplained" is used instead of "UNPLANNED" for the level rise indication in the third bullet of EAL 2.a. This is the same term used by NEI 99-01 for the Site Area Emergency (SAE) condition. If level rise cannot be explained, then it encompasses the term "UNPLANNED" and therefore meets the NEI intent.

A table is not used to present the containment challenge indications for EALs 1 and 2.b. The NEI indications are presented in bullet format with all NEI content retained in the ANO EAL.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: E-HU1

Damage to a loaded cask CONFINEMENT BOUNDARY

Operating Mode Applicability: Not applicable

Example Emergency Action Level:

1. Damage to a loaded cask CONFINEMENT BOUNDARY.

ANO: E-HU1

Damage to a loaded cask CONFINEMENT BOUNDARY

Operating Mode Applicability: All

Emergency Action Level(s):

1. Damage to a loaded cask CONFINEMENT BOUNDARY.

Deviations:

None.

Differences:

An operating mode applicability of “all” is used vice the NEI designation of “N/A.” The net effect is that this event is applicable regardless of operating mode and therefore, the same as the NEI intent.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: FU1

ANY Loss or ANY Potential Loss of Containment

Operating Mode Applicability: Power Operations
Startup
Hot Standby
Hot Shutdown

ANO: FU1

ANY loss or ANY potential loss of containment

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

Deviations:

None.

Differences:

None.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: FA1

ANY Loss or ANY Potential Loss of EITHER Fuel Clad OR RCS

Operating Mode Applicability: Power Operations
Startup
Hot Standby
Hot Shutdown

ANO: FA1

ANY loss or ANY potential loss of EITHER fuel clad or RCS

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

Deviations:

None.

Differences:

None.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: FS1

Loss or Potential Loss of ANY Two Barriers

Operating Mode Applicability: Power Operations
Startup
Hot Standby
Hot Shutdown

ANO: FS1

Loss or potential loss of ANY two barriers

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

Deviations:

None.

Differences:

None.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: FG1

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

Operating Mode Applicability: Power Operations
Startup
Hot Standby
Hot Shutdown

ANO: FG1

Loss of ANY two barriers AND loss or potential Loss of the third barrier

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

Deviations:

None.

Differences:

None.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: FUEL CLAD BARRIER

Fuel Clad Barrier Thresholds	
LOSS	**POTENTIAL LOSS**
1. Critical Safety Function Status	
A. Core Cooling – Red Entry Conditions Met	A. Core Cooling – Orange Entry Conditions Met **OR** B. Heat Sink – Red Entry Conditions Met
OR	
2. Primary Coolant Activity Level	
A. Coolant activity greater than (site-specific) value	Not Applicable
OR	
3. Core Exit Thermocouple Readings	
A. Core exit thermocouples reading greater than (site-specific °F)	A. Core exit thermocouples reading greater than (site-specific °F)
OR	
4. Reactor Vessel Water Level	
Not Applicable	A. RCS/RPV level less than (site-specific level for TOAF)
OR	
5. Not Applicable	
Not Applicable	Not Applicable
OR	
6. Containment Radiation Monitoring	
A. Containment radiation monitor reading greater than (site-specific value)	Not Applicable
OR	
7. Other Site-Specific Indications	
A. (site-specific) as applicable	A. (site-specific) as applicable
OR	
8. Emergency Director Judgment	
A. Any condition in the opinion of the Emergency Director that indicates Loss of the Fuel Clad Barrier	A. Any condition in the opinion of the Emergency Director that indicates Potential Loss of the Fuel Clad Barrier

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: FUEL CLAD BARRIER

Fuel Clad Barrier EALs	
LOSS	**POTENTIAL LOSS**
1. Safety Function Status (FCB1)	
Not Applicable	Not Applicable
1. Primary Activity Level (FCB1)	
1. Coolant activity > 300 µCi/gm dose equivalent I-131 activity by Chemistry sample **OR** 2. Radiation levels > 1000 MR/hr **Unit 1:** at SA-229 **Unit 2:** at 2TCD-19	None
2. Core Exit Thermocouple Readings (FCB2)	
> 1200 °F CET temperature	**Unit 1:** Inadequate Core Cooling (ICC) exists as evidenced by CETs indicating superheated conditions **Unit 2:** Average CETs indicate superheat for current RCS pressure
3. Reactor Vessel Water Level (FCB3)	
None	**Unit 1:** RVLMS Levels 1 through 9 indicate DRY **Unit 2:** RVLMS Levels 1 through 7 indicate DRY
4. Containment Radiation Monitoring (FCB4)	
Containment high range radiation monitor reading > 1000 R/hr	None
5. Core Damage Assessment (FCB5)	
At least 5% fuel clad damage as determined from core damage assessment	None
6. Emergency Director Judgment (FCB6)	
Any condition in the opinion of the SM / TSC Director / EOF Director that indicates Loss or Potential Loss of the Fuel Clad Barrier	

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: FUEL CLAD BARRIER (Cont'd)

Deviations:

None.

Differences:

EALs for Unit 1 and Unit 2 that correspond to the Critical Safety Function Status Trees (CSFSTs) included in the NEI 99-01, Revision 5, EALs are not provided. Unit 1 (a B&W plant) does not have a Safety Function process similar to that of Westinghouse units (which are included in the NEI 99-01, Revision 5, example EALs).

Unit 2 (a CE plant) does have methodologies similar to CSFSTs with some differences. Unit 2 performs Standard Post Trip Actions (SPTA) and verifies the status of its Safety Functions (Reactivity, Vital Auxiliaries, RCS Inventory, RCS Pressure, Core Heat Removal, RCS Heat Removal, & Containment) upon any reactor trip. An evaluation is made of each of the seven Safety Functions comparing plant response and critical parameters to standard, expected values. Each Safety Function is then marked on a tracking sheet as "SATISIFIED" or "NOT SATISIFIED." If any Safety Function is not satisfied, the condition is announced to the Control Room staff and a diagnostic flow chart is referenced to determine the proper Optimal Recovery Procedure (ORP) to enter. The diagnostic flowchart may direct the Operator to an ORP or to the Functional Recovery Procedure (FRP). The intent of this diagnostic action is to direct the Operator to the ORPs for a single event, and to the FRP for multiple events. Each ORP contains Safety Function Status Checks (SFSC) which are performed every 15 minutes. These checks ensure the Operator's utilization of the ORP is properly addressing plant critical parameters. If the SFSC is not met then the FRP is entered. Criteria for FRP entry is:

1. ANY event in progress which can NOT be diagnosed as a single event.
2. Actions taken have NOT satisfied SFSC acceptance criteria.
3. Entry is directed by Diagnostic Actions.

While all ORPs have SFSC criteria for all Safety Functions, all ORP acceptance criteria are not the same. For example; the SFSC criteria required to SATISIFY the requirements for RCS Heat Removal (a Safety Function) is different in the SPTAs than in Loss of Coolant Accident (LOCA) ORP, which is different than those contained in the Steam Generator Tube Rupture (SGTR) ORP, which is different than those in the Loss of Feedwater (LOF) ORP, and so on.

To compare NEI 99-01 Safety Function intent with that of Unit 2 above, a Loss of Offsite Power (LOOP) event is correctly classified per NEI 99-01 as System Malfunction – Loss of AC Power (SU1), "Loss of all offsite AC power to Vital 4.16 KV busses ≥ 15 minutes." This event is correctly classified as a NUE. However, a LOOP results in the loss of the operating Reactor Coolant Pumps due to loss of non-vital power sources. During performance of the SPTAs, the Core Heat Removal Safety Function will be assessed as "NOT SATISIFIED." If NEI 99-01, Fission Product Barrier Malfunction – Barriers, is referenced, FCB1 would be applicable and the event would require declaration of an ALERT.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: FUEL CLAD BARRIER (Cont'd)

Differences (Cont'd):

Entergy believes erroneous classification of a standard NUE condition as a ALERT is inappropriate. Natural circulation of the reactor coolant provides adequate core cooling and no significant challenge to the core heat removal functions are expected to occur. Other EALs are referenced when plant conditions change or degrade. The remaining EALs used in the Fuel Clad Barrier (FCB) section provide the Operators with the necessary information to classify events appropriately based on the actual coolant temperatures, pressures, vessel level, margin-to-sat values, etc., without the need for a reference to Safety Functions.

In summary, the ORP SFSC criteria were not established to meet EAL classification requirements. The SFCSs ensure Safety Function status is verified and updated at regular intervals so that changes in plant conditions may be recognized promptly and to enable trending of plant parameters important to safety. Based on the above, Entergy proposes to not adopt the use of Safety Functions in the Fuel Clad Barrier EAL. Subsequently, the NEI 99-01 FCBs are renumbered in the ANO EALs for formatting purposes based on the non-use of the Safety Function Status FCB criteria.

NEI provides a developer's note indicating that radiation levels observed on a sample may also be used for the primary coolant activity level EAL. Radiation levels are provided at one foot from the sample lines for this value. This is an equivalent use of the developer's note on sample radiation levels.

Additional bases information for CET temperature readings are provided to assist the decision maker in relating the associated potential losses and losses for all three fission product barriers.

ANO differs from NEI 99-01 guidance in that the potential loss reactor vessel level EAL does not represent the top of active fuel (TOAF) level, but a level above it. The RVLMS at ANO does not provide positive indication of core uncovery. The above core level indication provided is used to monitor the approach to and recovery from Inadequate Core Cooling conditions, but the CETs are used to identify core uncovery and are the only positive indication of core uncovery. The ANO EAL represents the lowest point that can be monitored that is above the top of active fuel. This difference represents an appropriately conservative value that continues to indicate a significant challenge in the ability to adequately cool the fuel cladding, is readily observable to the operators, and represents the lowest level that can be measured using installed instrumentation in the reactor vessel. Therefore, this difference is in accordance with plant design.

Site-specific detail is provided in the bases for RVLMS.

An additional EAL labeled "core damage assessment (ANO FCB5)" is provided where NEI provides for "other indications."

The Fuel Clad Barrier EALs are not provided in a table in the Basis Document. The EALs are presented as text. A table is used in the EAL Matrix document.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: RCS BARRIER

RCS Barrier Example Thresholds	
LOSS	**POTENTIAL LOSS**
1. Critical Safety Function Status	
Not Applicable	A. RCS Integrity – Red Entry Conditions Met **OR** B. Heat Sink – Red Entry Conditions Met
OR	
2. RCS Leak Rate	
A. RCS leak rate greater than available makeup capacity as indicated by a loss of RCS subcooling	B. RCS leak rate indicated greater than (site-specific capacity of once charging pump in the normal charging mode) with Letdown isolated
OR	
3. Not Applicable	
Not Applicable	Not Applicable
OR	
4. SG Tube Rupture	
A. RUPTURED Steam Generator (SG) results in an ECCS (SI) actuation	Not Applicable
OR	
5. Not Applicable	
Not Applicable	Not Applicable
OR	
6. Containment Radiation Monitoring	
A. Containment radiation monitor reading greater than (site-specific value)	Not Applicable
OR	
7. Other Site-Specific Indications	
A. (site-specific) as applicable	A. (site-specific) as applicable
8. Emergency Director Judgment	
A. Any condition in the opinion of the Emergency Director that indicates Loss of the RCS Barrier	A. Any condition in the opinion of the Emergency Director that indicates Potential Loss of the RCS Barrier

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: RCS BARRIER

RCS Barrier EALs	
LOSS	**POTENTIAL LOSS**
1. Safety Function Status (RCB1)	
Not Applicable	Not applicable
1. RCS Leak Rate (RCB1)	
RCS leak rate > available makeup capacity as indicated by: **Unit 1:** Loss of adequate subcooling margin **Unit 2:** RCS subcooling (margin-to-saturation or MTS) can NOT be maintained at least 30 °F	**Unit 1:** UNISOLABLE RCS leak > 50 gpm with Letdown isolated **Unit 2:** UNISOLABLE RCS leak > 44 gpm with Letdown isolated
2. SG Tube Rupture (RCB2)	
Steam Generator Tube Rupture (SGTR) that results in an ECCS Safety Injection (SI) actuation	None
3. Containment Radiation Monitoring (RCB3)	
Containment high range radiation monitor reading > 100 R/hr	None
4. Emergency Director Judgment (RCB4)	
Any condition in the opinion of the SM / TSC Director / EOF Director that indicates Loss or Potential Loss of the RCS Barrier.	

Deviations:

None.

Differences:

EALs for Unit 1 and Unit 2 that correspond to the Critical Safety Function Status Trees (CSFSTs) included in the NEI 99-01, Revision 5, EALs are not provided. Unit 1 (a B&W plant) does not have a Safety Function process similar to that of Westinghouse units (which are included in the NEI 99-01, Revision 5, example EALs).

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: RCS BARRIER (Cont'd)

Differences (cont'd):

Unit 2 (a CE plant) does have methodologies similar to CSFSTs with some differences. Unit 2 performs Standard Post Trip Actions (SPTA) and verifies the status of its Safety Functions (Reactivity, Vital Auxiliaries, RCS Inventory, RCS Pressure, Core Heat Removal, RCS Heat Removal, & Containment) upon any reactor trip. An evaluation is made of each of the seven Safety Functions comparing plant response and critical parameters to standard, expected values. Each Safety Function is then marked on a tracking sheet as "SATISIFIED" or "NOT SATISIFIED." If any Safety Function is not satisfied, the condition is announced to the Control Room staff and a diagnostic flow chart is referenced to determine the proper Optimal Recovery Procedure (ORP) to enter. The diagnostic flowchart may direct the Operator to an ORP or to the Functional Recovery Procedure (FRP). The intent of this diagnostic action is to direct the Operator to the ORPs for a single event, and to the FRP for multiple events. Each ORP contains Safety Function Status Checks (SFSC) which are performed every 15 minutes. These checks ensure the Operator's utilization of the ORP is properly addressing plant critical parameters. If the SFSC is not met then the FRP is entered. Criteria for FRP entry is:

1. ANY event in progress which can NOT be diagnosed as a single event.
2. Actions taken have NOT satisfied SFSC acceptance criteria.
3. Entry is directed by Diagnostic Actions.

While all ORPs have SFSC criteria for all Safety Functions, all ORP acceptance criteria are not the same. For example; the SFSC criteria required to SATISIFY the requirements for RCS Heat Removal (a Safety Function) is different in the SPTAs than in Loss of Coolant Accident (LOCA) ORP, which is different than those contained in the Steam Generator Tube Rupture (SGTR) ORP, which is different than those in the Loss of Feedwater (LOF) ORP, and so on.

To compare NEI 99-01 Safety Function intent with that of Unit 2 above, a Loss of Offsite Power (LOOP) event is correctly classified per NEI 99-01 as System Malfunction – Loss of AC Power (SU1), "Loss of all offsite AC power to Vital 4.16 KV busses ≥ 15 minutes." This event is correctly classified as a NUE. However, a LOOP results in the loss of the operating Reactor Coolant Pumps due to loss of non-vital power sources. During performance of the SPTAs, the Core Heat Removal Safety Function will be assessed as "NOT SATISIFIED." If NEI 99-01, Fission Product Barrier Malfunction – Barriers, is referenced, FCB1 would be applicable and the event would require declaration of an ALERT.

Entergy believes erroneous classification of a standard NUE condition as a ALERT is inappropriate. Natural circulation of the reactor coolant provides adequate core cooling and no significant challenge to the core heat removal functions are expected to occur. Other EALs are referenced when plant conditions change or degrade. The remaining EALs used in the RCS Barrier (RCB) section provide the Operators with the necessary information to classify events appropriately based on the actual radiation levels, RCS leakage, margin-to-sat values, etc., without the need for a reference to Safety Functions.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: RCS BARRIER (Cont'd)

Differences (cont'd):

In summary, the ORP SFSC criteria were not established to meet EAL classification requirements. The SFCSs ensure Safety Function status is verified and updated at regular intervals so that changes in plant conditions may be recognized promptly and to enable trending of plant parameters important to safety. Based on the above, Entergy proposes to not adopt the use of Safety Functions in the RCS Barrier EAL. Subsequently, the NEI 99-01 RCBs are renumbered in the ANO EALs for formatting purposes based on the non-use of the Safety Function Status RCB criteria.

The ANO Unit 2 design uses three positive displacement charging pumps for normal RCS makeup. The plant design specifics of the positive displacement pump is that the flow from a charging pump is not variable, but provides 44 gpm discrete flow and flow rises or lowers based on the number of pumps in service. Therefore, ANO uses 44 gpm for the EAL vice the NEI 99-01 developer's note guidance of 50 gpm for plants with low capacity charging pumps. The use of this 44 gpm value supports the NEI basis statement that "additional charging pumps being required is indicative of a substantial RCS leak."

The term "loss of adequate subcooling margin" is used for Unit 1 and the inability to maintain RCS subcooling at least 30 °F for Unit 2 to indicate a loss of subcooling.

The term "unisolable" is included for the potential loss RCS leakage description for consistency of EAL application. Use of this term provides clarity and does not alter intent.

Site-specific detail in the bases is provided to describe makeup systems and to clarify the indications for RCS leakage potential loss.

The term "SGTR" for steam generator tube rupture instead of the NEI term "RUPTURED SG" is used. "SGTR" is a term readily recognized by the Operations staff and has the same meaning as the NEI term.

The EALs refer to the ECCS (SI) actuation for ANO RCB2 indicator as being caused either manually or automatically in the bases to clarify the information presented.

Site-specific information is provided in the bases regarding containment high range monitor readings during the initial fifteen minutes after a thermal event.

Additional EALs that represent a loss or potential loss of the RCS barrier were not identified for inclusion in the EAL scheme for this IC. A review of EOPs and station procedures was performed to ensure additional EAL thresholds should not be considered in the "Other" category. This conforms to NEI guidance because an appropriately diverse mix of EALs is provided and the NEI 99-01 guidance does not specify that any particular additional EALs be provided, but specifies "as applicable."

The Reactor Coolant Barrier EALs are not provided in a table in the Basis Document. The EALs are presented as text. A table is used in the EAL Matrix document.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: CONTAINMENT BARRIER

Containment Barrier Example Thresholds	
LOSS	**POTENTIAL LOSS**
1. Critical Safety Function Status	
Not Applicable	A. Containment – Red Entry Conditions Met
OR	
2. Containment Pressure	
A. A containment pressure rise followed by a rapid unexplained drop in containment pressure **OR** B. Containment pressure or sump level response not consistent with Loss of Coolant Accident (LOCA) conditions	A. Containment pressure greater than (site-specific value) and rising **OR** B. Explosive mixture exists inside containment **OR** C. a. Pressure greater than containment depressurization actuation setpoint **AND** b. Less than one full train of depressurization equipment operating
OR	
3. Core Exit Thermocouple Readings	
Not Applicable	A. a. Core exit thermocouples in excess of (site-specific) °F **AND** b. Restoration procedures not effective within 15 minutes **OR** B. a. Core exit thermocouples in excess of (site-specific) °F **AND** b. Reactor vessel level below (site-specific level) **AND** c. Restoration procedures not effective within 15 minutes
OR	

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: CONTAINMENT BARRIER (Cont'd)

Containment Barrier Example Thresholds	
LOSS	**POTENTIAL LOSS**
4. SG Secondary Side Release With P-to -S Leakage	
A. RUPTURED SG is also FAULTED outside of containment **OR** B. a. Primary-to-Secondary leakrate greater than 10 gpm **AND** b. UNISOLABLE steam release from affected SG to the environment	Not Applicable
OR	
5. Containment Isolation Failure or Bypass	
A. a. Failure of all valves in any one line to close **AND** b. Direct downstream path to the environment exists after containment isolation signal	Not Applicable
OR	
6. Containment Radiation Monitoring	
Not Applicable	A. Containment radiation monitor reading greater than (site-specific value)
OR	
7. Other Site-Specific) Indications	
A. (site-specific) as applicable	A. (site-specific) as applicable
OR	
8. Emergency Director Judgment	
A. Any condition in the opinion of the Emergency Director that indicates Loss of the Containment Barrier	A. Any condition in the opinion of the Emergency Director that indicates Potential Loss of the Containment Barrier

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: CONTAINMENT BARRIER

Containment Barrier EALs	
LOSS	**POTENTIAL LOSS**
1. Safety Function Status (CNB1)	
Not Applicable	Not applicable
1. Containment Pressure (CNB1)	
1. Rapid unexplained drop in containment pressure following an initial rise in containment pressure **OR** 2. Containment pressure or sump level response not consistent with LOCA conditions	1. **Unit 1**: Containment pressure 73.7 PSIA (59 PSIG) and rising **Unit 2**: Containment pressure 73.7 PSIA and rising (59 PSIG) **OR** 2. Explosive mixture exists inside Containment **OR** 3. a. Containment Pressure > containment spray actuation setpoint **Unit 1:** 44.7 PSIA (30 PSIG) **Unit 2:** 23.3 PSIA (8.6 PSIG) **AND** b. LESS THAN one full train of spray operating
2. Core Exit Thermocouple Readings (CNB2)	
None	1. a. CETs indicate > 1200 °F **AND** b. Restoration procedures not effective within 15 minutes **OR** 2. a. CETs indicate > 700 °F **AND** b. RVLMS indicates: **Unit 1:** Levels 1 through 9 DRY **Unit 2:** Levels 1 through 7 DRY **AND** c. Restoration procedures not effective within 15 minutes

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: CONTAINMENT BARRIER (Cont'd)

<table>
<tr><th colspan="2">Containment Barrier EALs</th></tr>
<tr><th>LOSS</th><th>POTENTIAL LOSS</th></tr>
<tr><td colspan="2"><u>3. SG Secondary Side Release With Primary-to-Secondary Leakage (CNB3)</u></td></tr>
<tr><td>1. RUPTURED steam generator is also FAULTED outside of Containment
OR
2. a. Primary-to-secondary leakrate >10 gpm
AND
b. UNISOLABLE steam release from affected steam generator to the environment</td><td>None</td></tr>
<tr><td colspan="2"><u>4. Containment Isolation Failure or Bypass (CNB4)</u></td></tr>
<tr><td>1. UNISOLABLE breach of containment
AND
2. Direct downstream pathway to the environment exists after containment isolation signal</td><td>None</td></tr>
<tr><td colspan="2"><u>5. Containment Radiation Monitoring (CNB5)</u></td></tr>
<tr><td>None</td><td>Containment high range radiation monitor reading > 4000 R/hr</td></tr>
<tr><td colspan="2"><u>6. Other Indications (CNB6)</u></td></tr>
<tr><td colspan="2">Elevated readings on the following radiation monitors that indicate loss or potential loss of the Containment barrier:
<table>
<tr><th colspan="2">MONITORS – Unit 1</th><th colspan="2">MONITORS – UNIT 2</th></tr>
<tr><td>RX-9820</td><td>Containment Purge</td><td>2RX-9820</td><td>Containment Purge</td></tr>
<tr><td>RX-9825</td><td>Radwaste Area</td><td>2RX-9825</td><td>Radwaste Area</td></tr>
<tr><td>RX-9830</td><td>Fuel Handling Area</td><td>2RX-9830</td><td>Fuel Handling Area</td></tr>
<tr><td>RX-9835</td><td>Emergency Penetration Room</td><td>2RX-9835</td><td>Emergency Penetration Room</td></tr>
<tr><td></td><td></td><td>2RX-9840</td><td>Post Accident Sampling Building</td></tr>
</table></td></tr>
<tr><td colspan="2"><u>7. Emergency Director Judgment (CNB7)</u></td></tr>
<tr><td colspan="2">Any condition in the opinion of the SM / TSC Director / EOF Director that indicates Loss or Potential Loss of the Containment Barrier</td></tr>
</table>

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: CONTAINMENT BARRIER (Cont'd)

Deviations:

None.

Differences:

EALs for Unit 1 and Unit 2 that correspond to the Critical Safety Function Status Trees (CSFSTs) included in the NEI 99-01, Revision 5, EALs are not provided. Unit 1 (a B&W plant) does not have a Safety Function process similar to that of Westinghouse units (which are included in the NEI 99-01, Revision 5, example EALs).

Unit 2 (a CE plant) does have methodologies similar to CSFSTs with some differences. Unit 2 performs Standard Post Trip Actions (SPTA) and verifies the status of its Safety Functions (Reactivity, Vital Auxiliaries, RCS Inventory, RCS Pressure, Core Heat Removal, RCS Heat Removal, & Containment) upon any reactor trip. An evaluation is made of each of the seven Safety Functions comparing plant response and critical parameters to standard, expected values. Each Safety Function is then marked on a tracking sheet as "SATISIFIED" or "NOT SATISIFIED." If any Safety Function is not satisfied, the condition is announced to the Control Room staff and a diagnostic flow chart is referenced to determine the proper Optimal Recovery Procedure (ORP) to enter. The diagnostic flowchart may direct the Operator to an ORP or to the Functional Recovery Procedure (FRP). The intent of this diagnostic action is to direct the Operator to the ORPs for a single event, and to the FRP for multiple events. Each ORP contains Safety Function Status Checks (SFSC) which are performed every 15 minutes. These checks ensure the Operator's utilization of the ORP is properly addressing plant critical parameters. If the SFSC is not met then the FRP is entered. Criteria for FRP entry is:

1. ANY event in progress which can NOT be diagnosed as a single event.
2. Actions taken have NOT satisfied SFSC acceptance criteria.
3. Entry is directed by Diagnostic Actions.

While all ORPs have SFSC criteria for all Safety Functions, all ORP acceptance criteria are not the same. For example; the SFSC criteria required to SATISIFY the requirements for RCS Heat Removal (a Safety Function) is different in the SPTAs than in Loss of Coolant Accident (LOCA) ORP, which is different than those contained in the Steam Generator Tube Rupture (SGTR) ORP, which is different than those in the Loss of Feedwater (LOF) ORP, and so on.

To compare NEI 99-01 Safety Function intent with that of Unit 2 above, a Loss of Offsite Power (LOOP) event is correctly classified per NEI 99-01 as System Malfunction – Loss of AC Power (SU1), "Loss of all offsite AC power to Vital 4.16 KV busses ≥ 15 minutes." This event is correctly classified as a NUE. However, a LOOP results in the loss of the operating Reactor Coolant Pumps due to loss of non-vital power sources. During performance of the SPTAs, the Core Heat Removal Safety Function will be assessed as "NOT SATISIFIED." If NEI 99-01, Fission Product Barrier Malfunction – Barriers, is referenced, FCB1 would be applicable and the event would require declaration of an ALERT.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: CONTAINMENT BARRIER (Cont'd)

Differences (cont'd):

Entergy believes erroneous classification of a standard NUE condition as a ALERT is inappropriate. Natural circulation of the reactor coolant provides adequate core cooling and no significant challenge to the core heat removal functions are expected to occur. Other EALs are referenced when plant conditions change or degrade. The remaining EALs used in the Containment Barrier (CNB) section provide the Operators with the necessary information to classify events appropriately based on the actual radiation levels, reactor vessel level, containment pressure, etc., without the need for a reference to Safety Functions.

In summary, the ORP SFSC criteria were not established to meet EAL classification requirements. The SFCSs ensure Safety Function status is verified and updated at regular intervals so that changes in plant conditions may be recognized promptly and to enable trending of plant parameters important to safety. Based on the above, Entergy proposes to not adopt the use of Safety Functions in the Containment Barrier EAL. Subsequently, the NEI 99-01 CNBs are renumbered in the ANO EALs for formatting purposes based on the non-use of the Safety Function Status CNB criteria.

The wording "rapid unexplained drop in containment pressure following an initial rise in containment pressure" is utilized vice the NEI (inverse) wording of "a containment pressure rise followed by a rapid unexplained drop in containment pressure." This revised wording is provided for clarity and has the same meaning as the NEI wording.

Additional basis information is provided to describe the existence of an explosive mixture inside containment.

Additional site-specific basis information is provided to describe the NUE condition related to RCS leakage for SG secondary side release with primary-to-secondary leakage.

Additional basis information is provided for containment isolation failure or bypass that addresses the valve failure EAL (threshold) criteria in NEI 99-05 and clarifies classification as it relates to attempted isolation from the Control Room.

Broader terminology for ANO CNB4 other than limiting the condition to isolation valves is used. This meets the NEI 99-01 intent because the NEI condition is bounded by the EAL chosen for ANO and the basis information is unchanged.

Basis information is added for containment radiation monitoring that states that the value provided represents in itself indication for a General Emergency classification because the value also exceeds the loss EALs for fuel clad and RCS.

Other indications of the loss of the containment barrier based on radiation monitor readings are provided.

The Containment Barrier EALs are not provided in a table in the Basis Document. The EALs are presented as text. A table is used in the EAL Matrix document.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: HU4

Confirmed SECURITY CONDITION or threat which indicates a potential degradation in the level of safety of the plant

Operating Mode Applicability: All

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

1. A SECURITY CONDITION that does NOT involve a HOSTILE ACTION as reported by the (site-specific security shift supervision).

2. A credible site-specific security threat notification.

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

ANO: HU1

Confirmed SECURITY CONDITION or threat which indicates a potential degradation in the level of safety of the plant

Operating Mode Applicability: All

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

1. A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by ANO Security Shift Supervision.

   OR

2. A credible site-specific security threat notification.

   OR

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

Deviations:

None.

Differences:

NEI 99-01 **HU4** is renumbered to ANO **HU1** for formatting purposes based on site preference for order of ICs alone.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: HU5

Other conditions exist which in the judgment of the Emergency Director warrant declaration of a NOUE.

Operating Mode Applicability: All

Example Emergency Action Level:

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

ANO: HU2

Other conditions exist which in the judgment of the SM warrant declaration of an NUE

Operating Mode Applicability: All

Emergency Action Level(s):

1. Other conditions exist which in the judgment of the SM 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.

Deviations:

None.

Differences:

NEI 99-01 **HU5** is renumbered to ANO **HU2** for formatting purposes based on site preference for order of ICs alone.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: HU2

FIRE within the PROTECTED AREA not extinguished within 15 minutes of detection or EXPLOSION within the PROTECTED AREA

Operating Mode Applicability: All

Example Emergency Action Level: (1 or 2)

Note: The Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the duration has exceeded, or will likely exceed, the applicable time.

1. FIRE not extinguished within 15 minutes of control room notification or verification of a control room FIRE alarm in **ANY** of the following areas:

   (site-specific area list)

2. EXPLOSION within the PROTECTED AREA.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: HU4

FIRE within the PROTECTED AREA not extinguished within 15 minutes of detection or EXPLOSION within the PROTECTED AREA

Operating Mode Applicability: All

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

Note: *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the duration has exceeded, or will likely exceed, the applicable time.*

1. FIRE in any **Table H1** structure or area not extinguished 1) within 15 minutes of Control Room notification or 2) within 15 minutes of verification of a Control Room FIRE alarm.

Table H1	
Unit 1	**Unit 2**
CA-1 & HP Office Area	2A3 Room
Condensate Demineralizer Room	2A4, 2D02, & East Battery Room
Corridor 98	2B53 Room
Fire Area C	2B63 Room
Lower North Electrical Penetration Room (LNEPR)	2B9/2B10 Room
Lower South Electrical Equipment Room (LSEER) / Air Compressor Room	2Y11/13 Equipment Room
Lower South Electrical Penetration Room (LSEPR)	Auxiliary Building 317’ General Access
Lower South Piping Penetration Room (LSPPR)	Auxiliary Building 335'
Main Steam Isolation Violation (MSIV) Room	Auxiliary Building 354'
North Engineered Safeguards (ES) SWGR Room (A4)	‘B’ Engineered Safeguards Features (ESF) Room
South ES SWGR Room	Corridor Behind Door 340
Turbine Building • A1, A2, H1, H2 SWGR area • 354' Bowling Alley north end west of Breathing Air compressor room • 368' West Heater Deck from LSEER (orange door) along east wall of ES SWGR Rooms to Corridor 98 door	Turbine Building • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north Switchgear (SWGR) Room (2A3) and East of LNEPR
Upper North Electrical Penetration Room (UNEPR) / Hot Tool Room / Decon Room	Intake Structure 354' or 366'
Upper South Electrical Penetration Room (USEPR)	LNEPR
Upper South Piping Penetration Room (USPPR)	LSEPR
	Motor-Generator (MG) Set Room
	Steam Pipe Area
	Hot Machine Shop
	UNEPR, UNPPR, LNPPR, USPPR

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ANO: HU4 (Cont'd)

OR

2. EXPLOSION within the PROTECTED AREA.

Deviations:

None.

Differences:

NEI 99-01 **HU2** is renumbered to ANO **HU4** for formatting purposes based on site preference for order of ICs alone.

Site-specific areas for EAL #1 are presented in a table and the table is referenced causing a minor difference in EAL language from that in NEI 99-01.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: HU3

Release of toxic, corrosive, asphyxiant, or flammable gases deemed detrimental to NORMAL PLANT OPERATIONS

Operating Mode Applicability: All

Example Emergency Action Levels: (1 or 2)

1. Toxic, corrosive, asphyxiant or flammable gases in amounts that have or could adversely affect NORMAL PLANT OPERATIONS.

2. Report by local, county or state officials for evacuation or sheltering of site personnel based on an off-site event.

ANO: HU5

Release of toxic, corrosive, asphyxiant, or flammable gases deemed detrimental to NORMAL PLANT OPERATIONS

Operating Mode Applicability: All

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

1. Toxic, corrosive, asphyxiant or flammable gases in amounts that have or could adversely affect NORMAL PLANT OPERATIONS.

   OR

2. Report by Local, County or State officials for evacuation or sheltering of site personnel based on an offsite event.

Deviations:

None.

Differences:

NEI 99-01 **HU3** is renumbered to ANO **HU5** for formatting purposes based on site preference for order of ICs alone. In an attempt to group “families” of emergency classes together with the same last digit Arabic numeral designation (such as HU1, AU1, AS1, etc.), an IC-labeled HU3 is not provided. All NEI 99-01 NOUE ICs for the Hazards and Other Conditions Affecting Plant Safety category are still addressed in the ANO EALs.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: HU1

Natural or destructive phenomena affecting the PROTECTED AREA

Operating Mode Applicability: All

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

1. Seismic event identified by **ANY** 2 of the following:
   - Seismic event confirmed by (site-specific indication or method)
   - Earthquake felt in plant
   - National Earthquake Center
2. Tornado striking within PROTECTED AREA boundary or high winds greater than (site-specific mph).
3. Internal flooding that has the potential to affect safety-related equipment required by Technical Specifications for the current operating mode in **ANY** of the following areas:

   (site-specific area list)
4. Turbine failure resulting in casing penetration or damage to turbine or generator seals.
5. (Site-specific occurrences affecting the PROTECTED AREA).

ANO: HU6

Natural or destructive phenomena affecting the PROTECTED AREA

Operating Mode Applicability: All

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

1. Seismic event identified by any 2 of the following:
   - Seismic event confirmed by annunciation of the 0.01g acceleration alarm
   - Earthquake felt in plant
   - National Earthquake Center

   OR
2. Tornado striking within PROTECTED AREA boundary or high winds > 67 mph.

   OR

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ANO: HU6 (Cont'd)

3. Internal flooding that has the potential to affect safety-related equipment required by Technical Specifications for the current operating mode in any of the structures or areas in **Table H1**.

Table H1

Unit 1	Unit 2
CA-1 & HP Office Area	2A3 Room
Condensate Demineralizer Room	2A4, 2D02, & East Battery Room
Corridor 98	2B53 Room
Fire Area C	2B63 Room
Lower North Electrical Penetration Room (LNEPR)	2B9/2B10 Room
Lower South Electrical Equipment Room (LSEER) / Air Compressor Room	2Y11/13 Equipment Room
Lower South Electrical Penetration Room (LSEPR)	Auxiliary Building 317' General Access
Lower South Piping Penetration Room (LSPPR)	Auxiliary Building 335'
Main Steam Isolation Violation (MSIV) Room	Auxiliary Building 354'
North Engineered Safeguards (ES) SWGR Room (A4)	'B' Engineered Safeguards Features (ESF) Room
South ES SWGR Room	Corridor Behind Door 340
Turbine Building • A1, A2, H1, H2 SWGR area • 354' Bowling Alley north end west of Breathing Air compressor room • 368' West Heater Deck from LSEER (orange door) along east wall of ES SWGR Rooms to Corridor 98 door.	Turbine Building • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north Switchgear (SWGR) Room (2A3) and East of LNEPR
Upper North Electrical Penetration Room (UNEPR) / Hot Tool Room / Decon Room	Intake Structure 354' or 366'
Upper South Electrical Penetration Room (USEPR)	LNEPR
Upper South Piping Penetration Room (USPPR)	LSEPR
	Motor-Generator (MG) Set Room
	Steam Pipe Area
	Hot Machine Shop
	UNEPR, UNPPR, LNPPR, USPPR

OR

4. Turbine failure resulting in casing penetration or damage to turbine or generator seals.

OR

5. Lake Dardanelle level < 335 feet.

OR

6. Lake Dardanelle level > 345 feet.

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ANO: HU6 (Cont'd)

Deviations:

None.

Differences:

NEI 99-01 **HU1** is renumbered to ANO **HU6** for formatting purposes based on site preference for order of ICs alone.

Site-specific information is added on Safety Analysis Report (SAR) design basis in the bases for EAL #2.

Site-specific areas for EAL #3 are presented in a table and the table is referenced causing a minor difference in EAL language from that in NEI 99-01.

The reference to VISIBLE DAMAGE is removed from the bases for EAL #3 for escalation information because NEI 99-01 does not refer to VISIBLE DAMAGE for the corresponding Alert classification in HA1 EAL #3.

An evaluation was performed to determine if any other site-specific occurrences were applicable to ANO. Lake Dardanelle levels were determined to be the only other site-specific occurrences that warrant declaration of an NUE. These EALs were added as EALs #5 and #6.

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NEI 99-01: HA4

HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat

Operating Mode Applicability: All

Example Emergency Action Levels: (1 or 2)

1. A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLED AREA as reported by the (site-specific security shift supervision).

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

ANO: HA1

HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat

Operating Mode Applicability: All

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

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

   OR

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

Deviations:

None.

Differences:

NEI 99-01 **HA4** is renumbered to ANO **HA1** for formatting purposes based on site preference for order of ICs alone.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: HA6

Other conditions exist which in the judgment of the Emergency Director warrant declaration of an Alert.

Operating Mode Applicability: All

Example Emergency Action Level:

1. Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the Environmental Protection Agency (EPA) Protective Action Guideline exposure levels.

ANO: HA2

Other conditions exist which in the judgment of the SM / TSC Director / EOF Director warrant declaration of an Alert.

Operating Mode Applicability: All

Emergency Action Level(s):

1. Other conditions exist which in the judgment of the SM / TSC Director / EOF Director indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

Deviations:

None.

Differences:

NEI 99-01 **HA6** is renumbered to ANO **HA2** for formatting purposes based on site preference for order of ICs alone.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: HA5

Control room evacuation has been initiated.

Operating Mode Applicability: All

Example Emergency Action Level:

1. (Site-specific procedure) requires control room evacuation.

ANO: HA3

Control Room evacuation has been initiated.

Operating Mode Applicability: All

Emergency Action Level(s):

1. Alternate Shutdown procedure requires Control Room evacuation:

   Unit 1: 1203.002, “Alternate Shutdown”

   Unit 2: 2203.014, “Alternate Shutdown”

Deviations:

None.

Differences:

NEI 99-01 **HA5** is renumbered to ANO **HA3** for formatting purposes based on site preference for order of ICs alone.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: HA2

FIRE or EXPLOSION affecting the operability of plant safety systems required to establish or maintain safe shutdown

Operating Mode Applicability: All

Example Emergency Action Level:

1. FIRE or EXPLOSION resulting in VISIBLE DAMAGE to **ANY** of the following structures containing safety systems or components **OR** control room indication of degraded performance of those safety systems:

   (site-specific structure list)

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: HA4

FIRE or EXPLOSION affecting the operability of plant safety systems required to establish or maintain safe shutdown

Operating Mode Applicability: All

Emergency Action Level(s):

1. FIRE or EXPLOSION resulting in VISIBLE DAMAGE to any **Table H1** structure or area containing safety systems or components or Control Room indication of degraded performance of those safety systems.

Table H1	
Unit 1	**Unit 2**
CA-1 & HP Office Area	2A3 Room
Condensate Demineralizer Room	2A4, 2D02, & East Battery Room
Corridor 98	2B53 Room
Fire Area C	2B63 Room
Lower North Electrical Penetration Room (LNEPR)	2B9/2B10 Room
Lower South Electrical Equipment Room (LSEER) / Air Compressor Room	2Y11/13 Equipment Room
Lower South Electrical Penetration Room (LSEPR)	Auxiliary Building 317’ General Access
Lower South Piping Penetration Room (LSPPR)	Auxiliary Building 335'
Main Steam Isolation Violation (MSIV) Room	Auxiliary Building 354'
North Engineered Safeguards (ES) SWGR Room (A4)	‘B’ Engineered Safeguards Features (ESF) Room
South ES SWGR Room	Corridor Behind Door 340
Turbine Building • A1, A2, H1, H2 SWGR area • 354' Bowling Alley north end west of Breathing Air compressor room • 368' West Heater Deck from LSEER (orange door) along east wall of ES SWGR Rooms to Corridor 98 door.	Turbine Building • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north Switchgear (SWGR) Room (2A3) and East of LNEPR
Upper North Electrical Penetration Room (UNEPR) / Hot Tool Room / Decon Room	Intake Structure 354' or 366'
Upper South Electrical Penetration Room (USEPR)	LNEPR
Upper South Piping Penetration Room (USPPR)	LSEPR
	Motor-Generator (MG) Set Room
	Steam Pipe Area
	Hot Machine Shop
	UNEPR, UNPPR, LNPPR, USPPR

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ANO: HA4 (Cont'd)

Deviations:

None.

Differences:

NEI 99-01 **HA2** is renumbered to ANO **HA4** for formatting purposes based on site preference for order of ICs alone.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: HA3

Access to a VITAL AREA is prohibited due to toxic, corrosive, asphyxiant, or flammable gases which jeopardize operation of operable equipment required to maintain safe operations or safely shutdown the reactor.

Operating Mode Applicability: All

Example Emergency Action Levels:

Note: If the equipment in the stated area was already inoperable, or out of service, before the event occurred, then this EAL should not be declared as it will have no adverse impact on the ability of the plant to safely operate or safely shutdown beyond that already allowed by Technical Specifications at the time of the event.

1. Access to a VITAL AREA is prohibited due to toxic, corrosive, asphyxiant, or flammable gases which jeopardize operation of systems required to maintain safe operations or safely shutdown the reactor.

ANO: HA5

Access to a VITAL AREA is prohibited due to toxic, corrosive, asphyxiant, or flammable gases which jeopardize operation of operable equipment required to maintain safe operations or safely shutdown the reactor.

Operating Mode Applicability: All

Emergency Action Level(s):

Note: *If the equipment in the stated area was already inoperable, or out of service, before the event occurred, then this EAL should not be declared as it will have no adverse impact on the ability of the plant to safely operate or safely shutdown beyond that already allowed by Technical Specifications at the time of the event.*

1. Access to a VITAL AREA is prohibited due to toxic, corrosive, asphyxiant, or flammable gases which jeopardize operation of systems required to maintain safe operations or safely shutdown the reactor.

Deviations:

None.

Differences:

NEI 99-01 **HA3** is renumbered to ANO **HA5** for formatting purposes based on site preference for order of ICs alone.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: HA1

Natural or Destructive Phenomena Affecting VITAL AREAs

Operating Mode Applicability: All

Example Emergency Action Levels: (1 or 2 or 3 or 4 or 5 or 6)

1. a. Seismic event greater than Operating Basis Earthquake (OBE) as indicated by (site-specific seismic instrumentation) reading (site-specific OBE limit).

   AND

   b. Earthquake confirmed by **ANY** of the following:

   - Earthquake felt in plant
   - National Earthquake Center
   - Control Room indication of degraded performance of systems required for the safe shutdown of the plant

2. Tornado striking or high winds greater than (site-specific mph) resulting in VISIBLE DAMAGE to **ANY** of the following structures containing safety systems or components **OR** control room indication of degraded performance of those safety systems:

   (site-specific structure list)

3. Internal flooding in **ANY** of the following areas resulting in an electrical shock hazard that precludes access to operate or monitor safety equipment **OR** control room indication of degraded performance of those safety systems:

   (site-specific area list)

4. Turbine failure-generated PROJECTILES resulting in VISIBLE DAMAGE to or penetration of **ANY** of the following structures containing safety systems or components **OR** control room indication of degraded performance of those safety systems:

   (site-specific structure list)

5. Vehicle crash resulting in VISIBLE DAMAGE to **ANY** of the following structures containing safety systems or components **OR** control room indication of degraded performance of those safety systems:

   (site-specific structure list)

6. (Site-specific occurrences) resulting in VISIBLE DAMAGE to **ANY** of the following structures containing safety systems or components **OR** control room indication of degraded performance of those safety systems:

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ANO: HA6

Natural or destructive phenomena affecting VITAL AREAS

Operating Mode Applicability: All

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

1. a. Seismic event > Operating Basis Earthquake (OBE) as indicated by annunciation of the 0.1g acceleration alarm.

   AND

   b. Earthquake confirmed by any of the following:

   - Earthquake felt in plant
   - National Earthquake Center
   - Control Room indication of degraded performance of systems required for the safe shutdown of the plant

   OR

2. Tornado striking or high winds > 67 mph resulting in VISIBLE DAMAGE to any of the following structures/equipment containing safety systems or components or Control Room indication of degraded performance of those safety systems:

Reactor Building	Turbine Building
Intake Structure	Q Condensate Storage Tank (QCST)
Ultimate Heat Sink	Control Room
Startup Transformers	Auxiliary Building
Diesel Fuel Vault	Borated Water Storage Tank (BWST)
Refueling Water Tank (RWT)	

   OR

3. Internal flooding in any of the following areas resulting in an electrical shock hazard that precludes access to operate or monitor safety equipment or Control Room indication of degraded performance of those safety systems:

Intake Structure	Turbine Building
Ultimate Heat Sink	Control Room
BWST / RWT	Startup Transformers
Auxiliary Building	Diesel Fuel Vault
QCST	

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ANO: HA6 (Cont'd)

Emergency Action Level(s) (Cont'd)

OR

4. Turbine failure-generated PROJECTILES resulting in VISIBLE DAMAGE to or penetration of any of the structures/equipment in **Table H2** containing safety systems or components or Control Room indication of degraded performance of those safety systems.

Table H2	
Reactor Building	Turbine Building
Intake Structure	QCST
Ultimate Heat Sink	Control Room
BWST/RWT	Startup Transformers
Auxiliary Building	Diesel Fuel Vault

OR

5. Lake Dardanelle level < 335 feet and Emergency Cooling Pond inoperable.

OR

6. Vehicle crash resulting in VISIBLE DAMAGE to any of the structures/equipment in **Table H2** containing safety systems or components or Control Room indication of degraded performance of those safety systems.

Table H2	
Reactor Building	Turbine Building
Intake Structure	QCST
Ultimate Heat Sink	Control Room
BWST/RWT	Startup Transformers
Auxiliary Building	Diesel Fuel Vault

Deviations:

None.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: HA6 (Cont'd)

Differences:

NEI 99-01 **HA1** is renumbered to ANO **HA6** for formatting purposes based on site preference for order of ICs alone.

Site-specific information is added on SAR design basis in the bases for EAL #2.

Site-specific areas for EALs #4 and #6 are presented in a table and the table is referenced causing a minor difference in EAL language from that in NEI 99-01.

An evaluation was performed to determine if any other site-specific occurrences were applicable to ANO. Lake Dardanelle low level with the Emergency Cooling Pond inoperable was determined to be the only other site-specific occurrence that warrants declaration of an Alert. EAL #5 was added. The NEI EAL #5 was renumbered as EAL #6 to provide consistency between NUE and Alert EALs for lake level.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: HS4

HOSTILE ACTION within the PROTECTED AREA

Operating Mode Applicability: All

Example Emergency Action Level:

1. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the (site security shift supervision).

ANO: HS1

HOSTILE ACTION within the PROTECTED AREA

Operating Mode Applicability: All

Emergency Action Level(s):

1. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by ANO Security Shift Supervision.

Deviations:

None.

Differences:

NEI 99-01 **HS4** is renumbered to ANO **HS1** for formatting purposes based on site preference for order of ICs alone.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: HS3

Other conditions exist which in the judgment of the Emergency Director warrant declaration of a Site Area Emergency.

Operating Mode Applicability: All

Example Emergency Action Level:

1. Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts; (1) toward site personnel or equipment that could lead to the likely failure of or; (2) that prevent effective access to equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the site boundary.

ANO: HS2

Other conditions exist which in the judgment of the SM / TSC Director / EOF Director warrant declaration of a Site Area Emergency

Operating Mode Applicability: All

Emergency Action Level(s):

1. Other conditions exist which in the judgment of the SM / TSC Director / EOF Director indicate that events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts; (1) toward site personnel or equipment that could lead to the likely failure of or; (2) that prevent effective access to equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the site boundary.

Deviations:

None.

Differences:

NEI 99-01 **HS3** is renumbered to ANO **HS2** for formatting purposes based on site preference for order of ICs alone.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: HS2

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

Operating Mode Applicability: All

Example Emergency Action Level:

1. a. Control room evacuation has been initiated.

   AND

   b. Control of the plant cannot be established within (site-specific minutes).

ANO: HS3

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

Operating Mode Applicability: All

Emergency Action Level(s):

1. a. Control Room evacuation has been initiated

   AND

   b. Control of the plant cannot be established in accordance with the following procedures within 15 minutes:

   Unit 1: 1203.002, “Alternate Shutdown”

   Unit 2: 2203.014, “Alternate Shutdown”

Deviations:

None.

Differences:

NEI 99-01 **HS2** is renumbered to ANO **HS3** for formatting purposes based on site preference for order of ICs alone.

The procedural reference is included in the EAL for consistency with HA3.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: HG1

HOSTILE ACTION resulting in loss of physical control of the facility.

Operating Mode Applicability: All

Example Emergency Action Level: (1 or 2)

1. A HOSTILE ACTION has occurred such that plant personnel are unable to operate equipment required to maintain safety functions.

2. A HOSTILE ACTION has caused failure of Spent Fuel Cooling Systems and IMMINENT fuel damage is likely for a freshly off-loaded reactor core in pool.

ANO: HG1

HOSTILE ACTION resulting in loss of physical control of the facility

Operating Mode Applicability: All

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

1. A HOSTILE ACTION has occurred such that plant personnel are unable to operate equipment required to maintain safety functions.

   OR

2. A HOSTILE ACTION has caused failure of Spent Fuel Cooling Systems and IMMINENT fuel damage is likely for a freshly off-loaded reactor core in pool.

Deviations:

None.

Differences:

None.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: HG2

Other conditions exist which in the judgment of the Emergency Director warrant declaration of a General Emergency.

Operating Mode Applicability: All

Example Emergency Action Level:

1. Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.

ANO: HG2

Other conditions exist which in the judgment of the SM / TSC Director / EOF Director warrant declaration of a General Emergency.

Operating Mode Applicability: All

Emergency Action Level(s):

1. Other conditions exist which in the judgment of the SM / TSC Director / EOF Director indicate that events are in progress or have occurred which involve actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.

Deviations:

None.

Differences:

None.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: SU1

Loss of all Off-site AC power to emergency busses for 15 minutes or longer.

Operating Mode Applicability: Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Level:

Note: The Emergency Director 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.

1. Loss of all off-site AC power to (site-specific emergency busses) for 15 minutes or longer.

ANO: SU1

Loss of all offsite AC power to Vital 4.16 KV busses ≥ 15 minutes

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

Emergency Action Level(s):

Note: *The SM 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.*

1. Loss of all offsite AC power to Vital 4.16 KV busses ≥ 15 minutes.

Deviations:

None.

Differences:

The site-specific term “Vital 4.16 KV” is used in the IC and EAL to define emergency busses.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: SU3

UNPLANNED loss of safety system annunciation or indication in the control room for 15 minutes or longer.

Operating Mode Applicability: Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Level:

Note: The Emergency Director 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.

1. UNPLANNED Loss of greater than approximately 75% of the following for 15 minutes or longer:

   a. (Site-specific control room safety system annunciation)

   OR

   b. (Site-specific control room safety system indication)

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: SU6

UNPLANNED loss of safety system annunciation or indication in the Control Room ≥ 15 minutes

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

Emergency Action Level(s):

Note: *The SM 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.*

1. UNPLANNED loss of > approximately 75% of the following ≥ 15 minutes:

   a. Control Room annunciators associated with safety systems.

      OR

   b. Control Room safety system indication.

Deviations:

None.

Differences:

NEI 99-01 **SU3** is renumbered to ANO **SU6** for formatting purposes based on site preference for order of ICs alone. In an attempt to group “families” of emergency classes together with the same last digit Arabic numeral designation (such as SU1, SA1, SS1, etc.), ICs labeled SU2, SU3, SU4, and SU5 are not provided. All NEI 99-01 NOUE ICs for the System Malfunction category are still addressed in the ANO EALs.

Additional information is provided in the bases to define those systems associated with safety system indication.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: SU5

RCS leakage

Operating Mode Applicability: Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Levels: (1 or 2)

1. Unidentified or pressure boundary leakage greater than 10 gpm.

2. Identified leakage greater than 25 gpm.

ANO: SU7

RCS leakage

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

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

1. Unidentified or pressure boundary leakage > 10 gpm.

   OR

2. Identified leakage > 25 gpm.

Deviations:

None.

Differences:

Because prompt, procedurally driven action can be taken to isolate some sources of potential RCS leakage (such as isolating the Letdown system), the ANO basis document further defines this leakage to be a loss of RCS inventory due to a leak in the RCS or a supporting system that is not or cannot be isolated within 10 minutes. This clarification meets the intent of NEI 99-01.

NEI 99-01 **SU5** is renumbered to ANO **SU7** for formatting purposes based on site preference for order of ICs alone.

Basis information is added noting that steam generator tube leakage is considered as identified leakage.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-07: SU6

Loss of All On-site or Off-site communications capabilities

Operating Mode Applicability: Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Levels: (1 or 2)

1. Loss of all of the following on-site communication methods affecting the ability to perform routine operations.

   (site-specific list of communications methods)

2 Loss of all of the following off-site communication methods affecting the ability to perform offsite notifications.

   (site-specific list of communications methods)

ANO: SU8

Loss of all onsite or offsite communications capabilities

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

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

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

   OR

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ANO: SU8 (Cont'd)

2. Loss of all **Table M2** offsite communications methods affecting the ability to perform offsite notifications.

Table M1 **Onsite Communications Methods**
Station radio system
Plant paging system
In-plant telephones
Gaitronics

Table M2 **Offsite Communications Methods**
All telephone lines (commercial and microwave)
ENS

Deviations:

None.

Differences:

NEI 99-01 **SU6** is renumbered to ANO **SU8** for formatting purposes based on site preference for order of ICs alone.

Onsite and offsite communications methods are presented in tables and the tables are referenced causing a minor difference in EAL language from that in NEI 99-01.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: SU4

Fuel clad degradation

Operating Mode Applicability: Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Levels: (1 or 2)

1. (Site-specific radiation monitor readings indicating fuel clad degradation greater than Technical Specification allowable limits.)

2. (Site-specific coolant sample activity value indicating fuel clad degradation greater than Technical Specification allowable limits.)

ANO: SU9

Fuel clad degradation

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

Emergency Action Level(s):

1. Failed Fuel Iodine radiation monitor reading indicates fuel clad degradation > Technical Specification allowable limits:

   Unit 1:

   RI-1237S reads > 1.3×10^5 counts per minute

   Unit 2:

   2RITS-4806B reads > $.65 \times 10^5$ counts per minute

   OR

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ANO: SU9 (Cont'd)

2. RCS sample activity value indicating fuel clad degradation > Technical Specification allowable limits:

   - > 1.0 uCi/gm Dose Equivalent I-131 (DEI) for more than 48 hours

     OR

   - **Unit 1:**

     ≥ 60 uCi/gm Dose Equivalent I-131

     Unit 2:

     > 60 uCi/gm Dose Equivalent I-131

     OR

   - **Unit 1:**

     > 2200 µCi/gm Dose Equivalent Xe-133 for more than 48 hours

     Unit 2:

     > 3100 µCi/gm Dose Equivalent Xe-133 for more than 48 hours

Deviations:

None.

Differences:

NEI 99-01 **SU4** is renumbered to ANO **SU9** for formatting purposes based on site preference for order of ICs alone.

An EAL value and associated basis information are provided for the nominal operating limit for DEI for RCS activity in addition to the transient iodine spiking limit described in NEI 99-01. This value is also provided for Dose Equivalent Xe-133 in accordance with the station's Technical Specifications.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: SU8

Inadvertent criticality

Operating Mode Applicability: Hot Standby
Hot Shutdown

Example Emergency Action Level: (1 or 2)

1. UNPLANNED sustained positive period observed on nuclear instrumentation. *[BWR]*

1. UNPLANNED sustained positive startup rate observed on nuclear instrumentation. *[PWR]*

ANO: SU10

Inadvertent criticality

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

Emergency Action Level(s):

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

Deviations:

None.

Differences:

NEI 99-01 **SU8** is renumbered to ANO **SU10** for formatting purposes based on site preference for order of ICs alone.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: SU2

Inability to reach required shutdown within Technical Specification limits

Operating Mode Applicability: Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Level:

1. Plant is not brought to required operating mode within Technical Specifications Limiting Condition for Operation (LCO) Action Statement Time.

ANO: SU11

Inability to reach required operating mode within Technical Specification limits

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

Emergency Action Level(s):

1. Plant is not brought to required operating mode within Technical Specifications LCO action statement time.

Deviations:

None.

Differences:

NEI 99-01 **SU2** is renumbered to ANO **SU11** for formatting purposes based on site preference for order of ICs alone.

The NEI IC is changed to refer to required “operating mode” vice “shutdown” to provide clarity and agreement with the associated NEI EAL and bases. This change does not alter the meaning or intent of the IC.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: SA5

AC power capability to emergency busses reduced to a single power source for 15 minutes or longer such that any additional single failure would result in station blackout

Operating Mode Applicability: Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Level:

Note: The Emergency Director 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.

1. a. AC power capability to (site-specific emergency busses) reduced to a single power source for 15 minutes or longer.

   AND

   b. Any additional single power source failure will result in station blackout.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: SA1

AC power capability to Vital 4.16 KV busses reduced to a single power source ≥ 15 minutes such that any additional single failure would result in station blackout

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

Emergency Action Level(s):

Note: *The SM / TSC Director / EOF Director 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.*

1. a. AC power capability to Vital 4.16 KV busses reduced to a single power source ≥ 15 minutes.

   AND

   b. Any additional single power source failure will result in station blackout.

Deviations:

None.

Differences:

NEI 99-01 **SA5** is renumbered to ANO **SA1** for formatting purposes based on site preference for order of ICs alone.

The site-specific term “Vital 4.16 KV” is used in the IC and EAL to define emergency busses.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: SA2

Automatic Scram (Trip) fails to shutdown the reactor and the manual actions taken from the reactor control console are successful in shutting down the reactor.

Operating Mode Applicability: Power Operation
Startup

Example Emergency Action Level:

1. a. An automatic scram (trip) failed to shutdown the reactor.

   AND

   b. Manual actions taken at the reactor control console successfully shutdown the reactor as indicated by (site-specific indications of plant shutdown).

ANO: SA3

Automatic trip fails to shutdown the reactor and the manual actions taken from the reactor control console are successful in shutting down the reactor

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

Emergency Action Level(s):

1. a. An automatic trip failed to shutdown the reactor as indicated by reactor power ≥ 5%.

   AND

   b. Manual actions taken at the reactor control console successfully shutdown the reactor as indicated by reactor power < 5%.

Deviations:

None.

Differences:

NEI 99-01 **SA2** is renumbered to ANO **SA3** for formatting purposes based on site preference for order of ICs alone.

The site-specific % reactor power is used to indicate both when the automatic reactor trip is not successful and when the manual reactor trip is successful.

Additional information is provided in the bases to define a failure of the manual trip function.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: SA4

UNPLANNED Loss of safety system annunciation or indication in the control room with either (1) a SIGNIFICANT TRANSIENT in progress, or (2) compensatory indicators unavailable.

Operating Mode Applicability: Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Level:

Note: The Emergency Director 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.

1. a. UNPLANNED loss of greater than approximately 75% of the following for 15 minutes or longer:

   - (Site-specific control room safety system annunciation)

     OR

   - (Site-specific control room safety system indication)

   b. **EITHER** of the following:

   - A SIGNIFICANT TRANSIENT is in progress.

   - Compensatory indications are unavailable.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: SA6

UNPLANNED loss of safety system annunciation or indication in the Control Room with either (1) a SIGNIFICANT TRANSIENT in progress, or (2) compensatory indicators unavailable

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

Emergency Action Levels(s):

Note: *The SM / TSC Director / EOF Director 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.*

1. a. UNPLANNED loss of > approximately 75% of the following ≥ 15 minutes:

   - Control Room annunciators associated with safety systems

     OR

   - Control Room safety system indication

   AND

   b. Either of the following:

   - A SIGNIFICANT TRANSIENT is in progress

     OR

   - Compensatory indications are unavailable

Deviations:

None.

Differences:

NEI 99-01 **SA4** is renumbered to ANO **SA6** for formatting purposes based on site preference for order of ICs alone.

An “and” and an additional “or” are used in the EAL for clarity.

Additional information is provided in the bases with the term “SPDS” to define computer based information.

Additional information is provided in the bases to define those systems associated with safety system indication.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: SS1

Loss of all Off-site and all On-Site AC power to emergency busses for 15 minutes or longer.

Operating Mode Applicability: Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Level:

Note: The Emergency Director 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.

1. Loss of all Off-Site and all On-Site AC power to (site-specific emergency busses) for 15 minutes or longer.

ANO: SS1

Loss of all offsite and all onsite AC power to Vital 4.16 KV busses ≥ 15 minutes

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

Emergency Action Level(s):

Note: *The SM / TSC Director / EOF Director 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.*

1. Loss of all offsite and all onsite AC power to Vital 4.16 KV busses ≥ 15 minutes.

Deviations:

None.

Differences:

The site-specific term “Vital 4.16 KV” is used in the IC and EAL to define emergency busses.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: SS2

Automatic Scram (Trip) fails to shutdown the reactor and manual actions taken from the reactor control console are not successful in shutting down the reactor.

Operating Mode Applicability: Power Operation
Startup

Example Emergency Action Level:

1. a. An automatic scram (trip) failed to shutdown the reactor.

   AND

   b. Manual actions taken at the reactor control console do not shutdown the reactor as indicated by (site-specific indications of reactor not shutdown).

ANO: SS3

Automatic trip fails to shutdown the reactor and manual actions taken from the reactor control console are not successful in shutting down the reactor.

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

Emergency Action Level(s):

1. a. An automatic trip failed to shutdown the reactor.

   AND

   b. Manual actions taken at the reactor control console do not shutdown the reactor as indicated by reactor power ≥ 5%.

Deviations:

None.

Differences:

NEI 99-01 **SS2** is renumbered to ANO **SS3** for formatting purposes based on site preference for order of ICs alone.

Additional information is provided in the bases to define a failure of the manual trip function.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: SS3

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

Operating Mode Applicability: Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Level:

Note: The Emergency Director 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.

1. Less than (site-specific bus voltage indication) on all (site-specific Vital DC busses) for 15 minutes or longer.

ANO: SS4

Loss of all Vital DC power ≥ 15 minutes

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

Emergency Action Level(s):

Note: *The SM / TSC Director / EOF Director 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.*

1. < 105 volts on all Vital DC busses ≥ 15 minutes.

Deviations:

None.

Differences:

NEI 99-01 **SS3** is renumbered to ANO **SS4** for formatting purposes based on site preference for order of ICs alone.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: SS6

Inability to Monitor a SIGNIFICANT TRANSIENT in Progress

Operating Mode Applicability: Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Level:

Note: The Emergency Director 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.

1. a. Loss of greater than approximately 75% of the following for 15 minutes or longer:

   - (Site-specific control room safety system annunciation)

   OR

   - (Site-specific control room safety system indication)

   AND

   b. A SIGNIFICANT TRANSIENT is in progress.

   AND

   c. Compensatory indications are unavailable.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: SS6

Inability to monitor a SIGNIFICANT TRANSIENT in progress

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

Emergency Action Level(s):

Note: *The SM / TSC Director / EOF Director 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.*

1. a. Loss of > approximately 75% of the following ≥ 15 minutes:

   - Control Room annunciators associated with safety systems

     OR

   - Control Room safety system indication

   AND

   b. A SIGNIFICANT TRANSIENT is in progress.

   AND

   c. Compensatory indications are unavailable.

Deviations:

None.

Differences:

Additional information is provided in the bases with the term “SPDS” to define computer based information.

Additional information is provided in the bases to define those systems associated with safety system indication.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: SG1

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

Operating Mode Applicability: Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Level:

1. a. Loss of all off-site and all on-site AC power to (site-specific emergency busses).

   AND

   b. **EITHER** of the following:

   - Restoration of at least one emergency bus in less than (site-specific hours) is not likely.

   - (Site-specific indication of continuing degradation of core cooling based on Fission Product Barrier monitoring.)

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: SG1

Prolonged loss of all offsite and all onsite AC power to Vital 4.16 KV busses

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

Emergency Action Level(s):

1. a. Loss of all offsite and all onsite AC power to Vital 4.16 KV busses.

   AND

   b. Either of the following:

   - Restoration of at least one Vital 4.16 KV bus in < 4 hours is not likely

     OR

   - Continuing degradation of core cooling based on Fission Product Barrier monitoring as indicated by CETs ≥ 700 °F.

Deviations:

None.

Differences:

The site-specific term “Vital 4.16 KV” is used in the IC and EAL to define emergency busses.

An “or” is used in the EAL for clarity.

NEI 99-01 Revision 5 EAL Deviation-Differences Document

NEI 99-01: SG2

Automatic Scram (Trip) and all manual actions fail to shutdown the reactor and indication of an extreme challenge to the ability to cool the core exists.

Operating Mode Applicability: Power Operation
Startup

Example Emergency Action Level:

1. a. An automatic scram (trip) failed to shutdown the reactor.

   AND

   b. All manual actions do not shutdown the reactor as indicated by (site-specific indications of reactor not shutdown).

   AND

   c. **EITHER** of the following exist or have occurred due to continued power generation:

   - (Site-specific indication that core cooling is extremely challenged.)
   - (Site-specific indication that heat removal is extremely challenged.)

NEI 99-01 Revision 5 EAL Deviation-Differences Document

ANO: SG3

Automatic trip and all manual actions fail to shutdown the reactor and indication of an extreme challenge to the ability to cool the core exists.

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

Emergency Action Level(s):

1. a. An automatic trip failed to shutdown the reactor.

   AND

   b. All manual actions do not shutdown the reactor as indicated by reactor power ≥ 5%.

   AND

   c. Either of the following exist or have occurred due to continued power generation:

   - CET temperatures at or approaching 1200 °F

     OR

   - Feedwater flow rate less than:

     Unit 1: 430 gpm
     Unit 2: 485 gpm

Deviations:

None.

Differences:

SG2 is renumbered to ANO IC **SG3** for formatting purposes based on site preference for order of ICs alone.

An “or” is used in the EAL for clarity.

Attachment 2 to

0CAN121102

Proposed Technical Basis Document (Markup)

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AU1

Initiating Condition – NOTIFICATION OF UNUSUAL EVENT

Any release of gaseous or liquid radioactivity to the environment ~~greater than~~ > 2 times the ~~Radiological Effluent Technical Specifications/~~ODCM limits for ≥ 60 minutes ~~or longer.~~

Operating Mode Applicability: All

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

Note: *The SM ~~Emergency Director~~ should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the release duration has exceeded, or will likely exceed, the applicable time. In the absence of data to the contrary, assume that the release duration has exceeded the applicable time if an ongoing release is detected and the release start time is unknown.*

1. VALID reading on Channel 7 on ~~**ANY**~~any of the following radiation monitors > ~~greater than~~ the reading shown for ≥ 60 minutes ~~or longer~~:
   ~~(site specific monitor list and threshold values)~~

	MONITORS – UNIT 1	LIMIT
RX-9820	Containment Purge	5.90E-2 µCi/cc
RX-9825	Radwaste Area	5.36E-2 µCi/cc
RX-9830	Fuel Handling Area	4.54E-2 µCi/cc
RX-9835	Emergency Penetration Room	9.56E-1 µCi/cc
	MONITORS – UNIT 2	**LIMIT**
2RX-9820	Containment Purge	4.46E-2 µCi/cc
2RX-9825	Radwaste Area	3.32E-2 µCi/cc
2RX-9830	Fuel Handling Area	4.46E-2 µCi/cc
2RX-9835	Emergency Penetration Room	8.84E-1 µCi/cc
2RX-9840	Post Accident Sampling Building	4.42E-1 µCi/cc
2RX-9845	Aux. Building Extension	1.26E-1 µCi/cc
2RX-9850	Low Level Radwaste Storage Bldg.	1.77E-1 µCi/cc

OR

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AU1

2. VALID reading on any of the following radiation monitors ~~effluent monitor reading>~~ ~~greater than~~ 2 times the alarm setpoint established by a current release ~~radioactivity discharge~~ permit for ≥ 60 minutes ~~or longer~~.

EFFLUENT MONITORS – Unit 1	
RX-9820	Containment Purge (Channel 7 or 9)
RE-4830	Waste Gas Radiation Monitor
RE-4642	Liquid Radwaste Monitor
EFFLUENT MONITORS – Unit 2	
2RX-9820	Containment Purge (Channel 7 or 9)
2RE-2429	Waste Gas Decay Tank Vent Line Radiation Monitor
2RE-2330	BMS Liquid Discharge Monitor
2RE-4423	Regenerative Waste Discharge Monitor
2RE-4425	SG Blowdown to Flume Radiation Monitor

OR

3. Confirmed grab sample analyses for gaseous or liquid releases indicates concentrations or release rates > ~~greater than~~ 2 times the applicable values of the ODCM ~~(site specific RETS values)~~ for ≥ 60 minutes ~~or longer~~.

~~OR~~

~~4. VALID reading on perimeter radiation monitoring system reading greater than 0.10 mR/hr above normal* background for 60 minutes or longer. [for sites having telemetered perimeter monitors]~~

~~45~~VALID indication on automatic real-time dose assessment capability indicating greater than (site specific value) for 60 minutes or longer. [for sites having such capability]*Normal can be considered as the highest reading in the past twenty-four hours excluding the current peak value. **Basis:**

~~[*Refer to Appendix A for a detailed basis of the radiological effluent IC/EALs.*]~~ The SM ~~Emergency Director~~should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.

This IC addresses a potential reduction~~decrease~~ in the level of safety of the plant as indicated by a radiological release that exceeds regulatory commitments for an extended period of time.

ANO ~~Nuclear power plants~~ incorporates features intended to control the release of radioactive effluents to the environment. Further, there are administrative controls established to prevent unintentional releases, or control and monitor intentional releases. ~~[*These controls are located*~~

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AU1

~~*in the Off-site Dose Calculation Manual (ODCM), and for plants that have not implemented Generic Letter 89-01, in the Radiological Effluent Technical Specifications (RETS).]*~~ The occurrence of extended, uncontrolled radioactive releases to the environment is indicative of a degradation in these features and/or controls.

~~[*Some sites may find it advantageous to address gaseous and liquid releases with separate EALs.*]~~The ODCM ~~RETS~~ multiples are specified in AU1 and AA1 only to distinguish between non-emergency conditions, and from each other. While these multiples obviously correspond to an offsite dose or dose rate, the emphasis in classifying these events is the degradation in the level of safety of the plant, NOT~~not~~ the magnitude of the associated dose or dose rate.

~~*[*~~Releases should not be prorated or averaged over 60 minutes. For example, a release exceeding 4 times ~~x~~ODCM limits for 30 minutes does not meet the threshold for this IC.~~*]*~~

This Initiating Condition~~EAL~~ includes any release for which a radioactivity discharge permit was not prepared, or a release that exceeds the conditions (e.g., minimum dilution flow, maximum discharge flow, alarm setpoints, etc.) on the applicable permit.

EAL #1

This EAL addresses radioactivity releases, that for whatever reason, cause effluent radiation monitor readings to exceed the threshold identified in the EAL.

This EAL is intended for sites that have established effluent monitoring on non-routine release pathways for which a discharge permit would not normally be prepared.

~~[*The ODCM establishes a methodology for determining effluent radiation monitor setpoints. The ODCM specifies default source terms and, for gaseous releases, prescribes the use of pre-determined annual average meteorology in the most limiting downwind sector for showing compliance with the regulatory commitments. This EAL should be determined using this methodology.*]~~

EAL #2

This EAL addresses radioactivity releases, that for whatever reason, cause effluent radiation monitor readings to exceed the threshold identified in this ~~the~~ Initiating Condition established by the release ~~radioactivity discharge~~ permit. This value may be associated with a planned batch release, or a continuous release path.

~~[*In either case, the value is established by the ODCM to warn of a release that is not in compliance with the RETS. Indexing the EAL to the ODCM setpoints in this manner insures that the EAL will never be less than the setpoint established by a specific discharge permit.*]~~

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AU1

EAL #3

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

~~EALs #4 and #5~~

~~The 0.10 mR/hr value in EAL #4, and the site specific value for EAL #5,is based on a release rate not exceeding 500 mrem per year.~~

~~[*As provided in the ODCM / RETS, prorated over 8766 hours, multiplied by two, and rounded. (500 ÷ 8766 × 2 = 0.114).*]~~ EAL #1 and #2 directly correlate with the IC since annual average meteorology is required to be used in showing compliance with the ODCM and is used in calculating the alarm setpoints. ~~EALs #4 and #5 isare a function of actual meteorology, which will likely be different from the limiting annual average value. Thus, there will likely be a numerical inconsistency.~~

~~The underlying basis of this EAL involves the degradation in the level of safety of the plant implied by the uncontrolled release. Exceeding EAL #4 or #5 is an indication of an uncontrolled release.~~

Reference Documents:

1. 1604.051, “Eberline Radiation Monitor System”
2. Offsite Dose Calculation Manual

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AU2

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

UNPLANNED rise in plant radiation levels

Operating Mode Applicability: All

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

1. a. UNPLANNED lowering of water level ~~drop~~ in the ~~a reactor~~refueling canal or spent fuel pool ~~pathway~~ as indicated by ~~(site specific level or indication)~~:

   - Personnel observation, refueling crew report, indication on area security camera, borated water source (BWST or RWT) level drop due to makeup demands.

   AND

   b. VALID Area Radiation Monitor reading rise on any of the following: ~~(site specific list)~~.

Unit 1	
RE-8009	Spent Fuel Area
RE-8017	Fuel Handling Area
Unit 2	
2RE-8914	Spent Fuel Area
2RE-8915	Spent Fuel Area
2RE-8916	Spent Fuel Area
2RE-8912	Containment Incore Instrumentation

OR

2. UNPLANNED VALID Area Radiation Monitor readings or survey results indicate a rise by a factor of 1000 over normal* levels.

   NOTE: *For area radiation monitors with ranges incapable of measuring 1000 times normal* levels, classification shall be based on VALID full scale indication unless surveys confirm that area radiation levels are below 1000 times normal* within 15 minutes of the Area Radiation Monitor indications going to full scale indication.*

   *Normal can be considered as the highest reading in the past twenty-four hours excluding the current peak value.

Basis:

This IC addresses elevat~~increas~~ed radiation levels as a result of lowered water level ~~dropecreases~~ above irradiated fuel or events that have resulted, or may result, in UNPLANNED ris~~increas~~es in radiation dose rates within plant buildings. These radiation ri~~increa~~ses represent a loss of control over radioactive material and represent a potential degradation in the level of safety of the plant.

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AU2

EAL #1

[*Site specific indications may include instrumentation such as water level and local area radiation monitors, and personnel (e.g., refueling crew) reports. If available, video cameras may allow remote observation. Depending on available level instrumentation, the declaration threshold may need to be based on indications of water makeup rate or decrease in water storage tank level.*]

[*In light of Reactor Cavity Seal failure incidents at two different PWRs and loss of water in the Spent Fuel Pit/Fuel Transfer Canal at a BWR, explicit coverage of these types of events via threshold #1 is appropriate given their potential for increased doses to plant staff.*]

The refueling pathway is a site specific combination of cavities, tubes, canals and pools. While a radiation monitor could detect a risen increase in dose rate due to a drop in the water level, it might not be a reliable indication of whether or not the fuel is covered.

[For example, a refueling bridge ARM reading may rise due to planned evolutions such as head lift, or even a fuel assembly being raised in the manipulator mast. Also, a monitor could in fact be properly responding to a known event involving transfer or relocation of a source, stored in or near the fuel pool or responding to a planned evolution such as removal of the reactor head. Generally, elevated radiation monitor indications will need to be combined with another indicator (or personnel report) of water loss.]

[*Application of this EAL requires understanding of the actual radiological conditions present in the vicinity of the monitor. Information Notice No. 90-08, "KR-85 Hazards from Decayed Fuel" should be considered in establishing radiation monitor EALs.*]

For refueling events where the water level drops below the RPV flange classification would be via CU2. This event escalates to an Alert per AA2 if irradiated fuel outside the reactor vessel is uncovered. For events involving irradiated fuel in the reactor vessel, escalation would be via the Fission Product Barrier MatrixTable for events in operating modes 1-4.

EAL #2

This EAL addresses risincreases in plant radiation levels that represent a loss of control of radioactive material resulting in a potential degradation in the level of safety of the plant.

This EAL excludes radiation level risincreases that result from planned activities such as use of radiographic sources and movement of radioactive waste materials. A specific list of ARMs is not required as it would restrict the applicability of the Threshold. The intent is to identify loss of control of radioactive material in any monitored area.

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AA1

Initiating Condition - ALERT

Any release of gaseous or liquid radioactivity to the environment > ~~greater than~~200 times the ~~Radiological Effluent Technical Specifications/~~ODCM limits for
> 15 minutes~~ or longer.~~

Operating Mode Applicability: All

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

Note: *The SM / TSC Director / EOF Director ~~Emergency Director~~ should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the release duration has exceeded, or will likely exceed, the applicable time. In the absence of data to the contrary, assume that the release duration has exceeded the applicable time if an ongoing release is detected and the release start time is unknown.*

1. VALID reading on Channel 7 on any ~~**ANY**~~ of the following radiation monitors >~~greater than~~ the reading shown for > 15 minutes~~ or longer~~:

   ~~(site specific monitor list and threshold values)~~

MONITORS – UNIT 1		LIMIT
RX-9820	Containment Purge	5.90E0 µCi/cc
RX-9825	Radwaste Area	5.36E0 µCi/cc
RX-9830	Fuel Handling Area	4.54E0 µCi/cc
RX-9835	Emergency Penetration Room	9.56E+1 µCi/cc
MONITORS – UNIT 2		**LIMIT**
2RX-9820	Containment Purge	4.46E0 µCi/cc
2RX-9825	Radwaste Area	3.32E0 µCi/cc
2RX-9830	Fuel Handling Area	4.46E0 µCi/cc
2RX-9835	Emergency Penetration Room	8.84E+1 µCi/cc
2RX-9840	Post Accident Sampling Building	4.42E+1 µCi/cc
2RX-9845	Aux. Building Extension	1.26E+1 µCi/cc
2RX-9850	Low Level Radwaste Storage Bldg.	1.77E+1 µCi/cc

OR

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AA1

2. **EITHER** VALID reading on any of the following radiation monitors ~~effluent monitor>reading greater than~~ 200 times the alarm setpoint established by a current release ~~radioactivity discharge~~ permit for ≥ 15 minutes ~~or longer~~ **OR** VALID reading greater than the value listed for ≥ 15 minutes.

MONITORS – UNIT 1		LIMIT
RX-9820	Containment Purge (Channel 7 or 9)	N/A
RE-4830	Waste Gas Radiation Monitor	9.5E7 cpm
RE-4642	Liquid Radwaste Monitor	9.5E7 cpm
MONITORS – UNIT 2		**LIMIT**
2RX-9820	Containment Purge (Channel 7 or 9)	N/A
2RE-2429	Waste Gas Monitoring System	9.5E5 cpm
2RE-2330	BMS Liquid Discharge Monitor	9.5E5 cpm
2RE-4423	Regenerative Waste Discharge Monitor	9.5E5 cpm
2RE-4425	SG Blowdown to Flume Radiation Monitor	9.5E5 cpm

OR

3. Confirmed grab sample analyses for gaseous or liquid releases indicates concentrations or release rates > ~~greater than~~ 200 times the applicable values of the ODCM ~~(site specific RETS values)~~ for ≥ 15 minutes ~~or longer~~.

~~**OR**~~

~~4. VALID reading on perimeter radiation monitoring system reading greater than 10.0 mR/hr above normal* background for 15 minutes or longer. [for sites having telemetered perimeter monitors]~~

~~45VALID indication on automatic real-time dose assessment capability indicating greater than (site specific value) for 15 minutes or longer. [for sites having such capability]*Normal can be considered as the highest reading in the past twenty-four hours excluding the current peak value.~~

~~[*Refer to Appendix A for a detailed basis of the*~~ radiological ~~*effluent IC/EALs.*]~~ **Basis:**

The SM / TSC Director / EOF Director ~~Emergency Director~~ should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.

This IC addresses an actual or substantial potential reduction~~decrease~~ in the level of safety of the plant as indicated by a radiological release that exceeds regulatory commitments for an extended period of time. ANO~~Nuclear power plants~~ incorporates features intended to control the release of radioactive effluents to the environment. Further, there are administrative controls established to prevent unintentional releases, or control and monitor intentional releases. ~~[*These controls are located in the Off-site Dose Calculation Manual (ODCM), and for plants that have not implemented Generic Letter 89-01, in the Radiological Effluent Technical Specifications (RETS).]*~~ The occurrence of extended, uncontrolled radioactive releases to the environment is indicative of a degradation in these features and/or controls. ~~*[Some sites may find it advantageous to address gaseous and liquid releases with separate EALs.]*~~

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AA1

The ODCM ~~RETS~~ multiples are specified in AU1 and AA1 only to distinguish between non-emergency conditions, and from each other. While these multiples obviously correspond to an offsite dose or dose rate, the emphasis in classifying these events is the degradation in the level of safety of the plant, NOT~~not~~ the magnitude of the associated dose or dose rate.
~~*[To ensure a realistic near-linear escalation path, a value should be selected roughly half-way between the AU1 value and the value calculated for AS1 value. The value will be based on radiation monitor readings to exceed 200 times the Technical Specification limit and releases are not terminated within 15 minutes.* The *ODCM establishes a methodology for determining effluent radiation monitor setpoints. The ODCM specifies default source terms and, for gaseous releases, prescribes the use of pre-determined annual average meteorology in the most limiting downwind sector for showing compliance with the regulatory commitments. This EAL can be determined using this methodology if appropriate.*]~~
~~[~~Releases should not be prorated or averaged. For example, a release exceeding 600 times ODCM limits for 5 minutes does not meet the threshold for this IC.~~]~~

This Initiating Condition~~EAL~~ includes any release for which a release ~~radioactivity discharge~~ permit was not prepared, or a release that exceeds the conditions (e.g., minimum dilution flow, maximum discharge flow, alarm setpoints, etc.) on the applicable permit.

EAL #1

This EAL addresses radioactivity releases, that for whatever reason, cause effluent radiation monitor readings to exceed the threshold identified in the Initiating Condition~~IC~~.

This EAL is intended for sites that have established effluent monitoring on non-routine release pathways for which a discharge permit would not normally be prepared.

~~[*The ODCM establishes a methodology for determining effluent radiation monitor setpoints. The ODCM specifies default source terms and, for gaseous releases, prescribes the use of pre-determined annual average meteorology in the most limiting downwind sector for showing compliance with the regulatory commitments. This EAL should be determined using this methodology.*]~~

EAL #2

This EAL addresses radioactivity releases, that for whatever reason, cause effluent radiation monitor readings to exceed the threshold identified in this~~e~~ Initiating Condition established by the radioactivity discharge permit. This value may be associated with a planned batch release, or a continuous release path. The limit values provided are for those cases in which the maximum monitor range is less than the release permit value multiplied by 200.

~~[*In either case, the value is established by the ODCM to warn of a release that is not in compliance with the RETS. Indexing the EAL to the ODCM setpoints in this manner insures that the EAL will never be less than the setpoint established by a specific discharge permit.*]~~

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AA1

EAL #3

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

~~EALs #4 and #5 The 10.0 mR/hr value in EAL #4 , and the site specific value for EAL #5,is based on a release rate not exceeding 500 mrem per year.~~

~~[*As provided in the ODCM / RETS, prorated over 8766 hours, multiplied by 200, and rounded. (500 ÷ 8766 × 200 = 11.4)*].~~

EAL #1 and #2 directly correlate with the IC since annual average meteorology is required to be used in showing compliance with the ODCM and is used in calculating the alarm setpoints. ~~EALs #4 and #5 isare a function of actual meteorology, which will likely be different from the limiting annual average value. Thus, there will likely be a numerical inconsistency.~~

~~The underlying basis of this EAL involves the degradation in the level of safety of the plant implied by the uncontrolled release. Exceeding EAL #4 or #5 is an indication of an uncontrolled release.~~

~~The underlying basis of this EAL involves the degradation in the level of safety of the plant implied by the uncontrolled release. Exceeding EAL #4 or #5 is an indication of an uncontrolled release.~~

Reference Documents:

1. 1604.051, “Eberline Radiation Monitor System”
2. Offsite Dose Calculation Manual

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AA2

Initiating Condition - ALERT

Damage to irradiated fuel or loss of water level that has resulted or will result in the uncovering of irradiated fuel outside the reactor vessel

Operating Mode Applicability: All

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

1. A water level drop in the ~~reactor~~ refueling canal~~cavity,~~ or spent fuel pool ~~or fuel transfer canal~~ that will result in irradiated fuel becoming uncovered.

OR

2. ~~A~~ VALID alarm ~~or (site specific elevated reading)~~ on ~~**ANY**~~any of the following radiation monitors due to damage to irradiated fuel or loss of water level.

~~(site specific radiation monitors)~~

Unit 1	
RX-9820	Containment Purge (Channel 7 or 9)
RX-9825	Radwaste Area (Channel 7 or 9)
RX-9830	Fuel Handling Area (Channel 7 or 9)
RE-8060	Containment High Range Radiation Monitors
RE-8061	Containment High Range Radiation Monitors
RE-8009	Spent Fuel Area
RE-8017	Fuel Handling
Unit 2	
2RX-9820	Containment Purge (Channel 7 or 9)
2RX-9825	Radwaste Area (Channel 7 or 9)
2RX-9830	Fuel Handling Area (Channel 7 or 9)
2RE-8905	Containment Equipment Hatch Area
2RE-8909	Containment Personnel Access Area
2RE-8925-1	Containment High Range Radiation Monitors
2RE-8925-2	Containment High Range Radiation Monitors
2RE-8914	Spent Fuel Area
2RE-8915	Spent Fuel Area
2RE-8916	Spent Fuel Area
2RE-8912	Containment Incore Inst.

Basis:

This IC addresses ris~~increas~~es in radiation dose rates within plant buildings, and may be a precursor to a radioactivity release to the environment. These events represent a loss of control over radioactive material and represent an actual or substantial potential degradation in the level of safety of the plant.

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AA2

[These events escalate from AU2 in that fuel activity has been released, or is anticipated due to fuel heatup. This IC applies to spent fuel requiring water coverage and is not intended to address spent fuel which is licensed for dry storage.]

EAL #1

[Indications may include instrumentation such as water level and local area radiation monitors, and personnel (e.g., refueling crew) reports. Depending on available level indication, the declaration may be based on indications of water makeup rate or drop in applicable borated water storage tank level. Video cameras (Security or outage-related) may allow remote observation of level.]

[*In light of Reactor Cavity Seal failure incidents at two different PWRs and loss of water in the Spent Fuel Pit/Fuel Transfer Canal at a BWR, explicit coverage of these types of events via threshold #1 is appropriate given their potential for increased doses to plant staff.*]

EAL #2

This EAL addresses radiation monitor indications of fuel uncovery and/or fuel damage.

Elevat~~Increas~~ed ventilation monitor readings may be indication of a radioactivity release from the fuel, confirming that damage has occurred. Elevat~~Increas~~ed background at the ventilation monitor due to water level drop~~decrease~~ may mask elevat~~increas~~ed ventilation exhaust airborne activity and needs to be considered.

While a radiation monitor could detect a ris~~en increase~~ in dose rate due to a drop in the water level, it might not be a reliable indication of whether or not the fuel is covered.

[For example, a refueling bridge ARM reading may rise due to planned evolutions such as head lift, or even a fuel assembly being raised in the manipulator mast. Also, a monitor could in fact be properly responding to a known event involving transfer or relocation of a source, stored in or near the fuel pool or responding to a planned evolution such as removal of the reactor head. Generally, elevated radiation monitor indications will need to be combined with another indicator (or personnel report) of water loss.]

[*Application of this EAL requires understanding of the actual radiological conditions present in the vicinity of the monitor. Information Notice No. 90-08, "KR-85 Hazards from Decayed Fuel" should be considered in establishing radiation monitor EALs.*]

Escalation of this emergency classification level, if appropriate, would be based on AS1 or AG1.

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AA3

Initiating Condition - ALERT

Rise in radiation levels within the facility that impedes operation of systems required to maintain plant safety functions

Operating Mode Applicability: All

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

Dose rate >~~greater than~~ 15 mR/hr in ~~**ANY**~~any of the following areas requiring continuous occupancy to maintain plant safety functions:

~~(site specific area list)~~

- Unit 1 Control Room
- Unit 2 Control Room
- Central Alarm Station

Basis:

This IC addresses elevat~~increas~~ed radiation levels that impact continued operation in areas requiring continuous occupancy to maintain safe operation or to perform a safe shutdown.

The cause and/or magnitude of the rise~~increase~~ in radiation levels is not a concern of this IC. The SM/TSC Director/EOF Director~~Emergency Director~~ must consider the source or cause of the elevat~~increas~~ed radiation levels and determine if any other IC may be involved.

~~[*At multiple-unit sites, the EALs could result in declaration of an Alert at one unit due to a radioactivity release or radiation shine resulting from a major accident at the other unit. This is appropriate if the increase impairs operations at the operating unit.*]~~

~~[~~This IC is not meant to apply to rises in the containment dome radiation monitors as these are events which are addressed in the fission product barrier matrix EALs.~~]~~

~~[*The value of 15mR/hr is derived from the GDC 19 value of 5 rem in 30 days with adjustment for expected occupancy times. Although Section III.D.3 of NUREG-0737, "Clarification of TMI Action Plan Requirements", provides that the 15 mR/hr value can be averaged over the 30 days, the value is used here without averaging, as a 30 day duration implies an event potentially more significant than an Alert.*]~~

Areas requiring continuous occupancy include the C~~c~~ontrol R~~r~~ooms and the Central Alarm Station. ~~and, as appropriate to the site, any other control stations that are staffed continuously, such as a radwaste control room, or a security alarm station. *[Typically these areas are the Control Room and the Central Alarm Station (CAS).]*~~

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AS1

Initiating Condition -- SITE AREA EMERGENCY

Offsite dose resulting from an actual or IMMINENT release of gaseous radioactivity > ~~greater than~~ 100 mR~~rem~~ TEDE or 500 mR~~rem~~ child t~~T~~hyroid CDE for the actual or projected duration of the release

Operating Mode Applicability: All

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

Note: *The SM/TSC Director/EOF Director ~~Emergency Director~~ should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time. If dose assessment results are available, the classification ~~declaration~~ should be based on EAL #2 ~~dose assessment~~ instead of EAL #1~~radiation monitor values~~. Do not delay declaration awaiting dose assessment results.*

1. VALID reading on Channel 9 on any~~ANY~~ of the following radiation monitors > ~~greater than~~ the reading shown for ≥ 15 minutes~~ or longer~~:

   ~~(site specific monitor list and threshold values)~~

MONITORS – UNIT 1		LIMIT
RX-9820	Containment Purge	5.90E+1 µCi/cc
RX-9825	Radwaste Area	5.36E+1 µCi/cc
RX-9830	Fuel Handling Area	4.54E+1 µCi/cc
RX-9835	Emergency Penetration Room	9.56E+2 µCi/cc
MONITORS – UNIT 2		**LIMIT**
2RX-9820	Containment Purge	4.46E+1 µCi/cc
2RX-9825	Radwaste Area	3.32E+1 µCi/cc
2RX-9830	Fuel Handling Area	4.46E+1 µCi/cc
2RX-9835	Emergency Penetration Room	8.84E+2 µCi/cc
2RX-9840	Post Accident Sampling Building	4.42E+2 µCi/cc
2RX-9845	Aux. Building Extension	1.26E+2 µCi/cc
2RX-9850	Low Level Radwaste Storage Bldg.	1.77E+2 µCi/cc

OR

2. Dose assessment using actual meteorology indicates doses > ~~greater than~~100 mR~~rem~~ TEDE or 500 mR~~rem~~ child thyroid CDE at or beyond the site boundary.

~~3. VALID perimeter radiation monitoring system reading greater than 100 mR/hr for 15 minutes or longer. [for sites having telemetered perimeter monitors]~~

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AS1

OR

34. Field survey results indicate closed window dose rates > ~~greater than~~100 mR/hr expected to continue for > 60 minutes ~~or longer~~; or analyses of field survey samples indicate child thyroid CDE > ~~greater than~~ 500 mR~~rem~~ for one hour of inhalation, at or beyond the site boundary.

Basis:

~~*[Refer to Appendix A for a detailed basis of the radiological effluent IC/EALs.]*~~

This IC addresses radioactivity releases that result in doses at or beyond the site boundary that exceed 10% of the EPA Protective Action Guides (PAGs). Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public.

~~[*While these failures are addressed by other ICs, this IC provides appropriate diversity and addresses events which may not be able to be classified on the basis of plant status alone. It is important to note that for the more severe accidents the release may be unmonitored or there may be large uncertainties associated with the source term and/or meteorology.*]~~

~~[*The EPA PAGs are expressed in terms of the sum of the effective dose equivalent (EDE) and the committed effective dose equivalent (CEDE), or as the thyroid committed dose equivalent (CDE). For the purpose of these IC/EALs, the dose quantity total effective dose equivalent (TEDE), as defined in 10 CFR 20, is used in lieu of "…sum of EDE and CEDE…." The EPA PAG guidance provides for the use adult thyroid dose conversion factors. However, some states have decided to calculate child thyroid CDE. Utility IC/EALs need to be consistent with those of the states involved in the facility's emergency planning zone.*]~~

~~[*The TEDE dose is set at 10% of the EPA PAG, while the 500 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.*]~~

EAL #1

The ~~site specific~~ monitor list in EAL #1 ~~should~~ includes ~~effluent~~ monitors on all potential release pathways (plant stack, primary-secondary leak, fuel handling accident).

~~[*The monitor reading EALs should be determined using a dose assessment method that back calculates from the dose values specified in the IC. Since doses are generally not monitored in real-time, it is suggested that a release duration of one hour be assumed, and that the EALs be based on a site specific boundary (or beyond) dose of 100 mrem whole body or 500 mrem thyroid in one hour, whichever is more limiting (as was done for EALs #2 and #4). If individual site analyses indicate a longer or shorter duration for the period in which the substantial portion of the activity is released, the longer duration should be used.*]~~

~~[*The meteorology used should be the same as those used for determining AU1 and AA1 monitor reading EALs. The same source term (noble gases, particulates, and halogens) may also be used as long as it maintains a realistic and near linear escalation between the EALs for the four classifications. If proper escalations do not result from the use of the same source term, if the calculated values are unrealistically high, or if correlation between the values and*~~

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AS1

~~*dose assessment values does not exist, then consider using an accident source term for AS1 and AG1 calculations.*~~]

EAL #2

Since dose assessment in EAL #2 is based on actual meteorology, whereas the monitor readings in EAL #1 are~~is~~ not, the results from these assessments may indicate that the classification is not warranted, or may indicate that a higher classification is warranted. For this reason, emergency implementing procedures should call for the timely performance of dose assessments using actual meteorology and release information. If the results of these dose assessments are available when the classification is made (e.g., initiated at a lower classification level), the dose assessment results override the monitor reading EALs.

EAL #3

Field team surveys in EAL #3 should be performed at or beyond the SITE BOUNDARY and at the most accurate indicator of the condition. Field data are independent of release elevation and meteorology. The assumed release duration is one hour. Expected post accident source terms would be dominated by noble gases providing the dose rate value. Sampling of radioiodine by adsorption on a charcoal cartridge should determine the iodine value.

Reference Documents:

1. 1604.051, “Eberline Radiation Monitor System”
2. Offsite Dose Calculation Manual

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AG1

Initiating Condition -- GENERAL EMERGENCY

Offsite dose resulting from an actual or IMMINENT release of gaseous radioactivity > ~~greater than~~ 1000 mR~~rem~~ TEDE or 5000 mR~~rem~~ child t~~T~~hyroid CDE for the actual or projected duration of the release using actual meteorology

Operating Mode Applicability: All

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

Note: *The SM/TSC Director/EOF Director ~~Emergency Director~~ should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time. If dose assessment results are available, the classification ~~declaration~~ should be based on EAL #2 ~~dose assessment~~ instead of EAL #1 ~~radiation monitor values~~. Do not delay declaration awaiting dose assessment results.*

1. VALID reading on Channel 9 on any~~**ANY**~~ of the following radiation monitors > ~~greater than~~ the reading shown for ≥ 15 minutes ~~or longer~~:

   ~~(site specific monitor list and threshold values)~~

	MONITORS – UNIT 1	LIMIT
RX-9820	Containment Purge	5.90E+2 (µCi/cc)
RX-9825	Radwaste Area	5.36E+2 (µCi/cc)
RX-9830	Fuel Handling Area	4.54E+2 (µCi/cc)
RX-9835	Emergency Penetration Room	9.56E+3 (µCi/cc)
	MONITORS – UNIT 2	**LIMIT**
2RX-9820	Containment Purge	4.46E+2 (µCi/cc)
2RX-9825	Radwaste Area	3.32E+2 (µCi/cc)
2RX-9830	Fuel Handling Area	4.46E+2 (µCi/cc)
2RX-9835	Emergency Penetration Room	8.84E+3 (µCi/cc)
2RX-9840	Post Accident Sampling Building	4.42E+3 (µCi/cc)
2RX-9845	Aux. Building Extension	1.26E+3 (µCi/cc)
2RX-9850	Low Level Radwaste Storage Building	1.77E+3 (µCi/cc)

OR

2. Dose assessment using actual meteorology indicates doses > ~~greater than~~ 1000 mR~~rem~~ TEDE or 5000 mR~~rem~~ child thyroid CDE at or beyond the site boundary.

~~3. VALID perimeter radiation monitoring system reading greater than 1000 mR/hr for 15 minutes or longer. [for sites having telemetered perimeter monitors]~~

OR

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AG1

34. Field survey results indicate closed window dose rates > ~~greater than~~1000 mR/hr expected to continue for ≥ 60 minutes ~~or longer~~; or analyses of field survey samples indicate child thyroid CDE > ~~greater than~~ 5000 m~~R~~rem for one hour of inhalation, at or beyond the site boundary.

Basis:

~~[*Refer to Appendix A for a detailed basis of the radiological effluent IC/EALs.*]~~

This IC addresses radioactivity releases that result in doses at or beyond the site boundary that exceed the EPA Protective Action Guides (PAGs). Public protective actions will be necessary. Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public and likely involve fuel damage.

~~[*While these failures are addressed by other ICs, this IC provides appropriate diversity and addresses events which may not be able to be classified on the basis of plant status alone. It is important to note that for the more severe accidents the release may be unmonitored or there may be large uncertainties associated with the source term and/or meteorology.*]~~

~~[*The EPA PAGs are expressed in terms of the sum of the effective dose equivalent (EDE) and the committed effective dose equivalent (CEDE), or as the thyroid committed dose equivalent (CDE). For the purpose of these IC/EALs, the dose quantity total effective dose equivalent (TEDE), as defined in 10 CFR 20, is used in lieu of "…sum of EDE and CEDE…." The EPA PAG guidance provides for the use adult thyroid dose conversion factors. However, some states have decided to calculate child thyroid CDE. Utility IC/EALs need to be consistent with those of the states involved in the facilities emergency planning zone.*]~~

~~[*The TEDE dose is set at the EPA PAG, while the 5000 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.*]~~

EAL #1

The ~~site specific~~ monitor list in EAL #1 ~~should~~ includes ~~effluent~~ monitors on all potential release pathways (plant stack, primary-secondary leak, fuel handling accident).

~~[*The monitor reading EALs should be determined using a dose assessment method that back calculates from the dose values specified in the IC. Since doses are generally not monitored in real-time, it is suggested that a release duration of one hour be assumed, and that the EALs be based on a site specific boundary (or beyond) dose of 1000 mrem whole body or 5000 mrem thyroid in one hour, whichever is more limiting (as was done for EALs #2 and #4). If individual site analyses indicate a longer or shorter duration for the period in which the substantial portion of the activity is released, the longer duration should be used.*]~~

~~[*The meteorology used should be the same as those used for determining AU1 and AA1 monitor reading EALs. The same source term (noble gases, particulates, and halogens) may also be used as long as it maintains a realistic and near linear escalation between the EALs for the four classifications. If proper escalations do not result from the use of the same source term, if the calculated values are unrealistically high, or if correlation between the values and*~~

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AG1

~~*dose assessment values does not exist, then consider using an accident source term for AS1 and AG1 calculations.*~~]

EAL #2

Since dose assessment in EAL #2 is based on actual meteorology, whereas the monitor readings in EAL #1 are~~is~~ not, the results from these assessments may indicate that the classification is not warranted~~, or may indicate that a higher classification is warranted~~. For this reason, emergency implementing procedures should call for the timely performance of dose assessments using actual meteorology and release information. If the results of these dose assessments are available when the classification is made (e.g., initiated at a lower classification level), the dose assessment results override the monitor reading EALs.

EAL #3

Field team surveys in EAL #3 should be performed at or beyond the SITE BOUNDARY and at the most accurate indicator of the condition. Field data are independent of release elevation and meteorology. The assumed release duration is one hour. Expected post accident source terms would be dominated by noble gases providing the dose rate value. Sampling of radioiodine by adsorption on a charcoal cartridge should determine the iodine value.

Reference Documents:

1. 1604.051, “Eberline Radiation Monitor System”
2. Offsite Dose Calculation Manual

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU1

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

RCS leakage

Operating Mode Applicability: Cold Shutdown (Mode 5)

Example Emergency Action Level(s):

Note: *The SM~~Emergency Director~~ should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

~~1. RCS leakage results in the inability to maintain or restore RPV level greater than (site specific low level RPS actuation setpoint) for 15 minutes or longer. [*BWR*]~~

1. RCS leakage results in the inability to maintain or restore level within Pressurizer or RCS level target band~~(site specific pressurizer or RCS/RPV level target band)~~ for ≥ 15 minutes ~~or longer~~. ~~[*PWR*]~~

Basis:

This IC is considered to be a potential degradation of the level of safety of the plant. The inability to maintain or restore level is indicative of loss of RCS inventory.

Relief valve normal operation should be excluded from this IC. However, a relief valve that operates and fails to close per design should be considered applicable to this IC if the relief valve cannot be isolated.

Prolonged loss of RCS Inventory may result in escalation to the Alert emergency classification level via either CA1 or CA34

~~[*The difference between CU1 and CU2 deals with the RCS conditions that exist between cold shutdown and refueling modes. In the refueling mode the RCS is not intact and RPV level and inventory are monitored by different means. In cold shutdown the RCS will normally be intact and standard RCS inventory and level monitoring means are available.*]~~

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COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU2

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

UNPLANNED loss of RCS/reactor vesselRPV inventory

Operating Mode Applicability: Refueling (Mode 6)

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

Note: *The SMEmergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. UNPLANNED RCS/reactor vessel RPV level drop as indicated by either of the following:

   a. RCS/reactor vesselRPV water level drop below the reactor vessel RPV flange for ≥ 15 minutes or longer when the RCS/reactor vessel RPV level band is established above the reactor vesselRPV flange

   OR

   b. RCS/reactor vesselRPV water level drop below the RCS/reactor vessel level band for ≥ 15 minutes or longer when the RCS/reactor vessel RPV level band is established below the reactor vesselRPV flange.

   OR

2. RCS/reactor vesselRPV level cannot be monitored with a loss of RCS/reactor vessel RPV inventory as indicated by an unexplained level rise in (as applicable) the Reactor Building Sump, Reactor Drain Tank, Aux. Building Equipment Drain Tank, Aux. Building Sump, or Quench Tank(site specific sump or tank).

Basis:

This IC is a precursor of more serious conditions and considered to be a potential degradation of the level of safety of the plant.

Refueling evolutions that lowerdecrease RCS water level below the reactor vesselRPV flange are carefully planned and procedurally controlled. An UNPLANNED event that results in water level droppdecreasing below the reactor vessel RPV flange, or below the planned RCS water level for the given evolution (if the planned RCS water level is already below the reactor vessel RPV flange), warrants declaration of an NOUE due to the reduced RCS inventory that is available to keep the core covered.

The allowance of 15 minutes was chosen because it is reasonable to assume that level can be restored within this time frame using one or more of the redundant means of refill that should be available. If level cannot be restored in this time frame then it may indicate a more serious condition exists.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU2

Continued loss of RCS Inventory will result in escalation to the Alert emergency classification level via either CA1 or CA34.

~~[*The difference between CU1 and CU2 deals with the RCS conditions that exist between cold shutdown and refueling modes. In cold shutdown the RCS will normally be intact and standard RCS inventory and level monitoring means are available. In the refueling mode the RCS is not intact and RPV level and inventory are monitored by different means*].~~

EAL #1

This EAL involves a drop~~decrease~~ in RCS level below the top of the reactor vessel ~~RPV~~ flange that continues for 15 minutes due to an UNPLANNED event. This EAL is not applicable to drop~~decrease~~s in flooded reactor cavity level, which is addressed by AU2 EAL1, until such time as the level drop~~decrease~~s to the level of the vessel flange.

~~[*For BWRs*] if RPV level continues to decrease and reaches the Low-Low ECCS Actuation Setpoint then escalation to CA1 would be appropriate.~~

~~[*For PWRs*]~~ If reactor vessel~~RPV~~ level continues to drop~~decrease~~ and reaches the Bottom ID of the RCS Loop then escalation to CA1 would be appropriate.

EAL #2

This EAL addresses conditions in the refueling mode when normal means of core temperature indication and RCS level indication may not be available. Redundant means of reactor vessel~~RPV~~ level indication will normally be installed (including the ability to monitor level visually) to assure that the ability to monitor level will not be interrupted. However, if all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that reactor vessel~~RPV~~ inventory loss was occurring by observing sump and tank level changes. Sump and tank level ris~~increas~~es must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage.

Escalation to the Alert emergency classification level would be via either CA1 or CA34.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU53

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

AC power capability to Vital 4.16 KV~~emergency~~ busses reduced to a single power source ≥ ~~for~~ 15 minutes ~~or longer~~ such that any additional single failure would result in station blackout

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

Example Emergency Action Level(s):

Note: *The SM~~Emergency Director~~ should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. a. AC power capability to Vital 4.16 KV ~~(site specific emergency~~ busses~~)~~ reduced to a single power source ≥ ~~for~~ 15 minutes ~~or longer~~.

   AND

   b. Any additional single power source failure will result in station blackout.

Basis:

The condition indicated by this IC is the degradation of the offsite and onsite AC power systems such that any additional single failure would result in a station blackout. This condition could occur due to a loss of offsite power with a concurrent failure of all but one emergency generator to supply power to its emergency busses. The subsequent loss of this single power source would escalate the event to an Alert in accordance with CA53.

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

The EAL allows credit for operation of the Alternate AC Diesel Generator.

~~[*At multi-unit stations, the EALs should allow credit for operation of installed design features, such as cross-ties or swing diesels, provided that abnormal or emergency operating procedures address their use. However, these stations must also consider the impact of this condition on other shared safety functions in developing the site specific EAL.*]~~

~~[*Plants that have a proceduralized capability to cross-tie AC power from an off-site power supply of a companion unit may take credit for the redundant power source in the associated EAL for this IC.*]~~

Reference Documents:
1. 1202.007, "*Degraded Power*"
2. 1202.008, "*Blackout"*
3. 2202.007, "*Loss of Off-Site Power"*
4. 2202.008, "*Station Blackout"*
5. 2104.037, "*Alternate AC Diesel Generator Operations"*

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU34

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

UNPLANNED loss of decay heat removal capability with irradiated fuel in the reactor vessel ~~RPV.~~

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

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

Note: *The SM~~Emergency Director~~ should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. UNPLANNED event results in RCS temperature exceeding 200 °F~~the Technical Specification cold shutdown temperature limit~~.

   OR

2. Loss of all RCS temperature and RCS/reactor vessel~~RPV~~ level indication for ≥ 15 minutes ~~or longer~~.

Basis:

This IC is ~~be~~ a precursor of more serious conditions and, as a result, is considered to be a potential degradation of the level of safety of the plant. In cold shutdown the ability to remove decay heat relies primarily on forced cooling flow. Operation of the systems that provide this forced cooling may be jeopardized due to the unlikely loss of electrical power or RCS inventory. Since the RCS usually remains intact in the cold shutdown mode a large inventory of water is available to keep the core covered.

~~[*Entry into cold shutdown conditions may be attained within hours of operating at power. Entry into the refueling mode procedurally may not occur for typically 100 hours (site specific) or longer after the reactor has been shutdown. Thus the heatup threat and therefore the threat to damaging the fuel clad may be lower for events that occur in the refueling mode with irradiated fuel in the RPV (note that the heatup threat could be lower for cold shutdown conditions if the entry into cold shutdown was following a refueling). In addition, the operators should be able to monitor RCS temperature and RPV level so that escalation to the alert level via CA4 or CA1 will occur if required.*]~~

During refueling the level in the reactor vessel~~RPV~~ will normally be maintained above the reactor vessel~~RPV~~ flange. Refueling evolutions that lower ~~decrease~~ water level below the reactor vessel~~RPV~~ flange are carefully planned and procedurally controlled. Loss of forced decay heat removal at reduced inventory may result in more rapid ris~~increas~~es in RCS/reactor vessel~~RPV~~ temperatures depending on the time since shutdown.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU34

N[~~*Unlike the cold shutdown mode,*~~] normal means of core temperature indication and RCS level indication may not be available in the refueling mode. Redundant means of reactor vessel~~RPV~~ level indication are therefore procedurally installed to assure that the ability to monitor level will not be interrupted. However, if all level and temperature indication were to be lost in either the cold shutdown of refueling modes, EAL 2 would result in declaration of an NUE ~~NOUE~~ if both temperature and level indication cannot be restored within 15 minutes from the loss of both means of indication.

Escalation to Alert would be via CA1 based on an inventory loss or CA34 ~~4~~ based on exceeding its temperature criteria.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU8~~6~~

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Loss of all o~~O~~nsite or o~~O~~ffsite communications capabilities

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)
Defueled

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

1. Loss of all Table C2~~of the following~~ onsite communication methods affecting the ability to perform routine operations.

~~(site specific list of communications methods)~~

OR

2. Loss of all Table C3 ~~of the following~~ offsite communication methods affecting the ability to perform offsite notifications.

~~(site specific list of communications methods)~~

Table C2 Onsite Communications Methods
Station radio system Plant paging system In-plant telephones Gaitronics

Table C3 Offsite Communications Methods
All telephone lines (commercial and microwave) ENS

Basis:

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

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

~~[*Site specific list for on-site communications loss must encompass the loss of all means of routine communications (e.g., commercial telephones, sound powered phone systems, page party system and radios / walkie talkies).*~~

~~*Site specific list for off-site communications loss must encompass the loss of all means of communications with off-site authorities. This should include the ENS, commercial telephone lines, telecopy transmissions, and dedicated phone systems.*~~]

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU6~~7~~

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Loss of required DC power ≥ ~~for~~ 15 minutes ~~or longer.~~

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

Example Emergency Action Level(s):

Note: *The SM ~~Emergency Director~~ should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. < 105 volts ~~Less than (site specific bus voltage indication)~~ on required Vital DC bus ~~(site specific Vital DC busses) ≥~~ ~~for~~ 15 minutes ~~or longer~~.

Basis:

The purpose of this IC and its associated EALs is to recognize a loss of DC power compromising the ability to monitor and control the removal of decay heat during Cold Shutdown or Refueling operations.

~~[*This EAL is intended to be anticipatory in as much as the operating crew may not have necessary indication and control of equipment needed to respond to the loss.*]~~

~~[*Plants will routinely perform maintenance on a Train related basis during shutdown periods The required busses are the minimum allowed by Technical Specifications for the mode of operation.]*~~
It is intended that the loss of the operating (operable) train is to be considered. If this loss results in the inability to maintain cold shutdown, the escalation to an Alert will be per CA34.

~~[*(Site specific) bus voltage should be based on the minimum bus voltage necessary for the operation of safety related equipment. This voltage value should incorporate a margin of at least 15 minutes of operation before the onset of inability to operate those loads. This voltage is usually near the minimum voltage selected when battery sizing is performed. Typically the value for the entire battery set is approximately 105 VDC. For a 60 cell string of batteries the cell voltage is typically 1.75 Volts per cell. For a 58 string battery set the minimum voltage is typically 1.81 Volts per cell.*]~~

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

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU78

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Inadvertent criticality

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

Example Emergency Action Level(s):

~~1. UNPLANNED sustained positive period observed on nuclear instrumentation. (BWR)~~

1. UNPLANNED sustained positive startup rate observed on nuclear instrumentation. ~~(PWR)~~

Basis:

This IC addresses criticality events that occur in Cold Shutdown or Refueling modes ~~[(*NUREG 1449, Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States)*]~~ such as fuel mis-loading events and inadvertent dilution events. This IC indicates a potential degradation of the level of safety of the plant, warranting an N~~O~~UE classification.

~~[~~This condition can be identified using the startup rate meter. The term “sustained” is used in order to allow exclusion of expected short term positive startup rates from planned fuel bundle or control rod movements during core alteration. These short term positive startup rates are the result of the rise in neutron population due to subcritical multiplication.~~]~~

Escalation would be by SM~~Emergency Director~~ j~~J~~udgment.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA1

Initiating Condition - ALERT

Loss of RCS/reactor vessel~~/RPV~~ inventory~~.~~

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

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

Note: *The SM/TSC Director/EOF Director~~Emergency Director~~ should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. Loss of RCS/reactor vessel~~RPV~~ inventory as indicated by: ~~level.less than (site specific level)~~

   Unit 1: RVLMS Levels 1 through 8 indicate DRY
   Unit 2: RVLMS Levels 1 through 5 indicate DRY

   OR

   Unit 1: Reactor vessel level < 368 ft., 0 in. (bottom of the hot leg)
   Unit 2: Reactor vessel level < 369 ft., 1.5 in. (bottom of the hot leg)

   ~~[*Low-Low ECCS actuation setpoint / Level 2 (BWR)*]~~

   ~~[*Bottom ID of the RCS loop (PWR)*]~~

   OR

2. RCS/reactor vessel~~RPV~~ level cannot be monitored for ≥ 15 minutes ~~or longer~~ with a loss of RCS/reactor vessel~~RPV~~ inventory as indicated by an unexplained level rise in the Reactor Building Sump, Reactor Drain Tank, Aux. Building Equipment Drain Tank, Aux. Building Sump, or Quench Tank.~~(site specific sump or tank)~~.

Basis:

These EALs serve as precursors to a loss of ability to adequately cool the fuel. The magnitude of this loss of water indicates that makeup systems have not been effective and may not be capable of preventing further reactor vessel~~RPV~~ level lowering~~decrease~~ and potential core uncovery. This condition will result in a minimum emergency classification level of an Alert.

EAL #1

~~[*The BWR Low-Low ECCS Actuation Setpoint/Level 2 was chosen because it is a standard setpoint at which some available injection systems automatically start. The PWR Bottom ID of the RCS Loop Setpoint was chosen because at this level remote RCS level indication may be lost and loss of suction to decay heat removal systems has occurred. The Bottom ID of the RCS Loop*

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA1

~~*Setpoint should be the level equal to the bottom of the RPV loop penetration (not the low point of the loop).*~~]

The bottom of the RCS hot leg penetration into the reactor vessel is approximately RLVMS Level 8 (Unit 1) or RVLMS Level 5 (Unit 2). However, RVLMS may not be available in mode 6. Redundant means level indication is provided in this mode and included in EAL #1. The bottom of the RCS hot leg penetration into the reactor vessel is 368 ft., 0 in. (Unit 1) or 369 ft., 1.5 in. (Unit 2). Below this level, reactor vessel level indication will be lost and loss of suction to decay heat removal systems will occur. The inability to restore and maintain level after reaching this setpoint would be indicative of a failure of the RCS barrier.

EAL #2

~~[~~In the cold shutdown mode, normal RCS level and reactor vessel level instrumentation systems will usually be available. In the refueling mode, normal means of reactor vessel level indication may not be available. Redundant means of reactor vessel level indication will usually be installed (including the ability to monitor level visually) to assure that the ability to monitor level will not be interrupted. However, if all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that reactor vessel inventory loss was occurring by observing sump and tank level changes. Sump and tank level rises must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage.~~]

~~[*The 15-minute duration for the loss of level indication was chosen because it is half of the CS1 Site Area Emergency EAL duration. Significant fuel damage is not expected to occur until the core has been uncovered for greater than 1 hour per the analysis referenced in the CG1 basis. Therefore this EAL meets the definition for an Alert.*]~~

If reactor vessel~~RPV~~ level continues to lower then escalation to Site Area Emergency will be via CS1.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA~~3~~3

Initiating Condition - ALERT

Loss of all o~~O~~ffsite and all o~~O~~n~~S~~site AC power to Vital 4.16KV~~emergency~~ busses ≥ ~~for~~ 15 minutes ~~or longer.~~

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)
Defueled

Example Emergency Action Level(s):

Note: *The SM/TSC Director/EOF Director~~Emergency Director~~ should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. Loss of all o~~O~~ff~~S~~site and all o~~O~~n-s~~S~~ite AC p~~P~~ower to Vital 4.16KV busses ~~(site specific emergency busses)~~≥~~for~~ 15 minutes ~~or longer~~.

Basis:

Loss of all AC power compromises all plant safety systems requiring electric power including DHR/shutdown cooling~~RHR~~, emergency core cooling~~ECCS~~, c~~C~~ontainment cooling~~Heat Removal~~, s~~S~~pent f~~F~~uel pool cooling~~Heat Removal~~ and the u~~U~~ltimate h~~H~~eat s~~S~~ink.

The event can be classified as an Alert when in cold shutdown, refueling, or defueled mode because of the significantly reduced decay heat and lower temperature and pressure, which allow rai~~increa~~sing the time to restore one of the emergency busses, relative to that specified for the Site Area Emergency EAL.

Escalating to Site Area Emergency, if appropriate, is by Abnormal Radiation Levels / Radiological Effluent (TAB A) ICs.

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

~~*[The companion IC is SS1].*~~

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA34

Initiating Condition - ALERT

Inability to maintain plant in Ccold Sshutdown

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

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

1. An UNPLANNED event results in RCS temperature > 200°Fgreater than (site specificTechnical Specification cold shutdown temperature limit) > for greater than the specified duration ion Ttable C1.

Table C1 RCS Reheat Duration Thresholds		
RCS	**Containment Closure**	**Duration**
Intact (but not RCS Lowered Inventory [PWR])	N/A	60 minutes*
Not intact or RCS Lowered Inventory *(PWR)*	Established	20 minutes*
	Not Established	0 minutes
* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, the EAL is not applicable.		

OR

Note: *EAL #2 does not apply in solid plant conditions.*

2. An UNPLANNED event results in RCS pressure riseincrease > greater than10 psi due to a loss of RCS cooling. (PWR-This EAL does not apply in Solid Plant conditions.)

Basis:

EAL #1

TFor EAL 1, the RCS Reheat Duration Threshold table addresses complete loss of functions required for core cooling for greater than 60 minutes during refueling and cold shutdown modes when RCS integrity is established. [RCS integrity should be considered to be in place when the RCS pressure boundary is in its normal condition for the cold shutdown mode of operation (e.g., no freeze seals or nozzle dams). *The status of CONTAINMENT CLOSURE in this condition is immaterial given that the RCS is providing a high pressure barrier to fission product release to the environment.*] The 60 minute time frame should allow sufficient time to restore cooling without there being a substantial degradation in plant safety.

The RCS Reheat Duration Threshold table also addresses the complete loss of functions required for core cooling for greater than 20 minutes during refueling and cold shutdown modes when CONTAINMENT CLOSURE is established but RCS integrity is not established or RCS

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA34

inventory is reduced ~~[~~(e.g., mid-loop operation ~~in PWRs~~)~~]~~. ~~[~~As discussed above, RCS integrity should be assumed to be in place when the RCS pressure boundary is in its normal condition for the cold shutdown mode of operation (e.g., no freeze seals or nozzle dams)~~]~~. The allowed 20 minute time frame was included to allow operator action to restore the heat removal function, if possible~~. [*The allowed time frame is consistent with the guidance provided by Generic Letter 88-17, "Loss of Decay Heat Removal" (discussed later in this basis) and is believed to be conservative given that a low pressure Containment barrier to fission product release is established.*]~~

Finally, the EAL addresses complete loss of functions required for core cooling during refueling and cold shutdown modes when neither CONTAINMENT CLOSURE nor RCS integrity are established. ~~Finally, complete loss of functions required for core cooling during refueling and cold shutdown modes when neither CONTAINMENT CLOSURE nor RCS integrity are established. [*RCS integrity is in place when the RCS pressure boundary is in its normal condition for the cold shutdown mode of operation (e.g., no freeze seals or nozzle dams). No delay time is allowed because the evaporated reactor coolant that may be released into the Containment during this heatup condition could also be directly released to the environment.*]~~

The~~note~~ (*) indicates that this EAL is not applicable if actions are successful in restoring an RCS heat removal system to operation and RCS temperature is being reduced within the specified time frame.

EAL #2

T~~In EAL 2, t~~he 10 psi pressure rise~~increase~~ addresses situations where, due to high decay heat loads, the time provided to restore temperature control, should be less than 60 minutes. The RCS pressure setpoint chosen should be 10 psi or the lowest pressure that the site can read on installed Control Board instrumentation that is equal to or greater than 10 psi.

Escalation to Site Area Emergency would be via CS1 should boiling result in significant reactor vessel~~RPV~~ level loss leading to core uncovery.

~~[*For PWRs, this IC and its associated EALs are based on concerns raised by Generic Letter 88-17, "Loss of Decay Heat Removal." A number of phenomena such as pressurization, vortexing, steam generator U-tube draining, RCS level differences when operating at a mid-loop condition, decay heat removal system design, and level instrumentation problems can lead to conditions where decay heat removal is lost and core uncovery can occur. NRC analyses show that there are sequences that can cause core uncovery in 15 to 20 minutes and severe core damage within an hour after decay heat removal is lost.*]~~

A loss of Technical Specification components alone is not intended to constitute an Alert. The same is true of a momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when the heat removal function is available.

The SM/TSC Director/EOF Director ~~Emergency Director~~ must remain alert to events or conditions that lead to the conclusion that exceeding the EAL is IMMINENT. If, in the judgment of the SM/TSC Director/EOF Director~~Emergency Director~~, an IMMINENT situation is at hand, the classification should be made as if the threshold has been exceeded.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CS1

Initiating Condition - SITE AREA EMERGENCY

Loss of RCS/reactor vesselRPV inventory affecting core decay heat removal capability.

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

Example Emergency Action Level(s): (1 or 2 or 3)

Note: *The SM/TSC Director/EOF Director Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. With CONTAINMENT CLOSURE **not**not established:RCS/RPV level less than (site specific level).

   Unit 1: RVLMS Levels 1 through 9 indicate DRY
   Unit 2: RVLMS Levels 1 through 6 indicate DRY

   [*6" below the bottom ID of the RCS loop (PWR)*]
   [*6" below the low-low ECCS actuation setpoint (BWR)*]

   OR

2. With CONTAINMENT CLOSURE established, core exit thermocouples indicate superheat. RCS/RPV level less than (site specific level for TOAF).

   OR

3. RCS/reactor vesselRPV level cannot be monitored for ≥ 30 minutes or longer with a loss of RCS/reactor vessel RPV inventory as indicated by any **ANY** of the following:

   - Containment High Range Radiation Monitor reading > 10R/hr (Site specific radiation monitor) reading greater than (site specific value)
   - Erratic sSource rRange mMonitor iIndication
   - Unexplained level rise in Reactor Building Sump, Reactor Drain Tank, Quench Tank, Aux. Building Equipment Drain Tank, or Aux. Building Sump.(site specific sump or tank)

Basis:

Under the conditions specified by this IC, continued loweringdecrease in RCS/reactor vesselRPV level is indicative of a loss of inventory control. Inventory loss may be due to an RCS breach, pressure boundary leakage, or continued boiling in the RPV. Thus, declaration of a Site Area Emergency is warranted.

Escalation to a General Emergency is via CG1 or AG1.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CS1

~~EAL #1~~

~~[*6" below the bottom ID of the RCS Loop should be the level equal to 6" below the bottom of the RPV loop penetration (not the low point of the loop). PWRs unable to measure this level should choose the first observable point below the bottom ID of the loop as the EAL value. If a water level instrument is not available such that the PWR EAL value cannot be determined, then EAL 3 should be used to determine if the IC has been met.*]~~

~~[*Since BWRs have RCS penetrations below the EAL value, continued level decrease may be indicative of pressure boundary leakage.*]~~

EAL #3

~~[~~In the cold shutdown mode, normal RCS level and reactor vessel level instrumentation systems will usually be available. In the refueling mode, normal means of reactor vessel level indication may not be available. Redundant means of reactor vessel level indication will usually be installed (including the ability to monitor level visually) to assure that the ability to monitor level will not be interrupted. However, if all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that reactor vessel inventory loss was occurring by observing sump and tank level changes. Sump and tank level rises must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage.~~]~~

The 30-minute duration allows sufficient time for actions to be performed to recover inventory control equipment.

As water level in the reactor vessel~~RPV~~ lowers, the dose rate above the core will rise~~increase~~. The dose rate due to this core shine should result in site specific monitor indication and possible alarm.

~~[*This EAL should conservatively estimate a site specific dose rate setpoint indicative of core uncovery (i.e., level at TOAF). For BWRs that do not have installed radiation monitors capable of indicating core uncovery, alternate site specific level indications of core uncovery should be used.*]~~

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

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CG1

Initiating Condition - GENERAL EMERGENCY

Loss of RCS/reactor vessel~~RPV~~ inventory affecting fuel clad integrity with containment challenged

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

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

Note: *The SM/TSC Director/EOF Director~~Emergency Director~~ should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. a. Core exit thermocouples indicate superheat ~~RCS/RPV level less than (site specific level for TOAF)~~ for ≥ 30 minutes~~ or longer~~.

   AND

   b. Any of the following containment challenge indications:~~**ANY** containment challenge indication (see Table):~~

   - CONTAINMENT CLOSURE not established
   - Explosive mixture inside containment
   - UNPLANNED rise in containment pressure

   OR

2. a. RCS/reactor vessel~~RPV~~ level cannot be monitored with core uncovery indicated by any ~~**ANY**~~ of the following for ≥ 30 minutes:~~ or longer~~

   - Containment High Range Radiation Monitor reading > 10R/hr ~~(Site specific radiation monitor) reading greater than (site specific setpoint).~~
   - Erratic source range monitor indication
   - UNPLANNED level rise in Reactor Building Sump, Reactor Drain Tank, Quench Tank, Aux. Building Equipment Drain Tank, or Aux. Building Sump ~~(site specific sump or tank).~~
     ~~*[Other site specific indications]*~~

   AND

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CG1

b. Any of the following containment challenge indications: ~~**ANY** containment challenge indication (see Table):~~

~~**Table: Containment Challenge Indications**~~
~~□CONTAINMENT CLOSURE not established.~~ ~~□(Site specific explosive mixture) inside containment.~~ ~~□UNPLANNED rise in containment pressure.~~ ~~Secondary containment radiation monitor reading above (site specific value). [*BWR only*]~~

- CONTAINMENT CLOSURE not established
- Explosive mixture inside containment
- UNPLANNED rise in containment pressure

Basis:

This IC represents the inability to restore and maintain reactor vessel~~RPV~~ level to above the top of active fuel with containment challenged. Fuel damage is probable if reactor vessel~~RPV~~ level cannot be restored, as available decay heat will cause boiling, further reducing the reactor vessel~~RPV~~ level. With the CONTAINMENT breached or challenged then the potential for unmonitored fission product release to the environment is high. This represents a direct path for radioactive inventory to be released to the environment. This is consistent with the definition of a GE. The GE is declared on the occurrence of the loss or IMMINENT loss of function of all three barriers.

~~[*These EALs are based on concerns raised by Generic Letter 88-17, Loss of Decay Heat Removal, SECY 91-283, Evaluation of Shutdown and Low Power Risk Issues, 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.*]~~

A number of variables can have a significant impact on heat removal capability challenging the fuel clad barrier. Examples include~~: [*BWRs*] initial vessel level, shutdown heat removal system design~~

~~[*PWRs*]~~ mid-loop, reduced level/flange level, head in place, cavity flooded, RCS venting strategy, decay heat removal system design, vortexing pre-disposition, and steam generator U-tube draining.

Analysis indicates that core damage may occur within an hour following continued core uncovery therefore, 30 minutes was conservatively chosen.

If CONTAINMENT CLOSURE is re-established prior to exceeding the 30 minute core uncovery time limit then escalation to GE would not occur.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CG1

~~[*Site shutdown contingency plans typically provide for re-establishing CONTAINMENT CLOSURE following a loss of heat removal or RCS inventory functions.*]~~

~~[~~In the early stages of a core uncovery event, it is unlikely that hydrogen buildup due to a core uncovery could result in an explosive mixture of dissolved gasses in Containment. However, Containment monitoring and/or sampling should be performed to verify this assumption and a General Emergency declared if it is determined that an explosive mixture exists.~~]~~

~~[*For BWRs, the use of secondary containment radiation monitors should provide indication of increased release that may be indicative of a challenge to secondary containment. The site specific radiation monitor values should be based on the EOP "maximum safe values" because these values are easily recognizable and have an emergency basis.*]~~

~~EAL #2~~

Sump and tank level rises~~increases~~ must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage.

~~[~~In the cold shutdown mode, normal RCS level and reactor vessel level instrumentation systems will usually be available. In the refueling mode, normal means of reactor vessel level indication may not be available. Redundant means of reactor vessel level indication will usually be installed (including the ability to monitor level visually) to assure that the ability to monitor level will not be interrupted. However, if all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that reactor vessel inventory loss was occurring by observing sump and tank level changes. Sump and tank level rises must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage.~~]~~

As water level in the reactor vessel~~RPV~~ lowers, the dose rate above the core will rise~~increase~~. The dose rate due to this core shine should result in site specific monitor indication and possible alarm.

~~[This EAL should conservatively estimate a site specific dose rate setpoint indicative of core uncovery (ie., level at TOAF). For BWRs that do not have installed radiation monitors capable of indicating core uncovery, alternate site specific level indications of core uncovery should be used.]~~

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

Reference Documents

1. ULD-1-SYS-24, *"Unit 1 Inadequate Core Cooling"*
2. ULD-2-SYS-24, *"Unit 2 Inadequate Core Cooling"*

ISFSI MALFUNCTION

E-HU1

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Damage to a loaded cask CONFINEMENT BOUNDARY

Operating Mode Applicability: All ~~Not applicable~~

Example Emergency Action Level(s):

1. Damage to a loaded cask CONFINEMENT BOUNDARY.

Basis:

An NUE~~A NOUE~~ in this IC is categorized on the basis of the occurrence of an event of sufficient magnitude that a loaded cask CONFINEMENT BOUNDARY is damaged or violated. This includes classification based on a loaded fuel storage cask CONFINEMENT BOUNDARY loss leading to the degradation of the fuel during storage or posing an operational safety problem with respect to its removal from storage.

~~*[The results of the ISFSI Safety Analysis Report (SAR) per NUREG 1536 or SAR referenced in the cask('s) Certificate of Compliance and the related NRC Safety Evaluation Report identify natural phenomena events and accident conditions that could potentially effect the CONFINEMENT BOUNDARY]*~~This EAL addresses a dropped cask, a tipped over cask, EXPLOSION, PROJECTILE damage, FIRE damage or natural phenomena affecting a cask (e.g., seismic event, tornado, etc.).

FISSION PRODUCT BARRIERS

General Bases~~NOTES~~

The logic used for these initiating conditions reflects the following considerations:

- The Fuel Clad Barrier and the RCS Barrier are weighted more heavily than the Containment Barrier (See Sections 3.4 and 3.8). NUE~~NOUE~~ ICs associated with RCS and Fuel Clad Barriers are addressed under System Malfunction (S) ICs.

- At the Site Area Emergency level, there must be some ability to dynamically assess how far present conditions are from the threshold for a General Emergency. For example, if Fuel Clad and RCS Barrier "Loss" EALs existed, that, in addition to off-site dose assessments, would require continual assessments of radioactive inventory and containment integrity. Alternatively, if both Fuel Clad and RCS Barrier "Potential Loss" EALs existed, the SM/TSC Director/EOF Director~~Emergency Director~~ would have more assurance that there was no immediate need to escalate to a General Emergency.

- The ability to escalate to higher emergency classes~~classification levels~~ as an event deteriorates must be maintained. For example, RCS leakage steadily increasing would represent an increasing risk to public health and safety.

- The Containment Barrier should not be declared lost or potentially lost based on exceeding Technical Specification action statement criteria, unless there is an event in progress requiring mitigation by the Containment barrier. When no event is in progress (Loss or Potential Loss of either Fuel Clad and/or RCS) the Containment Barrier status is addressed by Technical Specifications.

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

FUEL CLAD

~~FUEL~~ Fuel ~~CLAD~~ Clad ~~BARRIER~~ Barrier Emergency Action Levels~~THRESHOLDS~~: ~~(1 or 2 or 3 or 4 or 6 or 7 or 8)~~ FCB1 **OR** FCB2 **OR** FCB3 **OR** FCB4 **OR** FCB5 **OR** FCB6

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

~~1. Critical Safety Function Status~~

~~[*These thresholds are for PWRs using Critical Safety Function Status Tree (CSFST) monitoring and functional restoration procedures. For more information, please refer to Section 3.9 of this document.*]~~

~~Loss:~~ ~~Core Cooling Red Entry Conditions Met.~~

~~Potential Loss:~~ ~~Core Cooling Orange Entry Conditions Met~~ **~~OR~~** ~~Heat Sink Red Entry Conditions Met.~~

~~Loss Threshold A~~

~~Core Cooling - RED indicates significant superheating and core uncovery and is considered to indicate loss of the Fuel Clad Barrier.~~

~~Potential Loss Threshold A~~

~~Core Cooling - ORANGE indicates subcooling has been lost and that some clad damage may occur.~~

~~Potential Loss Threshold B~~

~~Heat Sink - RED when heat sink is required indicates the ultimate heat sink function is under extreme challenge.~~

~~1~~2. Primary Coolant Activity Level (FCB1)

Loss:

1. Coolant activity ~~>greater than (site specific value)~~ 300 µCi/gm dose equivalent I-131 activity by Chemistry sample

   OR

2. Radiation levels > 1000 MR/hr

   Unit 1: at SA-229
   Unit 2: at 2TCD-19

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

FUEL CLAD

Potential Loss: None~~Not Applicable~~

Basis:

Loss

The site specific value corresponds to 300 µCi/gm I-131 equivalent. Assessment by the EAL Task Force indicates that this amount of coolant activity is well above that expected for iodine spikes and corresponds to less than 5% fuel clad damage. This amount of radioactivity indicates significant clad damage and thus the Fuel Clad Barrier is considered lost.

~~*[The value can be expressed either in mR/hr observed on the sample or as µCi/gm results from analysis.*~~]

A reading of greater than 1000 mR/hr within at one foot from the RCS sample lines (SA-229 for Unit 1, 2TCD-19 for Unit 2) has been determined to correspond to fuel clad failure of approximately 2-5%, and thus the fuel clad barrier is considered lost. This reading is well above that expected for iodine spikes and thus indicates significant clad damage and thus the fuel clad barrier is considered lost.

Potential Loss

There is no Potential Loss EAL~~threshold~~ associated with this item.

Reference Documents

1. ANO Calculation 03-E-0002-01, *"Radiation Monitor EAL Setpoints for Fission Product Barrier Degradation"*

~~2~~3. Core Exit Thermocouple Readings (FCB2)

Loss: ~~Core exit thermocouples reading~~ > 1200 °F CET temperature~~greater than (site specific degree F)~~.

Potential Loss: ~~Core exit thermocouples reading greater than (site specific degree F)~~.

Unit 1: ICC exists as evidenced by CETs indicating superheated conditions

Unit 2: Average CETs indicate superheat for current RCS pressure

Basis:

~~[*Core Exit Thermocouple Readings are included in addition to the Critical Safety Functions to include conditions when the CSFs may not be in use (initiation after SI is blocked) or plants which do not have a CSF scheme.*]~~

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

FUEL CLAD

Loss ~~Threshold A~~

The Loss EAL of > 1200 °F is consistent with NEI 99-01 and corresponds~~The site specific reading should correspond~~ to significant superheating of the coolant.

~~[*This value typically corresponds to the temperature reading that indicates core cooling - RED in Fuel Clad Barrier loss threshold 1.A which is usually about 1200 degrees F.*]~~

Potential Loss ~~Threshold A~~

~~The site specific reading should correspond to loss of subcooling.~~ The Potential Loss EAL corresponds to a loss of subcooling margin.

Note that the loss or potential loss EAL for this category will occur after a loss of adequate sub-cooling margin, which represents a loss of the RCS barrier in EAL RCB1, and therefore represents the loss of two barriers, resulting in a Site Area Emergency per FS1. Any loss or potential loss of the containment barrier at that point would escalate to a General Emergency.

~~[*This value typically corresponds to the temperature reading that indicates core cooling - ORANGE in Fuel Clad Barrier potential loss threshold 1.A which is usually about 700 to 900 degrees F.*]~~

Reference Documents

1. Unit 1 EOP 1202.005, *"Inadequate Core Cooling"*
2. Unit 1 EOP 1202.013, *"EOP Figures"*
3. Unit 2 OP 2202.009, *"Functional Recovery"*
4. ANO Procedure OP 1302.022, *"Core Damage Assessment"*
5. CE-NPSD-241, *"Development of the Comprehensive Procedure Guideline for Core Damage Assessment,"* Task 467
6. BWOG EOP Technical Bases Document, Vol. 3, Chapter III.F

34. Reactor Vessel Water Level (FCB3)

Loss: None~~Not Applicable~~

Potential Loss: ~~RCS/RPV level less than (site specific level for TOAF).~~

Unit 1: RVLMS Levels 1 through 9 indicate DRY

Unit 2: RVLMS Levels 1 through 7 indicate DRY

Basis:

Loss

There is no Loss EAL~~threshold~~ associated with this item.

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

FUEL CLAD

Potential Loss

~~The site specific value for the Potential Loss threshold corresponds to the top of the active fuel.~~

The Reactor Vessel Level Monitoring Systems at ANO do not provide positive indication of core uncovery. The above core level indication provided is used to monitor the approach to and recovery from ICC conditions, but the CETs are used to identify core uncovery, and are the only positive indication of core uncovery.

Per reference document #1, the reactor vessel level indicators installed in Unit 1 extend from the top of the reactor vessel to the fuel alignment plate, and information in reference document #2 indicates that the lowest sensor is greater than 2 feet above the top of active fuel. If any of the 4 RCPs are running, flow induced turbulence produced by the pumps renders the reactor vessel level indicator readings invalid.

Per reference document #3, only the reactor vessel level indicators above the core are considered part of the ICC monitoring system. Per reference document #4, the lowest sensor above the core, RVLMS LVL 6 on the ICC monitoring panel 2C388, is 47 inches above the top of the core. If any of the 4 RCPs are running, flow induced turbulence produced by the pumps renders the reactor vessel level indicator readings invalid.

For either unit then, should CET indication be unavailable and reactor vessel level indication be unavailable due to RCP operation or any other cause, a degraded ability to monitor the barrier would exist.

~~[*For sites using CSFSTs, the Potential Loss* threshold *is defined by the Core Cooling - ORANGE path. The site specific value in this* threshold *should be consistent with the CSFST value*.]~~

Reference Documents

1. ULD-1-SYS-24, *"Unit 1 Inadequate Core Cooling System"*
2. Calculation 84-EQ-0080-02, *"Loop Error Analysis for Reactor Vessel Level Monitoring System"*
3. ULD-2-SYS-24, *"Unit 2 Inadequate Core Cooling Monitoring System"*
4. Calculation 90-E-0116-01, *"Unit 2 EOP Setpoint Document,"* Setpoint R.3

~~**5. Not Applicable** (included for numbering consistency between barrier tables)~~

~~4~~6. Containment Radiation Monitoring (FCB4)

Loss: ~~Containment radiation monitor reading greater than (site specific value).~~ Containment high range radiation monitor reading > 1000 R/hr

Potential Loss: None~~Not Applicable~~

Basis:

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

FUEL CLAD

Loss

The 1000 R/hr~~site specific~~ reading on the containment high range radiation monitors (RE-8060 or RE-8061 for Unit 1, 2RE-8925-1 or 2RE-8925-2 for Unit 2) is a value which indicates the release of reactor coolant, with elevated activity indicative of fuel damage, into the containment.

~~[*The reading should be calculated assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with a concentration of 300 µCi/gm dose equivalent I-131 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.

This radiation monitor value is higher than that specified for RCS barrier Loss EAL **RCB3**~~threshold #6~~. Thus, this EAL~~threshold~~ indicates a loss of both the Fuel Clad barrier and RCS barrier that appropriately escalates the emergency classification ~~level~~ to a Site Area Emergency per FS1.

Potential Loss~~[Caution: it is important to recognize that in the event the radiation monitor is sensitive to shine from the reactor vessel or piping, spurious readings will be present and another indicator of fuel clad damage is necessary or compensated for in the threshold value.]~~

There is no Potential Loss EAL~~threshold~~ associated with this item.

Reference Documents

1. NUREG 1228, *"Source Term Estimation During Incident Response to Severe Nuclear Power Plant Accidents"*
2. ANO Calculation 03-E-0002-01, *"Radiation Monitor EAL Setpoints for Fission Product Barrier Degradation"*

~~57~~. ~~Other Site Specific Indications~~ Core Damage Assessment (FCB5)
~~This subcategory addresses other site specific thresholds that may be included to indicate loss or potential loss of the Fuel Clad barrier~~.
Loss: At least 5% fuel clad damage as determined from core damage assessment

Potential Loss: None

Basis:

FISSION PRODUCT BARRIERS
~~**PWR TABLE 5-F-3**~~

FUEL CLAD

Loss

This level is consistent with other fuel clad barrier loss EALs indicative of significant fuel clad damage, but uses core damage assessment evaluations by Technical Support personnel. The fuel clad barrier is considered lost.

If this determination is made from the high range containment radiation monitor readings, or if accompanied by other indications of a loss or potential loss of the RCS barrier, this EAL condition represents a Site Area Emergency per **FS1**.

Potential Loss

There is no potential loss EAL associated with this item.

Reference Documents

1. ANO Procedure OP-1302.022, *"Core Damage Assessment"*

~~6~~8. Emergency Director Judgment (FCB6)

~~Loss:~~ Any condition in the opinion of the SM/TSC Director/EOF Director~~Emergency Director~~ that indicates Loss or Potential Loss of the Fuel Clad b~~B~~arrier.

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

Basis:

This EAL~~These thresholds~~ addresses any other factors that are to be used by the SM/TSC Director/EOF Director ~~Emergency Director~~ in determining whether the Fuel Clad barrier is lost or potentially lost. In addition, the inability to monitor the barrier should also be incorporated in this EAL~~threshold~~ as a factor in SM/TSC Director/EOF Director ~~Emergency Director~~ judgment that the barrier may be considered lost or potentially lost.

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

RCS

RCS Barrier~~ARRIER~~ EALs~~THRESHOLDS~~: ~~(1 or 2 or 4 or 6 or 7 or 8)~~ RCB1 **OR** RCB2 **OR** RCB3 **OR** RCB4

The RCS Barrier includes the RCS primary side and its connections up to and including the pressurizer safety and relief valves, and other connections up to and including the primary isolation valves.

~~1. Critical Safety Function Status~~

~~[*These thresholds are for PWRs using Critical Safety Function Status Tree (CSFST) monitoring and functional restoration procedures. For more information, refer to Section 3.9 of this report.*]~~

~~Loss:~~ ~~Not Applicable~~

~~Potential Loss:~~

~~A. RCS Integrity Red Entry Conditions Met.~~

~~OR~~

~~B. Heat Sink Red Entry Conditions Met.~~

~~TBD~~

~~OR~~

~~Potential Loss~~ ~~Threshold A~~

~~RCS Integrity - RED indicates an extreme challenge to the safety function derived from appropriate instrument readings.~~

~~Potential Loss~~ ~~Threshold B~~

~~Heat Sink - RED when heat sink is required indicates the ultimate heat sink function is under extreme challenge.~~

~~There is no Loss threshold associated with this item.~~

~~1~~2. RCS Leak Rate (RCB1)

Loss: RCS leak rate > ~~greater than~~ available makeup capacity as indicated by: ~~a loss of RCS subcooling.~~

Unit 1: Loss of adequate subcooling margin

Unit 2: RCS subcooling (MTS) can NOT be maintained at least 30 °F

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

RCS

Potential Loss: ~~RCS leak rate indicated greater than (site specific capacity of one charging pump in the normal charging mode) with Letdown isolated~~.

Unit 1: UNISOLABLE RCS leak > 50 gpm with Letdown isolated

Unit 2: UNISOLABLE RCS leak > 44 gpm with Letdown isolated

Basis:

Loss ~~Threshold A~~

This EAL~~threshold~~ addresses conditions where leakage from the RCS is greater than available inventory control capacity such that a loss of subcooling has occurred. The loss of subcooling is the fundamental indication that the inventory control systems are inadequate in maintaining RCS pressure and inventory against the mass loss through the leak.

Potential Loss ~~Threshold A~~

This EAL~~threshold~~ is based on the apparent inability to maintain normal liquid inventory within the Reactor Coolant System (RCS) by normal operation of the Makeup and Purification System (Unit 1) or the Chemical and Volume Control System (Unit 2).~~Chemical and Volume Control System which is considered to be the flow rate equivalent to one charging pump discharging to the charging header~~.

For Unit 1 this is based on indications that leakage is greater than normal makeup capacity. The operator could not batch in water and boric acid to the makeup system fast enough to maintain the makeup tank level during a 50 gpm RCS leak. It is not necessary to perform a detailed assessment of the RCS leakrate to implement this EAL. Any event or condition which, in the judgment of the SM/TSC Director/EOF Director, could result in RCS leakage in excess of Unit 1 normal makeup capacity would meet the intent of this EAL; for example:

- Need to open the BWST suction for the operating makeup pump due to ~~decreasing~~lowering makeup tank level
- Full or partial HPI is needed to maintain the RCS pressure or pressurizer level
- Two out of three seal stages failed on any RCP
- RCS pressure ~~decreasing~~lowering due to failure of a primary relief valve to reseat

For Unit 2, this is considered as the capacity of one charging pump discharging to the charging header (44 gpm). Any event or condition which, in the judgment of the SM/TSC Director/EOF Director, could result in RCS leakage in excess of Unit 2 normal makeup capacity would meet the intent of this EAL; for example:

- A second charging pump being required is indicative of a substantial RCS leak
- Three out of four seal stages failed on any RCP
- RCS pressure ~~decreasing~~lowering due to failure of a primary relief valve to reseat

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

RCS

Isolating letdown is a standard abnormal operating procedure action and may prevent unnecessary classifications when a non-RCS leakage path such as a Makeup and Purification System or CVCS leak exists. The intent of this condition is met if attempts to isolate Letdown are NOT successful. Additional charging pumps being required is indicative of a substantial RCS leak.
~~[*For plants with low capacity charging pumps, a 50 gpm indicated leak rate value may be used to indicate the Potential Loss.*]~~

Reference Documents

1. Unit 1 EOP 1202.013, Figure 1, *"Saturation and Adequate SCM"*
2. Unit 1 EOP Setpoint Document, Calculation 90-E-0116-07, Setpoint B.19
3. Unit 2 EOP 2202.009, *"Functional Recovery"*
4. Unit 2 EOP Setpoint Document, Calculation 90-E-0116-01
5. Unit 2 SAR Table 9.3-14, Charging Pumps Design Data

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

24. SG Tube Rupture (RCB2)

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

Potential Loss: None~~Not Applicable~~

Basis:

Loss

This EAL~~threshold~~ addresses the full spectrum of Steam Generator (SG) tube rupture events in conjunction with Containment barrier Loss EALs~~thresholds~~. It addresses RUPTURED SG(s) for which the leakage is large enough to cause actuation (either automatic or manual) of ECCS (SI). This is consistent to the RCS leak rate barrier Potential Loss EAL~~threshold~~.

~~[*For plants that have implemented Westinghouse Owners Group emergency response guides, this condition is described by "entry into E-3 required by EOPs".*]~~

By itself, this EAL~~threshold~~ will result in the declaration of an Alert. However, if the SG is also FAULTED (i.e., two barriers failed), the declaration escalates to a Site Area Emergency per Containment barrier Loss EAL CNB3~~thresholds~~.

Potential Loss

There is no Potential Loss EAL~~threshold~~ associated with this item.

~~5. Not Applicable~~ ~~(included for numbering consistency between barrier tables)~~

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

RCS

~~36~~. Containment Radiation Monitoring (RCB3)

Loss: ~~Containment radiation monitor reading greater than (site specific value).~~ Containment high range rad monitor reading > 100 R/hr.

Potential Loss: None~~Not Applicable~~

Basis:

Loss

The 100 R/hr~~site specific~~ reading on the containment high range radiation monitors (RE-8060 or RE-8061 for Unit 1, 2RE-8925-1 or 2RE-8925-2 for Unit 2) is a value which indicates the release of reactor coolant to the containment.

~~[*The reading should be calculated assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with normal operating concentrations (i.e., within T/S) into the containment atmosphere.]*~~

This reading is ~~will be~~less than that specified for Fuel Clad barrier EAL **FCB4** ~~threshold 6~~. Thus, this EAL~~threshold~~ is ~~would be~~ indicative of a RCS leak only. If the radiation monitor reading rose~~increased~~ to that specified by Fuel Clad barrier EAL~~threshold~~, fuel damage would also be indicated.

~~[*However, if the site specific physical location of the containment radiation monitor is such that radiation from a cloud of released RCS gases could not be distinguished from radiation from adjacent piping and components containing elevated reactor coolant activity, this threshold should be omitted and other site specific indications of RCS leakage substituted.*]~~

During the initial fifteen minutes after a thermal event inside containment, the high range radiation monitor readings are considered invalid due to possibility of a transient thermally-induced current.

Potential Loss

There is no Potential Loss EAL~~threshold~~ associated with this item.

Reference Documents

1. ANO Calculation 03-E-0002-01, *"Radiation Monitor EAL Setpoints for Fission Product Barrier Degradation"*

~~7. Other Site Specific Indications~~

~~This subcategory addresses other site specific thresholds that may be included to indicate loss or potential loss of the RCS barrier.~~

~~48~~. Emergency Director Judgment (RCB4)

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

RCS

~~Loss:~~ Any condition in the opinion of the SM/TSC Director/EOF Director~~Emergency Director~~ that indicates Loss or Potential Loss of the RCS Barrier.

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

Basis:

This EAL~~These thresholds~~ addresses any other factors that are to be used by the SM/TSC Director/EOF Director ~~Emergency Director~~ in determining whether the RCS barrier is lost or potentially lost. In addition, the inability to monitor the barrier should also be incorporated in this EAL~~threshold~~ as a factor in SM/TSC Director/EOF Director ~~Emergency Director~~ judgment that the barrier may be considered lost or potentially lost.

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

CONTAINMENT

Containment~~ONTAINMENT~~ Barrier~~ARRIER~~ EALs~~THRESHOLDS~~: ~~(1 or 2 or 3 or 4 or 5 or 6 or 7 or 8)~~ CNB1 **OR** CNB2 **OR** CNB3 **OR** CNB4 **OR** CNB5 **OR** CNB6 **OR** CNB7

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

~~1. Critical Safety Function Status~~

~~[These thresholds are for PWRs using Critical Safety Function Status Tree (CSFST) monitoring and functional restoration procedures. For more information, refer to Section 3.9 of this report.]~~

~~Loss:~~ ~~Not Applicable~~

~~Potential Loss:~~ ~~A. Containment Red Entry Conditions Met.~~

~~RED path indicates an extreme challenge to the safety function derived from appropriate instrument readings and/or sampling results, and thus represents a potential loss of containment.~~

~~Conditions leading to a Containment RED path result from RCS barrier and/or Fuel Clad Barrier Loss. Thus, this threshold is primarily a discriminator between Site Area Emergency and General Emergency representing a potential loss of the third barrier.~~

~~There is no Loss threshold associated with this item.~~

2. Containment Pressure (CNB)

Loss:

1.~~A.~~ ~~A containment pressure rise followed by a R~~rapid unexplained drop in containment pressure following an initial rise in containment pressure

OR

2.~~B.~~ Containment pressure or sump level response not consistent with LOCA conditions

Potential Loss:

1.~~A.~~ **Unit 1:** Containment pressure > 73.7 PSIA (59 PSIG)~~greater than (site specific value)~~ and rising
Unit 2: Containment pressure > 73.7 PSIA (59 PSIG)~~greater than (site specific value)~~ and rising

OR

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

CONTAINMENT

2.~~B.~~ Explosive mixture exists inside containment.

OR

3.~~C~~. a. Containment Pressure~~>~~ ~~greater than~~ containment spray ~~depressurization~~ actuation setpoint
UNIT 1: 44.7 PSIA (30 PSIG)
UNIT 2: 23.3 PSIA (8.6 PSIG)

AND

b. LESS THAN~~Less than~~ one full train of spray ~~depressurization equipment~~ operating

Basis:

Loss ~~Thresholds A and B~~

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

This indicator relies on operator recognition of an unexpected response for the condition and therefore does not have a specific value associated with it. The unexpected response is important because it is the indicator for a containment bypass condition.

Potential Loss 1. ~~Threshold A~~

The site specific pressure is based on the containment design pressure.

Potential Loss 2. ~~Threshold B~~

Existence of an explosive mixture means a hydrogen and oxygen concentration of at least the lower deflagration limit curve exists. The hydrogen concentration of 4% has been recognized by the NRC staff as a well-established lower flammability limit in air or steam-air atmospheres that is adequately conservative for protecting against an H_2 explosion. Hydrogen control systems at ANO are designed and operated as to maintain the containment hydrogen concentration below this level, so that indications of hydrogen concentrations above this are considered a potential challenge to the containment integrity.~~The indications of potential loss under this EAL corresponds to some of those leading to the RED path in potential loss threshold 1.A above and may be declared by those sites using CSFSTs.~~

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

CONTAINMENT

Potential Loss 3. ~~Threshold C~~

This EAL~~threshold~~ represents a potential loss of containment in that the containment heat removal/depressurization system (e.g., containment sprays, ice condenser fans, etc., but not including containment venting strategies) are either lost or performing in a degraded manner, as indicated by containment pressure greater than the setpoint at which the equipment was supposed to have actuated.

Reference Documents

1. Unit 1 OP-1105.003, *"Engineering Safeguards Actuation System"*
2. Unit 1 SAR Sections 1.4.43, 5.2.1.2.1, 14.2.2.5.5.1 (reactor building design pressure)
3. Unit 1 SAR Section 6.6 (Post-Loss of Coolant Accident Hydrogen Control)
4. Unit 1 TS Table 3.3.5-1
5. Unit 2 SAR Section 6.2.5 (Combustible Gas Control In Containment)
6. Unit 2 SAR Section 3.8.1.3.1.D (Containment Design Pressure)
7. Unit 2 TS Table 3.3-4
8. Regulatory Guide 1.7, *"Control of Combustible Gas Concentrations in Containment Following a Loss-of-Coolant Accident, Rev. 2 1978"*

~~23~~. Core Exit Thermocouple Readings (CNB2)

Loss: None~~Not Applicable~~

Potential Loss:

~~A.~~1. a. CETs ~~Core Exit Thermocouples in excess of~~ indicate > 1200 ~~(site specific)~~ º F

AND

b. Restoration procedures not effective within 15 minutes.

OR

~~B.~~2.~~a.~~ a. CETs~~Core exit thermocouples~~ indicate > 700 ~~in excess of (site specific)~~ º F

AND

~~b.~~ b. RVLMS indicates:~~Reactor vessel level below (site specific level).~~
Unit 1: Levels 1 through 9 DRY
Unit 2: Levels 1 through 7 DRY

AND

~~c.~~ c. Restoration procedures not effective within 15 minutes.

Basis:

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

CONTAINMENT

Loss

~~[*Core Exit Thermocouple Readings are included in addition to the Critical Safety Functions to include conditions when the CSFs may not be in use (initiation after SI is blocked) or plants which do not have a CSF scheme.*]~~

There is no Loss EAL~~threshold~~ associated with this item.

Potential Loss

The conditions in these EAL~~threshold~~s represent an IMMINENT core melt sequence which, if not corrected, could lead to vessel failure and a~~n~~ higher~~increased~~ potential for containment failure. In conjunction with the Core Cooling and RCS Leakage criteria in the Fuel and RCS barrier columns, this threshold would result in the declaration of a General Emergency -- loss of two barriers and the potential loss of a third. If the function restoration procedures are ineffective, there is no "success" path.

The function restoration procedures are those emergency operating procedures that address the recovery of the core cooling critical safety functions. The procedure is considered effective if the temperature is dropping~~decreasing~~ or if the vessel water level is rising~~increasing~~.

~~[*For units using the CSF status trees, a direct correlation to those status trees can be made if the effectiveness of the restoration procedures is also evaluated as stated below.*] [*Severe accident analyses (e.g., NUREG-1150) have concluded that function restoration procedures can arrest core degradation within the reactor vessel in a significant fraction of the core damage scenarios, and that the likelihood of containment failure is very small in these events. Given this, it is appropriate to provide a reasonable period to allow function restoration procedures to arrest the core melt sequence.*]~~ Whether or not the procedures will be effective should be apparent within 15 minutes. The SM/TSC Director/EOF Director~~Emergency Director~~ should make the declaration as soon as it is determined that the procedures have been, or will be ineffective.

~~Potential Loss Threshold B~~

~~[*The reactor vessel level chosen should be consistent with the emergency response guides applicable to the facility.*]~~

34. SG Secondary Side Release With Primary-to-Secondary Leakage (CNB3)

Loss:

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

CONTAINMENT

~~A. RUPTURED SG is also FAULTED outside of containment~~

~~B.~~ 1~~a~~. Primary-to-s~~S~~econdary leakrate > ~~greater than~~ 10 gpm

AND

2~~b~~. UNISOLABLE steam release from affected steam generator~~SG~~ to the environment

Potential Loss: None~~Not Applicable~~

Basis:

Thi~~s~~e loss EAL~~threshold~~ recognizes that SG tube leakage can represent a bypass of the c~~C~~ontainment barrier as well as a loss of the RCS barrier.

~~Users should realize that the two loss thresholds could be considered redundant. This was recognized during the development process. The inclusion of an threshold that uses Emergency Procedure commonly used terms like "RUPTURED and FAULTED" adds to the ease of the classification process and has been included based on this human factor concern.~~

This EAL ~~threshold~~ results in a NUE ~~NOUE~~ for smaller breaks that; (1) do not exceed the Normal Makeup Capacity for Unit 1 or the capacity of one charging pump in the normal charging lineup for Unit 2 ~~the normal charging capacity~~ EAL ~~threshold~~ in RCS leak rate barrier Potential Loss ~~threshold~~, or (2) do not result in ECCS actuation in RCS SG tube rupture barrier Loss ~~threshold~~. For larger breaks, RCS barrier threshold criteria would result in an Alert. For SG tube ruptures which may involve multiple steam generators or UNISOLABLE~~unisolable~~ secondary line breaks, this condition ~~threshold~~ would exist in conjunction with RCS barrier condition~~threshold~~s and would result in a Site Area Emergency. Escalation to General Emergency would be based on "Potential Loss" of the Fuel Clad Barrier.

Loss 1.~~Threshold A~~

This EAL~~threshold~~ addresses the condition in which a RUPTURED steam generator is also FAULTED. This condition represents a bypass of the RCS and containment barriers and is a subset of the second threshold. In conjunction with RCS leak rate barrier loss EAL RCB2~~threshold~~, this would always result in the declaration of a Site Area Emergency.

Loss 2.~~Threshold B~~

This EAL~~threshold~~ addresses SG tube leaks that exceed 10 gpm in conjunction with an UNISOLABLE release path to the environment from the affected steam generator. The threshold for establishing the UNISOLABLE secondary side release is intended to be a prolonged release of radioactivity from the RUPTURED steam generator directly to the environment. This could be expected to occur when the main condenser is unavailable to accept the contaminated steam (i.e., SG tube rupture with concurrent loss of off-site power and the RUPTURED steam generator is required for plant cooldown or a stuck open relief valve). The time it takes to isolate a SG with

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

CONTAINMENT

tube leakage > 10 gpm in accordance with plant specific EOPs is not considered a prolonged release. In this case the SG with tube leakage > 10 gpm with a concurrent loss of offsite power is normally steamed to the environment in a controlled manner to achieve and maintain a RCS Hot Leg temperature below that which corresponds to the Main Steam Safety Valve relief settings. However, if the SG cannot be isolated or if both SGs have tube leakage > 10 gpm, a prolonged release will likely be necessary to support plant cooldown. If the main condenser is available, there may be releases via air ejectors, gland seal exhausters, and other similar controlled, and often monitored, pathways. These pathways do not meet the intent of an UNISOLABLE release path to the environment. These minor releases are assessed using Abnormal Radiation Levels / Radiological Effluent ICs (TAB A).

Potential Loss

~~*[The leakage threshold for this threshold has been increased with Revision 3. In the earlier revision, the threshold was leakage greater than T/S allowable. Since the prior revision, many plants have implemented reduced steam generator T/S limits (e.g., 150 gpd) as a defense in depth associated with alternate steam generator plugging criteria. The 150 gpd threshold is deemed too low for use as an emergency threshold. A pressure boundary leakage of 10 gpm was used as the threshold in IC SU5, RCS Leakage, and is deemed appropriate for this threshold.]*~~

There is no Potential Loss EAL associated with this item.

~~45~~. Containment Isolation Failure or Bypass (CNB4)

Loss:

~~A.~~ 1~~a~~. ~~A.Failure of all valves in any one line to close~~ UNISOLABLE breach of containment
.

AND

2~~b~~. Direct downstream pathway to the environment exists after containment isolation signal

Potential Loss: None~~Not Applicable~~

Basis:

Loss

This EAL~~threshold~~ addresses incomplete containment isolation that allows a direct release to the environment. A breach of containment has also occurred if an inboard and outboard pair of isolation valves fails to close on an automatic actuation signal or from a manual action in the Control Room and opens a release path to the environment.

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

CONTAINMENT

The breach is not isolable from the Control Room if an attempt for isolation from the Control Room has been made and was unsuccessful. An attempt for isolation should be made prior to the accident classification. If isolable upon identification then this Initiating Condition is not applicable.

The use of the modifier “direct” in defining the release path discriminates against release paths through interfacing liquid systems. The existence of an in–line charcoal filter does not make a release path indirect since the filter is not effective at removing fission product noble gases. Typical filters have an efficiency of 95-99% removal of iodine. Given the magnitude of the core inventory of iodine, significant releases could still occur.
In addition, since the fission product release would be driven by boiling in the reactor vessel, the high humidity in the release stream can be expected to render the filters ineffective in a short period.

Potential Loss

There is no Potential Loss EAL~~threshold~~ associated with this item.

~~56~~. Containment Radiation Monitoring (CNB5)

Loss: None~~Not Applicable~~

Potential Loss:

~~A. Containment radiation monitor reading greater than (site specific value).~~ Containment high range rad monitor reading > 4000 R/hr

Basis:

Loss

There is no Loss EAL~~threshold~~ associated with this item.

Potential Loss

The 4000 R/hr~~site specific~~ reading on the containment high range radiation monitors (RE-8060 or RE-8061 for Unit 1, 2RE-8925-1 or 2RE-8925-2 for Unit 2) is a value which indicates significant fuel damage well in excess of the EAL~~threshold~~s associated with both loss of Fuel Clad and loss of RCS barriers. ~~AAs stated in Section 3.8, a~~ major release of radioactivity requiring off-site protective actions from core damage is not possible unless a major failure of fuel cladding allows radioactive material to be released from the core into the reactor coolant.

Regardless of whether containment is challenged, this amount of activity in containment, if released, could have such severe consequences that it is prudent to treat this as a potential loss of containment, such that a General Emergency declaration is warranted.

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

CONTAINMENT

~~[*NUREG-1228, "Source Estimations During Incident Response to Severe Nuclear Power Plant Accidents," indicates that such conditions do not exist when the amount of clad damage is less than 20%. Unless there is a (site specific) analysis justifying a higher value, it is recommended that a radiation monitor reading corresponding to 20% fuel clad damage be specified here.*]~~
Because the monitor reading exceeds the readings for Fuel Clad Barrier loss in **FCB4** and RCS Barrier loss in **RCB3**, the SM/TSC Director/EOF Director should declare a General Emergency when this value on the Containment High Range Rad Monitor is exceeded as a loss of two barriers (fuel clad and RCS) and potential loss of the third (containment).

Reference Documents:

1. ANO Calculation 03-E-0002-01, *"Radiation Monitor EAL Setpoints for Fission Product Barrier Degradation"*
2. NUREG 1228, *"Source Term Estimation During Incident Response to Severe Nuclear Power Plant Accidents"*

~~67~~. Other ~~Site Specific~~ Indications (CNB6)

Elevated readings on the following radiation monitors that indicate loss or potential loss of the Containment barrier:

MONITORS – UNIT 1	
RX-9820	Containment Purge
RX-9825	Radwaste Area
RX-9830	Fuel Handling Area
RX-9835	Emergency Penetration Room
MONITORS – UNIT 2	
2RX-9820	Containment Purge
2RX-9825	Radwaste Area
2RX-9830	Fuel Handling Area
2RX-9835	Emergency Penetration Room
2RX-9840	Post Accident Sampling Building
2RX-9845	Aux. Building Extension

FISSION PRODUCT BARRIERS
~~PWR TABLE 5-F-3~~

CONTAINMENT

Basis:

This EAL covers other indications that may unambiguously indicate the loss or potential loss of the containment barrier.[~~*This EAL should cover other (site-specific) indications that may unambiguously indicate loss or potential loss of the containment barrier, including indications from area or ventilation monitors in containment annulus or other contiguous buildings. If site emergency operating procedures provide for venting of the containment during an emergency as a means of preventing catastrophic failure, a Loss EAL should be included for the containment barrier. This EAL should be declared as soon as such venting is IMMINENT. Containment venting as part of recovery actions is classified in accordance with the radiological effluent ICs.*~~]

~~7~~8. Emergency Director Judgment (CNB7)

~~Loss:~~ Any condition in the opinion of the SM/TSC Director/EOF Director~~Emergency Director~~ that indicates Loss or Potential Loss of the Containment Barrier.

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

Basis:

This EAL~~These thresholds~~ addresses any other factors that are to be used by the SM/TSC Director/EOF Director ~~Emergency Director~~ in determining whether the Containment barrier is lost or potentially lost. In addition, the inability to monitor the barrier should also be incorporated in this EAL ~~threshold~~ as a factor in SM/TSC Director/EOF Director ~~Emergency Director~~ judgment that the barrier may be considered lost or potentially lost.

The Containment barrier should not be declared lost or potentially lost based on exceeding Technical Specification action statement criteria, unless there is an event in progress requiring mitigation by the Containment barrier. When no event is in progress (Loss or Potential Loss of either Fuel Clad and/or RCS) the Containment barrier status is addressed by Technical Specifications.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU61

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Natural or destructive phenomena affecting the PROTECTED AREA

Operating Mode Applicability: All

Example Emergency Action Level: (1 or 2 or 3 or 4 or 5 or 6)

1. Seismic event identified by any~~**ANY**~~ 2 of the following:

   - Seismic event confirmed by annunciation of the 0.01g acceleration alarm ~~(site specific indication or method)~~
   - Earthquake felt in plant
   - National Earthquake Center

   OR

2. Tornado striking within PROTECTED AREA boundary or high winds > ~~greater than~~67~~(site specific~~ mph~~)~~.

   OR

3. Internal flooding that has the potential to affect safety related equipment required by Technical Specifications for the current operating mode in any~~**ANY**~~ of the structures or areas in **Table H1.**~~following areas:~~

   ~~(site specific area list)~~

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU6~~1~~

Table H1	
Unit 1	**Unit 2**
CA-1 & HP Office Area	2A3 Room
Condensate Demineralizer Room	2A4, 2D02, & East Battery Room
Corridor 98	2B53 Room
Fire Area C	2B63 Room
Lower North Electrical Penetration Room (LNEPR)	2B9/2B10 Room
Lower South Electrical Equipment Room (LSEER) / Air Compressor Room	2Y11/13 Equipment Room
Lower South Electrical Penetration Room (LSEPR)	Auxiliary Building 317’ General Access
Lower South Piping Penetration Room (LSPPR)	Auxiliary Building 335'
Main Steam Isolation Violation (MSIV) Room	Auxiliary Building 354'
North Engineered Safeguards (ES) SWGR Room (A4)	‘B’ Engineered Safeguards Features (ESF) Room
South ES SWGR Room	Corridor Behind Door 340
Turbine Building • A1, A2, H1, H2 SWGR area • 354' Bowling Alley north end west of Breathing Air compressor room • 368' West Heater Deck from LSEER (orange door) along east wall of ES SWGR Rooms to Corridor 98 door.	Turbine Building • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north Switchgear (SWGR) Room (2A3) and East of LNEPR
Upper North Electrical Penetration Room (UNEPR) / Hot Tool Room / Decon Room	Intake Structure 354' or 366'
Upper South Electrical Penetration Room (USEPR)	LNEPR
Upper South Piping Penetration Room (USPPR)	LSEPR
	Motor-Generator (MG) Set Room
	Steam Pipe Area
	Hot Machine Shop
	UNEPR, UNPPR, LNPPR, USPPR

OR

4. Turbine failure resulting in casing penetration or damage to turbine or generator seals.

OR

~~5. (Site specific occurrences affecting the PROTECTED AREA).~~

5. Lake Dardanelle level < 335 feet.

OR

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU61

6. Lake Dardanelle level > 345 feet.

Basis:

These EALs are categorized on the basis of the occurrence of an event of sufficient magnitude to be of concern to plant operators.

EAL #1

Damage may be caused to some portions of the site, but should not affect ability of safety functions to operate.

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

~~[*For most plants with seismic instrumentation, the seismic switches are set at an acceleration of about 0.01g. This EAL should be developed on site specific basis. The method of detection can be based on instrumentation, validated by a reliable source, or operator assessment.*]~~

The National Earthquake Center can confirm if an earthquake has occurred in the area of the plant.

EAL #2

This EAL is based on a tornado striking (touching down) or high winds within the PROTECTED AREA.

~~[*The high wind value should be based on site specific FSAR design basis as long as it is within the range of the instrumentation available for wind speed.*]~~

The high wind value in EAL #2 is conservatively based on the SAR design basis for Unit 1 of 67 mph. Unit 2 Design basis is 80 mph.

Escalation of this emergency classification level, if appropriate, would be based on VISIBLE DAMAGE, or by other in plant conditions, via HA~~6~~1.

EAL #3

This EAL addresses the effect of internal flooding caused by events such as component failures, equipment misalignment, or outage activity mishaps.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU61

[*The site specific areas include those areas that contain systems required for safe shutdown of the plant, which are not designed to be partially or fully submerged. The plant's IPEEE may provide insight into areas to be considered when developing this EAL.*]

Escalation of this emergency classification level, if appropriate, would be based VISIBLE DAMAGE via HA61, or by other plant conditions.

EAL #4

This EAL addresses main turbine rotating component failures of sufficient magnitude to cause observable damage to the turbine casing or to the seals of the turbine generator. Generator seal damage observed after generator purge does not meet the intent of this EAL because it did not impact normal operation of the plant.

Of major concern is the potential for leakage of combustible fluids (lubricating oils) and gases (hydrogen cooling) to the plant environs. Actual FIRES and flammable gas build up are appropriately classified via HU42 and HU53.

This EAL is consistent with the definition of an NUE NOUE while maintaining the anticipatory nature desired and recognizing the risk to non-safety related equipment.

Escalation of this emergency classification level, if appropriate, would be to HA61 based on damage done by PROJECTILES generated by the failure or by the radiological releases for a BWR, or in conjunction with a steam generator tube rupture, for a PWR. These latter events would be classified by the radiological (A) ICs or Fission Product Barrier (F) ICs.

EAL #5

This EAL addresses other site specific phenomena (such as hurricane, flood, or seiche) that can also be precursors of more serious events.

[*Sites subject to severe weather as defined in the NUMARC station blackout initiatives should include an EAL based on activation of the severe weather mitigation procedures (e.g., precautionary shutdowns, diesel testing, staff call-outs, etc.).*]

EALs #5 and #6

EALs #5 and #6 are based on the levels of Lake Dardanelle at which the site will take specific action to reduce the impact of the lake level on plant safety by initiating plant shutdown.

Reference Documents:

1. OP-1203.025, *"Natural Emergencies"*
2. OP-2203.008, *"Natural Emergencies"*
3. Unit 1 FSAR
4. Unit 2 FSAR

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU42

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

FIRE within the PROTECTED AREA not extinguished within 15 minutes of detection or EXPLOSION within the PROTECTED AREA

Operating Mode Applicability: All

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

Note: *The SMEmergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the duration has exceeded, or will likely exceed, the applicable time.*

1. FIRE in any **Table H1** structure or area not extinguished within 1) within 15 minutes of Ccontrol Rroom notification or 2) within 15 minutes of verification of a Ccontrol Rroom FIRE alarm in **ANY** of the following areas: (site specific area list)

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU~~42~~

Table H1	
Unit 1	**Unit 2**
CA-1 & HP Office Area	2A3 Room
Condensate Demineralizer Room	2A4, 2D02, & East Battery Room
Corridor 98	2B53 Room
Fire Area C	2B63 Room
Lower North Electrical Penetration Room (LNEPR)	2B9/2B10 Room
Lower South Electrical Equipment Room (LSEER) / Air Compressor Room	2Y11/13 Equipment Room
Lower South Electrical Penetration Room (LSEPR)	Auxiliary Building 317' General Access
Lower South Piping Penetration Room (LSPPR)	Auxiliary Building 335'
Main Steam Isolation Violation (MSIV) Room	Auxiliary Building 354'
North Engineered Safeguards (ES) SWGR Room (A4)	'B' Engineered Safeguards Features (ESF) Room
South ES SWGR Room	Corridor Behind Door 340
Turbine Building • A1, A2, H1, H2 SWGR area • 354' Bowling Alley north end west of Breathing Air compressor room • 368' West Heater Deck from LSEER (orange door) along east wall of ES SWGR Rooms to Corridor 98 door.	Turbine Building • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north Switchgear (SWGR) Room (2A3) and East of LNEPR
Upper North Electrical Penetration Room (UNEPR) / Hot Tool Room / Decon Room	Intake Structure 354' or 366'
Upper South Electrical Penetration Room (USEPR)	LNEPR
Upper South Piping Penetration Room (USPPR)	LSEPR
	Motor-Generator (MG) Set Room
	Steam Pipe Area
	Hot Machine Shop
	UNEPR, UNPPR, LNPPR, USPPR

OR

2. EXPLOSION within the PROTECTED AREA.

Basis:

This IC~~EAL~~ addresses the magnitude and extent of FIRES or EXPLOSIONS that may be potentially significant precursors of damage to safety systems. It addresses the FIRE / EXPLOSION, and not the degradation in performance of affected systems that may result.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU42

As used here, detection is visual observation and report by plant personnel or sensor alarm indication.

EAL #1

The 15 minute time period begins with a credible notification that a FIRE is occurring, or indication of a fire detection system alarm/actuation. Verification of a fire detection system alarm/actuation includes actions that can be taken within the Ccontrol Rroom or other nearby site specific location to ensure that it is not spurious. An alarm is assumed to be an indication of a FIRE unless it is disproved within the 15 minute period by personnel dispatched to the scene. In other words, a personnel report from the scene may be used to disprove a sensor alarm if received within 15 minutes of the alarm, but shall not be required to verify the alarm.

The intent of this 15 minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (e.g., smoldering waste paper basket).

~~[*The site specific list should be limited and applies to buildings and areas in actual contact with or immediately adjacent to VITAL AREAS or other significant buildings or areas. The intent of this IC is not to include buildings (i.e., warehouses) or areas that are not in actual contact with or immediately adjacent to VITAL AREAS. This excludes FIRES within administration buildings, waste-basket FIRES, and other small FIRES of no safety consequence. Immediately adjacent implies that the area immediately adjacent contains or may contain equipment or cabling that could impact equipment located in VITAL AREAS or the fire could damage equipment inside VITAL AREAS or that precludes access to VITAL AREAS.*]~~

EAL #2

This EAL addresses only those EXPLOSIONS of sufficient force to damage permanent structures or equipment within the PROTECTED AREA.

No attempt is made to assess the actual magnitude of the damage. The occurrence of the EXPLOSION is sufficient for declaration.

The SM~~Emergency director~~ also needs to consider any security aspects of the EXPLOSION, if applicable.

Escalation of this emergency classification level, if appropriate, would be based on HA42.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU53

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Release of toxic, corrosive, asphyxiant, or flammable gases deemed detrimental to NORMAL PLANT OPERATIONS.

Operating Mode Applicability: All

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

1. Toxic, corrosive, asphyxiant or flammable gases in amounts that have or could adversely affect NORMAL PLANT OPERATIONS.

   OR

2. Report by Llocal, Ccounty or Sstate officials for evacuation or sheltering of site personnel based on an offsite event.

Basis:

This ICEAL is based on the release of toxic, corrosive, asphyxiant or flammable gases of sufficient quantity to affect NORMAL PLANT OPERATIONS.

The fact that SCBAs may be worn does not eliminate the need to declare the event.

This IC is not intended to require significant assessment or quantification. It assumes an uncontrolled process that has the potential to affect plant operations. This would preclude small or incidental releases, or releases that do not impact structures needed for plant operation.

An asphyxiant is a gas capable of reducing the level of oxygen in the body to dangerous levels. Most commonly, asphyxiants work by merely displacing air in an enclosed environment. This reduces the concentration of oxygen below the normal level of around 19%, which can lead to breathing difficulties, unconsciousness or even death.

Escalation of this emergency classification level, if appropriate, would be based on HA53.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU14

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Confirmed SECURITY CONDITION or threat which indicates a potential degradation in the level of safety of the plant.

Operating Mode Applicability: All

Example Emergency Action Level(s): (1 or 2 or 3)

1. A SECURITY CONDITION that does notNOT involve a HOSTILE ACTION as reported by theANO Security Shift Supervision(site specific security shift supervision).

   OR

2. A credible site specific security threat notification.

   OR

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

Basis:

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

Security events which do not represent a potential degradation in the level of safety of the plant are reported under 10 CFR 73.71 or in some cases under 10 CFR 50.72. Security events assessed as HOSTILE ACTIONS are classifiable under HA14, HS14 and HG1.

A higher initial classification could be made based upon the nature and timing of the security threat and potential consequences. CThe licensee shall consideration shall be given to upgrading the emergency response status and emergency classificationlevel in accordance with the site's Safeguards Contingency Plan and Emergency Plan.

EAL #1

The Security Shift Supervisor isReference is made to site specific security shift supervision because these individuals are the designated individualpersonnel on-site qualified and trained to confirm that a security event is occurring or has occurred. Training on security event classification confirmation is closely controlled due to the strict secrecy controls placed on the plant Safeguards Contingency Plan.

This EALthreshold is based on the Safeguards Contingency Plansite specific security plans. The Safeguards Contingency Plan isSite specific Safeguards Contingency Plans are based on guidance provided inby NEI 03-12.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU14

EAL #2

This EALthreshold is included to ensure that appropriate notifications for the security threat are made in a timely manner. This includes information of a credible threat. Only the plant to which the specific threat is made need declare the NUENotification of an UnusualEvent.

The determination of "credible" is made through use of information found in thesite specific Safeguards Contingency Plan.

EAL #3

The intent of this EAL is to ensure that notifications for the aircraft threat are made in a timely manner and that Offsite Response Organizations and plant personnel are at a state of heightened awareness regarding the credible threat. It is not the intent of this EAL to replace existing non-hostile related EALs involving aircraft.

This EAL is met when a plant receives information regarding an aircraft threat from NRC. Validation is performed by calling the NRC or by other approved methods of authentication. Only the plant to which the specific threat is made need declare the NUEUnusual Event.

The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an airliner (airliner is meant to be a large aircraft with the potential for causing significant damage to the plant). The status and size of the plane may be provided by NORAD through the NRC.

Escalation to Alert via HA1 emergency classification level would be via HA4 would be appropriate if the threat involves an airliner within 30 minutes of the plant.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU2~~5~~

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Other conditions exist which in the judgment of the SM~~Emergency Director~~ warrant declaration of an NUE~~NOUE.~~

Operating Mode Applicability: All

Example Emergency Action Level(s):

1. Other conditions exist which in the judgment of the SM~~Emergency Director~~ indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the SM~~Emergency Director~~ to fall under the NUE~~NOUE~~ emergency classification level.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA6~~1~~

Initiating Condition - ALERT

Natural or destructive phenomena affecting VITAL AREAS

Operating Mode Applicability: All

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

1. a. Seismic event >~~greater than~~ Operating Basis Earthquake (OBE) as indicated by annunciation of the 0.1g acceleration alarm~~(site specific seismic instrumentation) reading (site specific OBE limit)~~.

   AND

   b. Earthquake confirmed by any~~**ANY**~~ of the following:
   - Earthquake felt in plant
   - National Earthquake Center
   - Control Room indication of degraded performance of systems required for the safe shutdown of the plant

   OR

2. Tornado striking or high winds >~~greater than~~ 67 mph~~(site specific mph)~~ resulting in VISIBLE DAMAGE to any~~**ANY**~~ of the following structures/equipment containing safety systems or components or ~~**OR**~~ C~~c~~ontrol R~~r~~oom indication of degraded performance of those safety systems:

   ~~(site specific structure list)~~

   - Reactor Building
   - Intake Structure
   - Ultimate Heat Sink
   - BWST/RWT
   - Auxiliary Building
   - Turbine Building
   - QCST
   - Control Room
   - Startup Transformers
   - Diesel Fuel Vault

   OR

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA~~61~~

3. Internal flooding in any~~**ANY**~~ of the following areas resulting in an electrical shock hazard that precludes access to operate or monitor safety equipment or~~**OR**~~ C~~c~~ontrol R~~r~~oom indication of degraded performance of those safety systems:

   ~~(site specific area list)~~

   - Intake Structure
   - Ultimate Heat Sink
   - BWST/RWT
   - Auxiliary Building
   - Turbine Building
   - QCST
   - Control Room
   - Startup Transformers
   - Diesel Fuel Vault

   OR

4. Turbine failure-generated PROJECTILES resulting in VISIBLE DAMAGE to or penetration of any~~**ANY**~~ of the ~~following~~ structures/equipment in **Table H2** containing safety systems or components or~~**OR**~~ C~~c~~ontrol R~~r~~oom indication of degraded performance of those safety systems:
   ~~(site specific structure list)~~

Table H2	
Reactor Building	Turbine Building
Intake Structure	QCST
Ultimate Heat Sink	Control Room
BWST/RWT	Startup Transformers
Auxiliary Building	Diesel Fuel Vault

   OR

5. Lake Dardanelle level < 335 feet and Emergency Cooling Pond inoperable.

   OR

6~~5~~. Vehicle crash resulting in VISIBLE DAMAGE to any~~**ANY**~~ of the~~following~~ structures/equipment in **Table H2** containing safety systems or components or~~**OR**~~ C~~c~~ontrol R~~r~~oom indication of degraded performance of those safety systems:

   ~~(site specific structure list)~~

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA6~~1~~

Table H2	
Reactor Building	Turbine Building
Intake Structure	QCST
Ultimate Heat Sink	Control Room
BWST/RWT	Startup Transformers
Auxiliary Building	Diesel Fuel Vault

~~6. (Site specific occurrences) resulting in VISIBLE DAMAGE to **ANY** of the following structures containing safety systems or components **OR** control room indication of degraded performance of those safety systems:~~

~~(site specific structure list)~~

Basis:

These EALs escalate from HU6~~1~~ in that the occurrence of the event has resulted in VISIBLE DAMAGE to plant structures or areas containing equipment necessary for a safe shutdown, or has caused damage to the safety systems in those structures evidenced by C~~c~~ontrol R~~r~~oom indications of degraded system response or performance. The occurrence of VISIBLE DAMAGE and/or degraded system response is intended to discriminate against lesser events. The initial report should not be interpreted as mandating a lengthy damage assessment prior to classification. No attempt is made in this EAL to assess the actual magnitude of the damage. The significance here is not that a particular system or structure was damaged, but rather, that the event was of sufficient magnitude to cause this degradation.

Escalation of this emergency classification level, if appropriate, would be based on System Malfunction (S) ICs.

~~EALs #2 - #5~~

~~[*These EALs should specify site specific structures or areas that contain safety system, or component and functions required for safe shutdown of the plant. Site specific Safe*~~

~~*Shutdown Analysis should be consulted for equipment and plant areas required to establish or maintain safe shutdown.*]~~

EAL #1

Seismic events of this magnitude can result in a VITAL AREA being subjected to forces beyond design limits, and thus damage may be assumed to have occurred to plant safety systems.

~~[*This threshold should be based on site specific FSAR design basis. See EPRI-sponsored "Guidelines for Nuclear Plant Response to an Earthquake", dated October 1989, for information on seismic event categories.*]~~

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA6~~1~~

The National Earthquake Center can confirm if an earthquake has occurred in the area of the plant.

EAL #2

This EAL is based on a tornado striking (touching down) or high winds that have caused VISIBLE DAMAGE to structures containing functions or systems required for safe shutdown of the plant. The high wind value in EAL #2 is conservatively based on the SAR design basis for Unit 1 of 67 mph. Unit 2 Design basis is 80 mph.

~~[*The high wind value should be based on site specific FSAR design basis as long as it is within the range of the instrumentation available for wind speed.*]~~

EAL #3

This EAL addresses the effect of internal flooding caused by events such as component failures, equipment misalignment, or outage activity mishaps. It is based on the degraded performance of systems, or has created industrial safety hazards (e.g., electrical shock) that preclude necessary access to operate or monitor safety equipment. The inability to access, operate or monitor safety equipment represents an actual or substantial potential degradation of the level of safety of the plant.

Flooding as used in this EAL describes a condition where water is entering the room faster than installed equipment is capable of removal, resulting in a rise of water level within the room. Classification of this EAL should not be delayed while corrective actions are being taken to isolate the water source.

~~[*The site specific areas include those areas that contain systems required for safe shutdown of the plant, which are not designed to be partially or fully submerged. The plant's IPEEE may provide insight into areas to be considered when developing this EAL.*]~~

EAL #4

This EAL addresses the threat to safety related equipment imposed by PROJECTILEs generated by main turbine rotating component failures. Therefore, this EAL is consistent with the definition of an ALERT in that the potential exists for actual or substantial potential degradation of the level of safety of the plant.

~~[*The site specific list of areas should include all areas containing safety structure, system, or component, their controls, and their power supplies.*]~~

EAL #5

This EAL addresses vehicle crashes within the PROTECTED AREA that result~~s~~ in VISIBLE DAMAGE to VITAL AREAS or indication of damage to safety structures, systems, or components containing functions and systems required for safe shutdown of the plant.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA6~~1~~

EAL #6

~~This EAL addresses other site specific phenomena that result in VISIBLE DAMAGE to VITAL AREAS or results in indication of damage to safety structures, systems, or components containing functions and systems required for safe shutdown of the plant (such as hurricane, flood, or seiche) that can also be precursors of more serious events.~~

~~[*Sites subject to severe weather as defined in the NUMARC station blackout initiatives should include an EAL based on activation of the severe weather mitigation procedures (e.g., precautionary shutdowns, diesel testing, staff call-outs, etc.).*]~~

EAL #6 addresses site specific phenomena which has the potential for the loss of primary and secondary heat sink.

Reference Documents:

1. OP-1203.025, *"Natural Emergencies"*
2. OP-2203.008, *"Natural Emergencies"*
3. Unit 1 FSAR
4. Unit 2 FSAR

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA~~42~~

Initiating Condition - ALERT

FIRE or EXPLOSION affecting the operability of plant safety systems required to establish or maintain safe shutdown

Operating Mode Applicability: All

Example Emergency Action Level(s):

1. FIRE or EXPLOSION resulting in VISIBLE DAMAGE to any~~**ANY**~~ **Table H1**~~of the following~~ structure~~s~~ or area containing safety systems or components or~~**OR**~~ C~~c~~ontrol R~~r~~oom indication of degraded performance of those safety systems.

~~(site specific structure list)~~

Table H1

Unit 1	Unit 2
CA-1 & HP Office Area	2A3 Room
Condensate Demineralizer Room	2A4, 2D02, & East Battery Room
Corridor 98	2B53 Room
Fire Area C	2B63 Room
Lower North Electrical Penetration Room (LNEPR)	2B9/2B10 Room
Lower South Electrical Equipment Room (LSEER) / Air Compressor Room	2Y11/13 Equipment Room
Lower South Electrical Penetration Room (LSEPR)	Auxiliary Building 317’ General Access
Lower South Piping Penetration Room (LSPPR)	Auxiliary Building 335'
Main Steam Isolation Violation (MSIV) Room	Auxiliary Building 354'
North Engineered Safeguards (ES) SWGR Room (A4)	‘B’ Engineered Safeguards Features (ESF) Room
South ES SWGR Room	Corridor Behind Door 340
Turbine Building • A1, A2, H1, H2 SWGR area • 354' Bowling Alley north end west of Breathing Air compressor room • 368' West Heater Deck from LSEER (orange door) along east wall of ES SWGR Rooms to Corridor 98 door.	Turbine Building • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north Switchgear (SWGR) Room (2A3) and East of LNEPR
Upper North Electrical Penetration Room (UNEPR) / Hot Tool Room / Decon Room	Intake Structure 354' or 366'
Upper South Electrical Penetration Room (USEPR)	LNEPR
Upper South Piping Penetration Room (USPPR)	LSEPR
	Motor-Generator (MG) Set Room
	Steam Pipe Area
	Hot Machine Shop
	UNEPR, UNPPR, LNPPR, USPPR

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA~~4~~2

Basis:

VISIBLE DAMAGE is used to identify the magnitude of the FIRE or EXPLOSION and to discriminate against minor FIRES and EXPLOSIONS.

The reference to structures or areas containing safety systems or components is included to discriminate against FIRES or EXPLOSIONS in areas having a low probability of affecting safe operation. The significance here is not that a safety system was degraded but the fact that the FIRE or EXPLOSION was large enough to cause damage to these systems.

The use of VISIBLE DAMAGE should not be interpreted as mandating a lengthy damage assessment prior to classification. The declaration of an Alert and the activation of the Technical Support Center will provide the SM/TSC Director/EOF Director~~Emergency Director~~ with the resources needed to perform detailed damage assessments.

The SM/TSC Director/EOF Director~~Emergency Director~~ also needs to consider any security aspects of the EXPLOSION.

~~[*This EAL should specify site specific structures or areas that contain safety system, or component and functions required for safe shutdown of the plant. Site specific Safe Shutdown Analysis should be consulted for equipment and plant areas required to establish or maintain safe shutdown.*]~~

Escalation of this emergency classification level, if appropriate, will be based on System Malfunction (S)~~s~~, Fission Product Barrier Degradation (F) or Abnormal Radiation Levels / Radiological Effluent (A) ICs.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA5~~3~~

Initiating Condition - ALERT

Access to a VITAL AREA is prohibited due to toxic, corrosive, asphyxiant or flammable gases which jeopardize operation of operable equipment required to maintain safe operations or safely shutdown the reactor

Operating Mode Applicability: All

Example Emergency Action Level(s):

Note: *If the equipment in the stated area was already inoperable, or out of service, before the event occurred, then this EAL should not be declared as it will have no adverse impact on the ability of the plant to safely operate or safely shutdown beyond that already allowed by Technical Specifications at the time of the event.*

1. Access to a VITAL AREA is prohibited due to toxic, corrosive, asphyxiant or flammable gases which jeopardize operation of systems required to maintain safe operations or safely shutdown the reactor.

Basis:

Gases in a VITAL AREA can affect the ability to safely operate or safely shutdown the reactor.

The fact that SCBAs may be worn does not eliminate the need to declare the event.

Declaration should not be delayed for confirmation from atmospheric testing if the atmosphere poses an immediate threat to life and health or an immediate threat of severe exposure to gases. This could be based upon documented analysis, indication of personal ill effects from exposure, or operating experience with the hazards.

If the equipment in the stated area was already inoperable, or out of service, before the event occurred, then this EAL should not be declared as it will have no adverse impact on the ability of the plant to safely operate or safely shutdown beyond that already allowed by 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.

An uncontrolled release of flammable gasses within a facility structure has the potential to affect safe operation of the plant by limiting either operator or equipment operations due to the potential for ignition and resulting equipment damage/personnel injury. Flammable gasses, such as hydrogen and acetylene, are routinely used to maintain plant systems (hydrogen) or to repair equipment/components (acetylene - used in welding). This EAL assumes concentrations of flammable gasses which can ignite/support combustion.

Escalation of this emergency classification level, if appropriate, will be based on System Malfunction (S)~~s~~, Fission Product Barrier Degradation (F) or Abnormal Radiation Levels / Radioactive Effluent (A) ICs.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA14

Initiating Condition - ALERT

HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat

Operating Mode Applicability: All

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

1. A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by ANO~~the~~ Security Shift Supervision~~(site specific security shift supervision)~~.

   OR

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

Basis:

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

These EALs address the contingency for a very rapid progression of events, such as that experienced on September 11, 2001. They are not premised solely on the potential for a radiological release. Rather the issue includes the need for rapid assistance due to the possibility for significant and indeterminate damage from additional air, land or water attack elements.

The fact that the site is under serious attack or is an identified attack target with minimal time available for further preparation or additional assistance to arrive requires a heightened state of readiness and implementation of protective measures that can be effective (such as on-site evacuation, dispersal or sheltering).

EAL #1

This EAL addresses the potential for a very rapid progression of events due to a HOSTILE ACTION. It is not intended to address incidents that are accidental events or acts of civil disobedience, such as small aircraft impact, hunters, or physical disputes between employees within the OWNER CONTROLLED AREA. Those events are adequately addressed by other EALs.

Note that this EAL is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OWNER CONTROLLED AREA. This includes Independent Spent Fuel Storage Installation~~'~~s that may be outside the PROTECTED AREA but still ~~with~~in the OWNER CONTROLLED AREA.

~~[*Although nuclear plant security officers are well trained and prepared to protect against HOSTILE ACTION, it is appropriate for OROs to be notified and encouraged to begin activation (if they do not normally) to be better prepared should it be necessary to consider further actions.*]~~

~~[*If not previously notified by the NRC that the airborne HOSTILE ACTION was intentional, then it would be expected, although not certain, that notification by an appropriate Federal agency would*~~

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA14

~~*follow. In this case, appropriate federal agency is intended to be NORAD, FBI, FAA or NRC. However, the declaration should not be unduly delayed awaiting Federal notification.*~~]

EAL #2

This EAL addresses the immediacy of an expected threat arrival or impact on the site within a relatively short time.

The intent of this EAL is to ensure that notifications for the airliner attack threat are made in a timely manner and that Offsite Response Organizations and plant personnel are at a state of heightened awareness regarding the credible threat. Airliner is meant to be a large aircraft with the potential for causing significant damage to the plant.

This EAL is met when a plant receives information regarding an airliner attack threat from NRC and the airliner is within 30 minutes of the plant. Only the plant to which the specific threat is made need declare the Alert.

The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an airliner (airliner is meant to be a large aircraft with the potential for causing significant damage to the plant). The status and size of the plane may be provided by NORAD through the NRC.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA3~~5~~

Initiating Condition - ALERT

Control room evacuation has been initiated

Operating Mode Applicability: All

Example Emergency Action Level(s):

1. Alternate Shutdown procedure~~(Site-specific procedure)~~ requires C~~c~~ontrol R~~r~~oom evacuation:

   Unit 1: 1203.002, "Alternate Shutdown"
   Unit 2: 2203.014, "Alternate Shutdown"

Basis:

With the C~~c~~ontrol R~~r~~oom evacuated, additional support, monitoring and direction through the Technical Support Center and/or other emergency response facilities may be necessary.

Inability to establish plant control from outside the C~~c~~ontrol R~~r~~oom will escalate this event to a Site Area Emergency.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA2~~6~~

Initiating Condition - ALERT

Other conditions exist which in the judgment of the SM/TSC Director/EOF Director~~Emergency Director~~ warrant declaration of an Alert

Operating Mode Applicability: All

Example Emergency Action Level(s):

1. Other conditions exist which in the judgment of the SM/TSC Director/EOF Director~~Emergency Director~~ indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the SM/TSC Director/EOF Director~~Emergency Director~~ to fall under the Alert emergency classification level.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS32

Initiating Condition - SITE AREA EMERGENCY

Control Rroom evacuation has been initiated and plant control cannot be established

Operating Mode Applicability: All

Example Emergency Action Level(s):

1. a. Control room evacuation has been initiated

   AND

   b. Control of the plant cannot be established in accordance with the following procedures within 15(site specific minutes):

   Unit 1: 1203.002, "Alternate Shutdown"
   Unit 2: 2203.014, "Alternate Shutdown"

Basis:

The intent of this IC is to capture those events where control of the plant cannot be reestablished in a timely manner. In this case, expeditious transfer of control of safety systems has not occurred (although fission product barrier damage may not yet be indicated).

The intent of the EAL is to establish control of important plant equipment and knowledge of important plant parameters in a timely manner. Primary emphasis should be placed on those components and instruments that supply protection for and information about safety functions such as reactivity control (ability to shutdown the reactor and maintain it shutdown), RCS inventory (ability to cool the core), and decay heat removal (ability to maintain a heat sink).Typically, these safety functions are reactivity control (ability to shutdown the reactor and maintain it shutdown), reactor water level (ability to cool the core), and decay heat removal (ability to maintain a heat sink) for a BWR. The equivalent functions for a PWR are reactivity control, RCS inventory, and secondary heat removal.

The determination of whether or not control is established at the remote shutdown panel is based on SM/TSC Director/EOF DirectorEmergency Director (ED) judgment. The SM/TSC Director/EOF DirectorEmergency Director is expected to make a reasonable, informed judgment within 15 minutesthe site specific time for transfer that the plant stafflicensee has control of the plant from the remote shutdown panel.

[The *site specific time for transfer is based on analysis or assessments as to how quickly control must be reestablished without core uncovering and/or core damage. This time should not exceed 15 minutes without additional justification.*]

Escalation of this emergency classification level, if appropriate, would be by Fission Product Barrier Degradation (F) or Abnormal Radiation Levels/Radiological Effluent (A) EALs.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS23

Initiating Condition - SITE AREA EMERGENCY

Other conditions exist which in the judgment of the SM/TSC Director/EOF Director~~Emergency Director~~ warrant declaration of a Site Area Emergency

Operating Mode Applicability: All

Example Emergency Action Level(s):

1. Other conditions exist which in the judgment of the SM/TSC Director/EOF Director~~Emergency Director~~ indicate that events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts; (1) toward site personnel or equipment that could lead to the likely failure of or; (2) that prevent effective access to equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the site boundary.

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the SM/TSC Director/EOF Director~~Emergency Director~~ to fall under the emergency classification level description for Site Area Emergency.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS14

Initiating Condition - SITE AREA EMERGENCY

HOSTILE ACTION within the PROTECTED AREA

Operating Mode Applicability: All

Example Emergency Action Level(s):

1. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by ANO~~the~~ Security Shift Supervision~~(site security shift supervision)~~.

Basis:

This condition represents an escalated threat to plant safety above that contained in the Alert in that a HOSTILE FORCE has progressed from the OWNER CONTROLLED AREA to the PROTECTED AREA.

This EAL addresses the contingency for a very rapid progression of events, such as that experienced on September 11, 2001. It is not premised solely on the potential for a radiological release. Rather the issue includes the need for rapid assistance due to the possibility for significant and indeterminate damage from additional air, land or water attack elements.

The fact that the site is under serious attack with minimal time available for further preparation or additional assistance to arrive requires Offsite Response Organization readiness and preparation for the implementation of protective measures.

This EAL addresses the potential for a very rapid progression of events due to a HOSTILE ACTION. It is not intended to address incidents that are accidental events or acts of civil disobedience, such as small aircraft impact, hunters, or physical disputes between employees within the PROTECTED AREA. Those events are adequately addressed by other EALs.

~~[*Although nuclear plant security officers are well trained and prepared to protect against HOSTILE ACTION, it is appropriate for OROs to be notified and encouraged to begin preparations for public protective actions (if they do not normally) to be better prepared should it be necessary to consider further actions.*]~~

~~[*If not previously notified by NRC that the airborne HOSTILE ACTION was intentional, then it would be expected, although not certain, that notification by an appropriate Federal agency would follow. In this case, appropriate federal agency is intended to be NORAD, FBI, FAA or NRC. However, the declaration should not be unduly delayed awaiting Federal notification.*]~~

Escalation of this emergency classification level, if appropriate, would be based on actual plant status after impact or progression of attack.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HG1

Initiating Condition - GENERAL EMERGENCY

HOSTILE ACTION resulting in loss of physical control of the facility

Operating Mode Applicability: All

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

1. A HOSTILE ACTION has occurred such that plant personnel are unable to operate equipment required to maintain safety functions.

OR

2. A HOSTILE ACTION has caused failure of Spent Fuel Cooling Systems and IMMINENT fuel damage is likely for a freshly off-loaded reactor core in pool.

Basis:

EAL #1

This EAL encompasses conditions under which a HOSTILE ACTION has resulted in a loss of physical control of VITAL AREAS (containing vital equipment or controls of vital equipment) required to maintain safety functions and control of that equipment cannot be transferred to and operated from another location. These safety functions are reactivity control (ability to shut down the reactor and keep it shutdown) RCS inventory (ability to cool the core), and secondary heat removal (ability to maintain a heat sink).

~~[*Typically, these safety functions are reactivity control (ability to shut down the reactor and keep it shutdown) reactor water level (ability to cool the core), and decay heat removal (ability to maintain a heat sink) for a BWR. The equivalent functions for a PWR are reactivity control, RCS inventory, and secondary heat removal.*]~~

~~[~~Loss of physical control of the Control Room or remote shutdown/alternate shutdown capability alone may not prevent the ability to maintain safety functions per se. Design of the remote shutdown/alternate shutdown capability and the location of the transfer switches should be taken into account. Primary emphasis should be placed on those components and instruments that supply protection for and information about safety functions.~~]~~

If control of the plant equipment necessary to maintain safety functions can be transferred to another location, then the threshold is not met.

EAL #2

This EAL addresses failure of spent fuel cooling systems as a result of HOSTILE ACTION if IMMINENT fuel damage is likely, such as when a freshly off-loaded reactor core is in the spent fuel pool. At ANO, the term “freshly off-loaded reactor core” refers to fuel that has been discharged from the core and stored in the spent fuel pool for a period of LESS THAN one year.
~~[*A freshly off-loaded reactor core is defined by site specific criteria.*~~

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HG2

Initiating Condition - GENERAL EMERGENCY

Other conditions exist which in the judgment of the SM/TSC Director/EOF Director~~Emergency Director~~ warrant declaration of a General Emergency

Operating Mode Applicability: All

Example Emergency Action Level(s):

1. Other conditions exist which in the judgment of the SM/TSC Director/EOF Director~~Emergency Director~~ indicate that events are in progress or have occurred which involve actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the SM/TSC Director/EOF Director~~Emergency Director~~ to fall under the emergency classification level description for General Emergency.

SYSTEM MALFUNCTION

SU1

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Loss of all o~~O~~ffsite AC power to Vital 4.16 KV~~emergency~~ busses > ~~for~~ 15 minutes ~~or longer~~

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

Example Emergency Action Level(s):

Note: *The SM ~~Emergency Director~~ 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.*

1. Loss of all offsite AC power to Vital 4.16 KV ~~(site specific emergency~~ busses) ~~for~~ > 15 minutes ~~or longer~~.

Basis:

Prolonged loss of offsite AC power reduces required redundancy and potentially degrades the level of safety of the plant by rendering the plant more vulnerable to a complete loss of AC power to emergency busses.

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

Reference Documents:
1. 1202.007, "*Degraded Power*"
2. 1202.008, "*Blackout*"
3. 2202.007, "*Loss of Off-Site Power*"
4. 2202.008, "*Station Blackout*"

~~[*At multi-unit stations, the EALs should allow credit for operation of installed design features, such as cross-ties or swing diesels, provided that abnormal or emergency operating procedures address their use. However, these stations must also consider the impact of this condition on other shared safety functions in developing the site specific EAL.*]~~

~~[*Plants that have a proceduralized capability to cross-tie AC power from an off-site power supply of a companion unit may take credit for the redundant power source in the associated EAL for this IC.*]~~

SYSTEM MALFUNCTION

SU11~~2~~

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Inability to reach required operating mode~~shutdown~~ within Technical Specification limits

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

Example Emergency Action Level(s):

1. Plant is not brought to required operating mode within Technical Specifications LCO Action Statement t~~T~~ime.

Basis:

Limiting Conditions of Operation (LCOs) require the plant to be brought to a required operating mode when the Technical Specification required configuration cannot be restored. Depending on the circumstances, this may or may not be an emergency or precursor to a more severe condition. In any case, the initiation of plant shutdown required by the site Technical Specifications requires a four hour report under 10 CFR 50.72 (b) Non-emergency events. The plant is within its safety envelope when being shut down within the allowable action statement time in the Technical Specifications. An immediate N~~O~~UE is required when the plant is not brought to the required operating mode within the allowable action statement time in the Technical Specifications. Declaration of an N~~O~~UE is based on the time at which the LCO-specified action statement time period elapses under the site Technical Specifications and is not related to how long a condition may have existed**.**

~~[*Other required Technical Specification shutdowns that involve precursors to more serious events are addressed by other System Malfunction, Hazards, or Fission Product Barrier Degradation ICs.*]~~

Reference Documents:

1. ANO2 Technical Specifications
2. ANO1 Technical Specifications

SYSTEM MALFUNCTION

SU6~~3~~

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

UNPLANNED loss of safety system annunciation or indication in the C~~c~~ontrol R~~r~~oom ≥ ~~for~~ 15 minutes ~~or longer~~

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

Example Emergency Action Level(s):

Note: *The SM~~Emergency Director~~ 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.*

1. UNPLANNED Loss of ~~>greater than~~ approximately 75% of the following ~~for~~ ≥ 15 minutes ~~or longer~~:

   ~~(Site specific control room safety system annunciation)~~

   a. Control Room annunciators associated with safety systems.

   OR

   b. C~~(Site specific c~~ontrol R~~r~~oom safety system indication.~~)~~

Basis:

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

Recognition of the availability of computer based indication equipment is considered ~~[~~e.g., SPDS, plant computer, etc.~~]~~

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

Quantification is arbitrary, however, it is estimated that if approximately 75% of the safety system annunciators or indicators are lost, there is an increased risk that a degraded plant condition could go undetected. It is not intended that plant personnel perform a detailed count of the instrumentation lost but use the value as a judgment threshold for determining the severity of the plant conditions.

SYSTEM MALFUNCTION

SU6~~3~~

It is further recognized that most plant designs provide redundant safety system indication powered from separate uninterruptible power supplies. While failure of a large portion of annunciators is more likely than a failure of a large portion of indications, the concern is included in this EAL due to difficulty associated with assessment of plant conditions. The loss of specific, or several, safety system indicators should remain a function of that specific system or component operability status. This will be addressed by the specific Technical Specification. The initiation of a Technical Specification imposed plant shutdown related to the instrument loss will be reported via 10 CFR 50.72. If the shutdown is not in compliance with the Technical Specification action, the N~~O~~UE is based on SU11~~2~~ "Inability to r~~R~~each r~~R~~equired operating mode ~~Shutdown w~~Within Technical Specification l~~L~~imits."

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

~~[*Site specific annunciators or indicators for this EAL must include those identified in the Abnormal Operating Procedures, in the Emergency Operating Procedures, and in other EALs (e.g., area, process, and/or effluent rad monitors, etc.).*]~~

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

~~[*Due to the limited number of safety systems in operation during cold shutdown, refueling, and defueled modes, no IC is indicated during these modes of operation.*]~~

This N~~O~~UE will be escalated to an Alert based on a concurrent loss of compensatory indications or if a SIGNIFICANT TRANSIENT is in progress during the loss of annunciation or indication (SA6).

Reference Documents:

1. 1203.043, “*Loss Control Room Annunciators”*
2. 2203.042, “*Loss of Control Room Annunciators”*

SYSTEM MALFUNCTION

SU9

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Fuel c~~C~~lad degradation

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

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

~~1. (Site specific radiation monitor readings indicating fuel clad degradation greater than Technical Specification allowable limits.)~~

~~2. (Site specific coolant sample activity value indicating fuel clad degradation greater than Technical Specification allowable limits.)~~

1. Failed Fuel Iodine radiation monitor reading indicates fuel clad degradation > Technical Specification allowable limits:

   Unit 1:
   RI-1237S reads > 1.3 x 10^5 counts per minute
   Unit 2:
   2RITS-4806B reads > .65 x 10^5 counts per minute

   OR

2. RCS sample activity value indicating fuel clad degradation > Technical Specification allowable limits:

   - > 1.0 uCi/gm Dose Equivalent I-131 for more than 48 hours

     OR

   - **Unit 1:**
     ≥ 60 uCi/gm Dose Equivalent I-131
     Unit 2:
     > 60 uCi/gm Dose Equivalent I-131

     OR

   - **Unit 1:**
     > 2200 µCi/gm Dose Equivalent Xe-133 for more than 48 hours
     Unit 2:
     > 3100 µCi/gm Dose Equivalent Xe-133 for more than 48 hours

SYSTEM MALFUNCTION

SU9

Basis:

This ICEAL is included because it is a precursor of more serious conditions and, as result, is considered to be a potential degradation of the level of safety of the plant.

EAL #1

This threshold addresses the Letdown site-specific Rradiation Mmonitor readings that provide indication of a degradation of fuel clad integrity.

[*Such as BWR air ejector monitors, PWR failed fuel monitors, etc.*]

EAL #2

This EALthreshold addresses coolant samples exceeding coolant technical specifications for transient iodine spiking limits and coolant samples exceeding coolant Technical Specifications for nominal operating limits for the time period specified in the Technical Specifications.

Escalation of this ICEAL to the Alert level is via the Fission Product Barriers (F).

Reference Documents:

1. ANO1 Technical Specifications
2. ANO2 Technical Specifications

SYSTEM MALFUNCTION

SU7~~5~~

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

RCS leakage

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

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

1. Unidentified or pressure boundary leakage >~~greater than~~ 10 gpm.

OR

2. Identified leakage > ~~greater than~~25 gpm.

Basis:

With respect to this IC, RCS leakage is defined as a loss of RCS inventory due to a leak in the RCS or a supporting system that is not or cannot be isolated within 10 minutes. For example, isolation of the RCS Letdown (purification) system is a standard abnormal operating procedure action and may prevent unnecessary classifications when a non-RCS leakage path leak exists. However, the intent of this condition is met if attempts to isolate the RCS leak are NOT successful.

This IC is included as an N~~O~~UE because it may be a precursor of more serious conditions and, as result, is considered to be a potential degradation of the level of safety of the plant. The 10 gpm value for the unidentified or pressure boundary leakage was selected as it is observable with normal C~~c~~ontrol R~~r~~oom indications. Lesser values must generally be determined through time-consuming surveillance tests (e.g., mass balances).

Relief valve normal operation should be excluded from this IC. However, a relief valve that operates and fails to close per design should be considered applicable to this IC if the relief valve cannot be isolated.

The EAL for identified leakage is set at a higher value due to the lesser significance of identified leakage in comparison to unidentified or pressure boundary leakage. Steam generator tube leakage is identified leakage. In either case, escalation of this IC to the Alert level is via Fission Product Barrier Degradation (F) ICs.

SYSTEM MALFUNCTION

SU8~~6~~

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Loss of all o~~O~~nsite or o~~O~~ffsite communications capabilities

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

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

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

   ~~(site specific list of communications methods)~~

   OR

2. Loss of all Table M2~~of the following~~ offsite communications methods affecting the ability to perform offsite notifications.

   ~~(site specific list of communications methods)~~

Table M1 Onsite Communications Methods
Station radio system Plant paging system In-plant telephones Gaitronics

Table M2 Offsite Communications Methods
All telephone lines (commercial and microwave) ENS

Basis:

The purpose of this IC and its associated EALs is to recognize a loss of communications capability that either defeats the plant operations staff ability to perform routine tasks necessary for plant operations or the ability to communicate issues with offsite authorities.

~~[*The loss of off-site communications ability is expected to be significantly more comprehensive than the condition addressed by 10 CFR 50.72.*]~~

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

SYSTEM MALFUNCTION

SU8~~6~~

Reference Documents:

1. 1903.062, *"Communications System Operating Procedure"*

[~~*Site specific list for on-site communications loss must encompass the loss of all means of communications (e.g., commercial telephones, sound powered phone systems, page party system (Gaitronics) and radios / walkie talkies) routinely used for operations.*~~]

[~~*Site specific list for off-site communications loss must encompass the loss of all means of communications with off-site authorities. This should include the ENS, commercial telephone lines, telecopy transmissions, and dedicated phone systems that are routinely used for offsite emergency notifications.*~~]

SYSTEM MALFUNCTION

SU10~~8~~

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Inadvertent criticality

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

Example Emergency Action Level(s):

~~1. UNPLANNED sustained positive period observed on nuclear instrumentation. [*BWR*]~~

1. UNPLANNED sustained positive startup rate observed on nuclear instrumentation. ~~[~~*PWR*~~]~~

Basis:

This IC addresses inadvertent criticality events. This IC indicates a potential degradation of the level of safety of the plant, warranting an N~~O~~UE classification. This IC excludes inadvertent criticalities that occur during planned reactivity changes associated with reactor startups (e.g., criticality earlier than estimated).

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

Escalation would be by the Fission Product Barrier Table (F), as appropriate to the operating mode at the time of the event.

Reference Documents:

1. 1203.012G, *“Annunciator K08 Corrective Action”*
2. 2203.012D, *“Annunciator 2K04 Corrective Action”*

SYSTEM MALFUNCTION

SA3~~2~~

Initiating Condition - ALERT

Automatic t~~Scram (T~~rip~~)~~ fails to shutdown the reactor and the manual actions taken from the reactor control console are successful in shutting down the reactor

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

Example Emergency Action Level(s):

1. a. An automatic ~~scram (~~trip~~)~~ failed to shutdown the reactor as indicated by reactor power ≥ 5%.

   AND

   b. Manual actions taken at the reactor control console successfully shutdown the reactor as indicated by reactor power < 5%~~(site specific indications of plant shutdown)~~.

Basis:

~~[*The reactor should be considered shutdown when it producing less heat than the maximum decay heat load for which the safety systems are designed (typically 3 to 5% power). For plants using CSFSTs, this EAL equates to the criteria used to determine a valid Subcriticality Red Path. For BWRs this EAL should be the APRM downscale trip setpoint.*]~~

Manual ~~scram (~~trip~~)~~ actions taken at the reactor control console are any set of actions by the R~~r~~eactor O~~o~~perator(s) which causes or should cause control rods to be rapidly inserted into the core and shuts down the reactor. Any action taken to trip the reactor from any location other than panel C03 (Unit 1) or panels 2C03/2C14 (Unit 2) constitutes a failure of the manual trip function. Failure of manual trip would escalate the event to a Site Area Emergency (**SS3**).

~~[*If the manual scram (trip) switches/pushbuttons on the control room console panels are considered an automatic input into the Reactor Protection System, a failure to scram (trip) without any other automatic input would make this threshold applicable.*]~~

This condition indicates failure of the automatic protection system to ~~scram (~~trip~~)~~ the reactor. This condition is more than a potential degradation of a safety system in that a front line automatic protection system did not function in response to a plant transient. Thus the plant safety has been compromised because design limits of the fuel may have been exceeded. An Alert is indicated because conditions may exist that lead to potential loss of fuel clad or RCS and because of the failure of the Reactor Protection System to automatically shutdown the plant.

If manual actions taken at the reactor control console fail to shutdown the reactor, the event would escalate to a Site Area Emergency.

SYSTEM MALFUNCTION

SA64

Initiating Condition - ALERT

UNPLANNED ~~l~~Loss of safety system annunciation or indication in the C~~c~~ontrol R~~r~~oom with either~~EITHER~~ (1) a SIGNIFICANT TRANSIENT in progress, or (2) compensatory indicators unavailable

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

Example Emergency Action Level(s):

Note: *The SM/TSC Director/EOF Director~~Emergency Director~~ 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.*

1. a. UNPLANNED loss of >~~greater than~~ approximately 75% of the following ≥ ~~for~~ 15 minutes ~~or longer~~:

~~(Site specific control room safety system annunciation)~~

- Control Room annunciators associated with safety systems

OR

- C~~(Site specific c~~ontrol R~~r~~oom safety system indication~~)~~

AND

b. Either~~EITHER~~ of the following:

- A SIGNIFICANT TRANSIENT is in progress

OR.

- Compensatory indications are unavailable.

Basis:

This IC is intended to recognize the difficulty associated with monitoring changing plant conditions without the use of a major portion of the annunciation or indication equipment during a SIGNIFICANT TRANSIENT.

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

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

SYSTEM MALFUNCTION

SA64

Quantification is arbitrary, however, it is estimated that if approximately 75% of the safety system annunciators or indicators are lost, there is an increased risk that a degraded plant condition could go undetected. It is not intended that plant personnel perform a detailed count of the instrumentation lost but use the value as a judgment threshold for determining the severity of the plant conditions. It is also not intended that the Shift ManagerSupervisor be tasked with making a judgment decision as to whether additional personnel are required to provide increased monitoring of system operation.

It is further recognized that most plant designs provide redundant safety system indication powered from separate uninterruptible power supplies. While failure of a large portion of annunciators is more likely than a failure of a large portion of indications, the concern is included in this EAL due to difficulty associated with assessment of plant conditions. The loss of specific, or several, safety system indicators should remain a function of that specific system or component operability status. This will be addressed by the specific Technical Specification. The initiation of a Technical Specification imposed plant shutdown related to the instrument loss will be reported via 10 CFR 50.72. If the shutdown is not in compliance with the Technical Specification action, the NOUE is based on SU112 "Inability to rReach rRequired operating modeShutdown wWithin Technical Specification lLimits."

[Site-specific annunciators or indicators for this EAL must include those identified in the Abnormal Operating Procedures, in the Emergency Operating Procedures, and in other EALs (e.g., area, process, and/or effluent rad monitors, etc.).]

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

"Compensatory indications" in this context includes computer based information such as SPDS, QSPDS, COLSS, etc. [*This should include all computer systems available for this use depending on specific plant design and subsequent retrofits.*] If both a major portion of the annunciation system and all computer monitoring are unavailable, the Alert is required.

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

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

This Alert will be escalated to a Site Area Emergency if the operating crew cannot monitor the transient in progress due to a concurrent loss of compensatory indications with a SIGNIFICANT TRANSIENT in progress during the loss of annunciation or indication.

Reference Documents:

1. 1015.037, "*Post Transient Review*"
2. 1203.043, "*Loss of Control Room Annunciators*"
3. 2203.042, "*Loss of Control Room Annunciators*"

SYSTEM MALFUNCTION

SA1~~5~~

Initiating Condition - ALERT

AC power capability to Vital 4.16 KV~~emergency~~ busses reduced to a single power source ≥ ~~for~~ 15 minutes ~~or longer~~ such that any additional single failure would result in station blackout

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

Example Emergency Action Level(s):

Note: *The SM/TSC Director/EOF Director~~Emergency Director~~ 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.*

1. a. AC power capability to Vital 4.16 KV~~(site-specific emergency~~ busses~~)~~ reduced to a single power source ≥~~for~~ 15 minutes ~~or longer~~.

   AND

   b. Any additional single power source failure will result in station blackout.

Basis:

~~[*This IC and the associated EALs are intended to provide an escalation from IC SU1, "Loss of All Off-site AC Power To Emergency Busses for Greater Than 15 Minutes."*]~~

The condition indicated by this IC is the degradation of the offsite and onsite AC power systems such that any additional single failure would result in a station blackout. This condition could occur due to a loss of offsite power with a concurrent failure of all but one emergency generator to supply power to its emergency busses. Another related condition could be the loss of all offsite power and loss of onsite emergency generators with only one train of emergency busses being backfed from the unit main generator, or the loss of onsite emergency generators with only one train of emergency busses being backfed from offsite power. The subsequent loss of this single power source would escalate the event to a Site Area Emergency in accordance with **SS1**.

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

The EAL allows credit for operation of the Alternate AC Diesel Generator.

Reference Documents:
1. 1202.007, "*Degraded Power*"
2. 1202.008, "*Blackout*"
3. 2202.007, "*Loss of Off-Site Power*"
4. 2202.008, "*Station Blackout*"
5. 2104.037, "*Alternate AC Diesel Generator Operations*"

SYSTEM MALFUNCTION

SA1~~5~~

[*~~At multi-unit stations, the EALs should allow credit for operation of installed design features, such as cross-ties or swing diesels, provided that abnormal or emergency operating procedures address their use. However, these stations must also consider the impact of this condition on other shared safety functions in developing the site specific EAL.~~*]

[*~~Plants that have a proceduralized capability to cross-tie AC power from an off-site power supply of a companion unit may take credit for the redundant power source in the associated EAL for this IC.~~*]

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SYSTEM MALFUNCTION

SS1

Initiating Condition - SITE AREA EMERGENCY

Loss of all oOffsite and all oOnsSite AC power to Vital 4.16 KVemergency busses >for 15 minutes or longer.

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

Example Emergency Action Level(s):

Note: *The SM/TSC Director/EOF DirectorEmergency Director 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.*

1. Loss of all oOffs Site and all oOns Site AC power to Vital 4.16 KV(site specific emergency busses) > for 15 minutes or longer.

Basis:

Loss of all AC power to emergency busses compromises all plant safety systems requiring electric power including Shutdown CoolingRHR, ECCS, Containment Heat Removal and the Ultimate Heat Sink. Prolonged loss of all AC power to emergency busses will lead to loss of Fuel Clad, RCS, and Containment, thus this event can escalate to a General Emergency.

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

[*At multi-unit stations, the EALs should allow credit for operation of installed design features, such as cross-ties or swing diesels, provided that abnormal or emergency operating procedures address their use. However, these stations must also consider the impact of this condition on other shared safety functions in developing the site specific EAL.*]

[*Plants that have a proceduralized capability to cross-tie AC power from an off-site power supply of a companion unit may take credit for the redundant power source in the associated EAL for this IC.*]

Escalation to General Emergency is via Fission Product Barrier Degradation (F) or IC SG1, "Prolonged lLoss of aAll oOffsite Powerand aProlonged Loss of All oOnsite AC pPower to Vital 4.16 KV busses."

Reference Documents:
1. 1202.007, "*Degraded Power*"
2. 1202.008, "*Blackout*"
3. 2202.007, "*Loss of Off-Site Power*"
4. 2202.008, "*Station Blackout*"
5. 2104.037, "*Alternate AC Diesel Generator Operations*"

SYSTEM MALFUNCTION

SS3~~2~~

Initiating Condition - SITE AREA EMERGENCY

Automatic t~~Scram (T~~rip~~)~~ fails to shutdown the reactor and manual actions taken from the reactor control console are not successful in shutting down the reactor

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

Example Emergency Action Level(s):

1. a. An automatic ~~scram (~~trip~~)~~ failed to shutdown the reactor.

   AND

   b. Manual actions taken at the reactor control console do not shutdown the reactor as indicated by reactor power ≥ 5%. ~~(site specific indications of reactor not shutdown)~~.

Basis:

Under these conditions, the reactor is producing more heat than the maximum decay heat load for which the safety systems are designed and efforts to bring the reactor subcritical are unsuccessful. A Site Area Emergency is warranted because conditions exist that lead to IMMINENT loss or potential loss of both fuel clad and RCS.

~~[T*he reactor should be considered shutdown when it producing less heat than the maximum decay heat load for which the safety systems are designed (typically 3 to 5% power). For plants using CSFSTs, this EAL equates to the criteria used to determine a valid Subcriticality Red Path. For BWRs this EAL should be the APRM downscale trip setpoint.*]~~

Manual ~~scram (~~trip~~)~~ actions taken at the reactor control console are any set of actions by the R~~r~~eactor O~~o~~perator(s) ~~at~~ which causes or should cause control rods to be rapidly inserted into the core and shuts down the reactor.

Manual ~~scram (~~trip~~)~~ actions are not considered successful if action away from panel C03 (Unit 1) or panels 2C03/2C14 (Unit 2)~~the reactor control console~~ is required to ~~scram (~~trip~~)~~ the reactor. This EAL is still applicable even if actions taken away from panel C03 (Unit 1) or panels 2C03/2C14 (Unit 2)~~the reactor control console~~ are successful in shutting the reactor down because the design limits of the fuel may have been exceeded or because of the gross failure of the Reactor Protection System to shutdown the plant.

~~[*Although this IC may be viewed as redundant to the Fission Product Barrier Degradation IC, its inclusion is necessary to better assure timely recognition and emergency response.*]~~

Escalation of this event to a General Emergency would be due to a prolonged condition leading to an extreme challenge to either core-cooling or heat removal.

SYSTEM MALFUNCTION

SS~~43~~

Initiating Condition - SITE AREA EMERGENCY

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

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

Example Emergency Action Level(s):

Note: *The SM/TSC Director/EOF Director~~Emergency Director~~ 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.*

1. < ~~Less than~~ 105 volts ~~(site specific bus voltage indication)~~ on all ~~(site specific~~ V~~v~~ital DC busses~~)~~ > ~~for~~ 15 minutes ~~or longer~~.

Basis:

Loss of all DC power compromises ability to monitor and control plant safety functions. Prolonged loss of all DC power will cause core uncovering and loss of containment integrity when there is significant decay heat and sensible heat in the reactor system.

~~[*Site specific bus voltage should be based on the minimum bus voltage necessary for the operation of safety related equipment. This voltage value should incorporate a margin of at least 15 minutes of operation before the onset of inability to operate those loads. This voltage is usually near the minimum voltage selected when battery sizing is performed. Typically the value for the entire battery set is approximately 105 VDC. For a 60 cell string of batteries the cell voltage is typically 1.75 Volts per cell. For a 58 string battery set the minimum voltage is typically 1.81 Volts per cell.*]~~

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

Escalation to a General Emergency would occur by Abnormal Radiation Levels/Radiological Effluent (A), Fission Product Barrier Degradation (F).

SYSTEM MALFUNCTION

SS6

Initiating Condition - SITE AREA EMERGENCY

Inability to monitor a SIGNIFICANT TRANSIENT in progress

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

Example Emergency Action Level(s):

Note: *The SM/TSC Director/EOF Director~~Emergency Director~~ 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.*

1. a. Loss of > ~~greater than~~ approximately 75% of the following ≥ ~~for~~ 15 minutes ~~or longer~~:

   ~~(Site specific control room safety system annunciation)~~

   - Control Room annunciators associated with safety systems

   OR

   - C~~(Site specific c~~ontrol R~~r~~oom safety system indication~~)~~

   AND

   b. A SIGNIFICANT TRANSIENT is in progress.

   AND

   c. Compensatory indications are unavailable.

Basis:

This IC is intended to recognize the threat to plant safety associated with the complete loss of capability of the control room staff to monitor plant response to a SIGNIFICANT TRANSIENT.

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

Quantification is arbitrary, however, it is estimated that if approximately 75% of the safety system annunciators or indicators are lost, there is an increased risk that a degraded plant condition could go undetected. It is not intended that plant personnel perform a detailed count of the instrumentation lost but use the value as a judgment threshold for determining the severity of the plant conditions. It is also not intended that the Shift Manager~~Supervisor~~ be tasked with making a

SYSTEM MALFUNCTION

SS6

judgment decision as to whether additional personnel are required to provide increased monitoring of system operation.

It is further recognized that most plant designs provide redundant safety system indication powered from separate uninterruptible power supplies. While failure of a large portion of annunciators is more likely than a failure of a large portion of indications, the concern is included in this EAL due to difficulty associated with assessment of plant conditions. The loss of specific, or several, safety system indicators should remain a function of that specific system or component operability status. This will be addressed by the specific Technical Specification. The initiation of a Technical Specification imposed plant shutdown related to the instrument loss will be reported via 10 CFR 50.72. If the shutdown is not in compliance with the Technical Specification action, the N~~O~~UE is based on SU11~~2~~ "Inability to r~~R~~each r~~R~~equired operating mode~~Shutdown~~ w~~W~~ithin Technical Specification l~~L~~imits."

A Site Area Emergency is considered to exist if the C~~c~~ontrol R~~r~~oom staff cannot monitor safety functions needed for protection of the public while a significant transient is in progress.

~~[*Site specific annunciators for this EAL should be limited to include those identified in the Abnormal Operating Procedures, in the Emergency Operating Procedures, and in other EALs (.g., area, process, and/or effluent rad monitors, etc.)*]~~

Site specific indications needed to monitor safety functions necessary for protection of the public must include C~~c~~ontrol R~~r~~oom indications, computer generated indications and dedicated annunciation capability.

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

~~[*The specific indications should be those used to determine such functions as the ability to shut down the reactor, maintain the core cooled, to maintain the reactor coolant system intact, maintain the spent fuel cooled, and to maintain containment intact.*]~~

"Compensatory indications" in this context includes computer based information such as SPDS, QSPDS, COLSS, etc. This should include all computer systems available for this use depending on specific plant design and subsequent retrofits.

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

Reference Documents:

1. 1015.037, *"Post Transient Review"*
2. 1203.043, *"Loss of Control Room Annunciators"*
3. 2203.042, *"Loss of Control Room Annunciators"*

~~[*Due to the limited number of safety systems in operation during cold shutdown, refueling and defueled modes, no IC is indicated during these modes of operation.*]~~

SYSTEM MALFUNCTION

SG1

Initiating Condition - GENERAL EMERGENCY

Prolonged loss of all oOffsite and all oOns-Site AC power to safetyemergency busses

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

Example Emergency Action Level(s):

1. a. Loss of all offsite and all onsite AC power to safety(site specific emergency busses).

   AND

   b. Either**EITHER** of the following:

   - Restoration of at least one safetyemergency bus in < less than (site specific 4 hours) is not likely.

     OR

   - Continuing degradation of core cooling based on Fission Product Barrier monitoring as indicated by CETs ≥ 700°F.(Site specific indication of continuing degradation of core cooling based on Fission Product Barrier monitoring.)

Basis:

Loss of all AC power to emergency busses compromises all plant safety systems requiring electric power including Shutdown CoolingRHR, ECCS, Containment Heat Removal and the Ultimate Heat Sink. Prolonged loss of all AC power to emergency busses will lead to loss of fuel clad, RCS, and containment, thus warranting declaration of a General Emergency.

[*The (site-specific hours) to restore AC power can be based on a site blackout coping analysis performed in conformance with 10 CFR 50.63 and Regulatory Guide 1.155, "Station Blackout," as available. Appropriate allowance for off-site emergency response including evacuation of surrounding areas should be considered. Although this IC may be viewed as redundant to the Fission Product Barrier Degradation IC, its inclusion is necessary to better assure timely recognition and emergency response.*]

This IC is specified to assure that in the unlikely event of a prolonged station blackout, timely recognition of the seriousness of the event occurs and that declaration of a General Emergency occurs as early as is appropriate, based on a reasonable assessment of the event trajectory.

The likelihood of restoring at least one emergency bus should be based on a realistic appraisal of the situation since a delay in an upgrade decision based on only a chance of mitigating the event could result in a loss of valuable time in preparing and implementing public protective actions.

SYSTEM MALFUNCTION

SG1

In addition, under these conditions, fission product barrier monitoring capability may be degraded.

~~[~~Although it may be difficult to predict when power can be restored, it is necessary to give the SM/TSC Director/EOF Director ~~Emergency Director~~ a reasonable idea of how quickly (s)he may need to declare a General Emergency based on two major considerations:

1. Are there any present indications that core cooling is already degraded to the point that loss or potential loss of Fission Product Barriers is IMMINENT?

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

Thus, indication of continuing core cooling degradation must be based on Fission Product Barrier monitoring with particular emphasis on SM/TSC Director/EOF Director ~~Emergency Director~~ judgment as it relates to IMMINENT loss or potential loss of fission product barriers and degraded ability to monitor fission product barriers.~~]~~

Reference Documents:

1. Unit 1 Calculation 85-E-0072-02, "*Time from Loss of All AC Power to Loss of Subcooling"*
2. Unit 2 Calculation 85-E-0072-01, "*Time from Loss of All AC Power to Loss of Subcooling"*

SYSTEM MALFUNCTION

SG~~32~~

Initiating Condition - GENERAL EMERGENCY

Automatic ~~tScram (T~~rip~~)~~ and all manual actions fail to shutdown the reactor and indication of an extreme challenge to the ability to cool the core exists

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

Example Emergency Action Level(s):

1. a. An automatic ~~scram (~~trip~~)~~ failed to shutdown the reactor

   AND

   b. All manual actions do not shutdown the reactor as indicated by reactor power ≥ 5% ~~(site specific indications of reactor not shutdown)~~.

   AND

   c. Either~~EITHER~~ of the following exist or have occurred due to continued power generation:

   ~~(Site specific indication that core cooling is extremely challenged.)~~

   - CET temperatures at or approaching 1200° F

     OR

   ~~(Site specific indication that heat removal is extremely challenged.)~~

   - Feedwater flow rate less than:

     Unit 1: 430 gpm
     Unit 2: 485 gpm

Basis:

Under these conditions, the reactor is producing more heat than the maximum decay heat load for which the safety systems are designed and efforts to bring the reactor subcritical are unsuccessful.

~~[T*he reactor should be considered shutdown when it producing less heat than the maximum decay heat load for which the safety systems are designed (typically 3 to 5% power). For plants using CSFSTs, this EAL equates to the criteria used to determine a valid Subcriticality Red Path. For BWRs this EAL should be the APRM downscale trip setpoint.*]~~

~~[*For PWRs, the extreme challenge to the ability to cool the core is intended to mean that the core exit temperatures are at or approaching 1200 degrees F or that the reactor vessel water level is*~~

SYSTEM MALFUNCTION

SG32

~~*below the top of active fuel. For plants using CSFSTs, this EAL equates to a Core Cooling RED condition combined with a Subcriticality RED condition.*~~]

[~~*For BWRs, the extreme challenge to the ability to cool the core is intended to mean that the reactor vessel water level cannot be restored and maintained above Minimum Steam Cooling RPV Water Level as described in the EOP bases.*~~]

[~~*Another consideration is the inability to initially remove heat during the early stages of this sequence. For PWRs, if emergency feedwater flow is insufficient to remove the amount of heat required by design from at least one steam generator, an extreme challenge should be considered to exist. For plants using CSFSTs, this EAL equates to a Heat Sink RED condition combined with a Subcriticality RED condition.*~~]

[~~*For BWRs, considerations include inability to remove heat via the main condenser, or via the suppression pool or torus (e.g., due to high pool water temperature).*~~]

In the event either of these challenges exists at a time that the reactor has not been brought below the power associated with the safety system design a core melt sequence exists. In this situation, core degradation can occur rapidly. For this reason, the General Emergency declaration is intended to be anticipatory of the fission product barrier table declaration to permit maximum off-site intervention time.

Attachment 3 to

0CAN121102

Proposed Technical Basis Document (Clean)

ANO EAL BASIS DOCUMENT

ANO EAL BASIS DOCUMENT

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ANO EAL BASIS DOCUMENT

GENERAL NOTES ON BASIS DOCUMENT USE

Plant Operating Mode Usage for ANO EALs:

UNIT 1:

Mode 1 = Power Operation – Keff ≥ 0.99, Reactor Power > 5%

Mode 2 = Startup – Keff ≥ .99, Reactor Power ≤ 5%

Mode 3 = Hot Standby – Keff < .99, RCS ≥ 280 °F

Mode 4 = Hot Shutdown – Keff < .99, 280 °F > RCS >200 °F

Mode 5 = Cold Shutdown – Keff < .99, RCS ≤ 200 °F

Mode 6 = Refueling – One or more reactor vessel head closure bolts less than fully tensioned

Defueled (D) – All reactor fuel removed from reactor pressure vessel (full core offload during refueling or extended outage). This is not an operating mode designation by Technical Specifications.

UNIT 2:

Mode 1 = Power Operation – Keff ≥ 0.99, Reactor Power > 5%, RCS ≥ 300 °F

Mode 2 = Startup – Keff ≥ .99, Reactor Power ≤ 5%, RCS ≥ 300 °F

Mode 3 = Hot Standby – Keff < .99, Reactor Power 0, RCS ≥ 300 °F

Mode 4 = Hot Shutdown – Keff < .99, Reactor Power 0, 300 °F > RCS > 200 °F

Mode 5 = Cold Shutdown – Keff < .99, Reactor Power 0, RCS ≤ 200 °F

Mode 6 = Refueling – Keff ≤ .95, Reactor Power 0, RCS ≤ 140 °F Reactor vessel head unbolted or removed and fuel in the vessel

Defueled (D) – All reactor fuel removed from reactor pressure vessel (full core offload during refueling or extended outage). This is not an operating mode designation by Technical Specifications.

This basis document serves two basic functions:

- It provides background and explanatory information based on NEI 99-01 to present a basis for the origination of the ANO EALs for reviewers and users.
- The second function this basis document may provide is an aid to decision makers when making a determination to classify an emergency event. It is intended that decision makers have all the information in Attachment 7.1 of this procedure that they need to make a sound classification decision. Information that may be useful to a decision maker in classifying emergency events is also contained in the Basis section for each IC in the Basis Document.

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. A decision maker's use of this Basis Document for assistance is not intended to delay the classification.

ANO EAL BASIS DOCUMENT

DEFINITIONS

The following definitions are taken from NEI 99-01 are applicable to the ANO emergency classification system:

AFFECTING SAFE SHUTDOWN:

Event in progress has adversely affected functions that are necessary to bring the plant to and maintain it in the applicable HOT or COLD SHUTDOWN condition. Plant condition applicability is determined by Technical Specification LCOs in effect.

Example 1: Event causes damage that results in entry into an LCO that requires the plant to be placed in HOT SHUTDOWN. HOT SHUTDOWN is achievable, but COLD SHUTDOWN is not. This event is not "AFFECTING SAFE SHUTDOWN."

Example 2: Event causes damage that results in entry into an LCO that requires the plant to be placed in COLD SHUTDOWN. HOT SHUTDOWN is achievable, but COLD SHUTDOWN is not. This event is "AFFECTING SAFE SHUTDOWN."

BOMB:

Refers to an explosive device suspected of having sufficient force to damage plant systems or structures.

CIVIL DISTURBANCE:

A group of persons violently protesting station operations or activities at the site.

CONFINEMENT BOUNDARY:

The barrier(s) between areas containing radioactive substances and the environment.

CONTAINMENT CLOSURE:

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

EXPLOSION:

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

EXTORTION:

An attempt to cause an action at the station by threat of force.

ANO EAL BASIS DOCUMENT

FAULTED:

In a steam generator, the existence of secondary side leakage that results in an uncontrolled drop in steam generator pressure or the steam generator being completely depressurized.

FIRE:

Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do not constitute FIREs.

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

HOSTAGE:

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

HOSTILE ACTION:

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

HOSTILE FORCE:

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

IMMINENT:

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

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.

INTRUSION:

A person(s) present in a specified area without authorization. Discovery of a BOMB in a specified area is indication of INTRUSION into that area by a HOSTILE FORCE.

ANO EAL BASIS DOCUMENT

NORMAL PLANT OPERATIONS:

Activities at the plant site associated with routine testing, maintenance, or equipment operations, in accordance with normal operating or administrative procedures. Entry into off-normal or emergency operating procedures, or deviation from normal security or radiological controls posture, is a departure from NORMAL PLANT OPERATIONS.

OWNER CONTROLLED AREA (OCA):

The external area contiguous to the designated reactor site Protected Area over which site Security exercises control. The OCA extends outward to the Entergy site property lines.

PROJECTILE:

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

PROTECTED AREA:

An area encompassed by physical barriers (i.e., the security fence) and to which access is controlled.

RUPTURED:

In a steam generator, existence of primary-to-secondary leakage of a magnitude sufficient to require or cause a reactor trip and safety injection.

SABOTAGE:

Deliberate damage, mis-alignment, or mis-operation of plant equipment with the intent to render the equipment inoperable. Equipment found tampered with or damaged due to malicious mischief may not meet the definition of SABOTAGE until this determination is made by security supervision.

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.

SIGNIFICANT TRANSIENT:

An UNPLANNED event involving one or more of the following: (1) automatic turbine runback > 25% thermal reactor power, (2) electrical load rejection > 25% full electrical load, (3) Reactor Trip, (4) Safety Injection Activation, or (5) thermal power oscillations > 10%.

ANO EAL BASIS DOCUMENT

STRIKE ACTION:

A work stoppage within the PROTECTED AREA by a body of workers to enforce compliance with demands made on Entergy or its affiliates. The STRIKE ACTION must threaten to interrupt NORMAL PLANT OPERATIONS.

UNISOLABLE:

A breach or leak that cannot be promptly isolated.

UNPLANNED:

A parameter change or an event that is not the result of an intended evolution and requires corrective or mitigative actions.

VALID:

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

VISIBLE DAMAGE:

Damage to equipment or structure that is readily observable without measurements, testing, or analysis. Damage is sufficient to cause concern regarding the continued operability or reliability of the affected structure, system, or component. Example damage includes: deformation due to heat or impact, denting, penetration, rupture, cracking, paint blistering. Surface blemishes (e.g., paint chipping, scratches) should not be included.

VITAL AREAS:

Any area within a protected area containing any equipment, system or device which, by result of failure, destruction or associated release, could directly or indirectly endanger the health and safety of the public.

ABNORMAL RADIATION LEVELS / RADIOLOGICAL EFFLUENTS

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AU1

Initiating Condition – NOTIFICATION OF UNUSUAL EVENT

Any release of gaseous or liquid radioactivity to the environment > 2 times the ODCM limits for ≥ 60 minutes

Operating Mode Applicability: All

Example Emergency Action Level(s): (1 or 2 or 3)

Note: *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the release duration has exceeded, or will likely exceed, the applicable time. In the absence of data to the contrary, assume that the release duration has exceeded the applicable time if an ongoing release is detected and the release start time is unknown.*

1. VALID reading on Channel 7 on any of the following radiation monitors > the reading shown for ≥ 60 minutes:

MONITORS – UNIT 1		LIMIT
RX-9820	Containment Purge	5.90E-2 µCi/cc
RX-9825	Radwaste Area	5.36E-2 µCi/cc
RX-9830	Fuel Handling Area	4.54E-2 µCi/cc
RX-9835	Emergency Penetration Room	9.56E-1 µCi/cc
MONITORS – UNIT 2		**LIMIT**
2RX-9820	Containment Purge	4.46E-2 µCi/cc
2RX-9825	Radwaste Area	3.32E-2 µCi/cc
2RX-9830	Fuel Handling Area	4.46E-2 µCi/cc
2RX-9835	Emergency Penetration Room	8.84E-1 µCi/cc
2RX-9840	Post Accident Sampling Building	4.42E-1 µCi/cc
2RX-9845	Aux. Building Extension	1.26E-1 µCi/cc
2RX-9850	Low Level Radwaste Storage Bldg.	1.77E-1 µCi/cc

OR

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AU1

2. VALID reading on any of the following radiation monitors > 2 times the alarm setpoint established by a current release permit for ≥ 60 minutes.

EFFLUENT MONITORS – Unit 1	
RX-9820	Containment Purge (Channel 7 or 9)
RE-4830	Waste Gas Radiation Monitor
RE-4642	Liquid Radwaste Monitor
EFFLUENT MONITORS – Unit 2	
2RX-9820	Containment Purge (Channel 7 or 9)
2RE-2429	Waste Gas Decay Tank Vent Line Radiation Monitor
2RE-2330	BMS Liquid Discharge Monitor
2RE-4423	Regenerative Waste Discharge Monitor
2RE-4425	SG Blowdown to Flume Radiation Monitor

OR

3. Confirmed grab sample analyses for gaseous or liquid releases indicates concentrations or release rates > 2 times the applicable values of the ODCM for ≥ 60 minutes.

Basis:

The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.

This IC addresses a potential reduction in the level of safety of the plant as indicated by a radiological release that exceeds regulatory commitments for an extended period of time.

ANO incorporates features intended to control the release of radioactive effluents to the environment. Further, there are administrative controls established to prevent unintentional releases, or control and monitor intentional releases. The occurrence of extended, uncontrolled radioactive releases to the environment is indicative of a degradation in these features and/or controls.

The ODCM multiples are specified in AU1 and AA1 only to distinguish between non-emergency conditions, and from each other. While these multiples obviously correspond to an offsite dose or dose rate, the emphasis in classifying these events is the degradation in the level of safety of the plant, NOT the magnitude of the associated dose or dose rate.

Releases should not be prorated or averaged over 60 minutes. For example, a release exceeding 4 times ODCM limits for 30 minutes does not meet the threshold for this IC.

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AU1

This Initiating Condition includes any release for which a radioactivity discharge permit was not prepared, or a release that exceeds the conditions (e.g., minimum dilution flow, maximum discharge flow, alarm setpoints, etc.) on the applicable permit.

EAL #1

This EAL addresses radioactivity releases, that for whatever reason, cause effluent radiation monitor readings to exceed the threshold identified in the EAL.

This EAL is intended for sites that have established effluent monitoring on non-routine release pathways for which a discharge permit would not normally be prepared.

EAL #2

This EAL addresses radioactivity releases, that for whatever reason, cause effluent radiation monitor readings to exceed the threshold identified in this Initiating Condition established by the release permit. This value may be associated with a planned batch release, or a continuous release path.

EAL #3

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

EAL #1 and #2 directly correlate with the IC since annual average meteorology is required to be used in showing compliance with the ODCM and is used in calculating the alarm setpoints.

Reference Documents:

1. 1604.051, “Eberline Radiation Monitor System”
2. Offsite Dose Calculation Manual

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AU2

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

UNPLANNED rise in plant radiation levels

Operating Mode Applicability: All

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

1. a. UNPLANNED lowering of water level in the refueling canal or spent fuel pool as indicated by:

   - Personnel observation, refueling crew report, indication on area security camera, borated water source (BWST or RWT) level drop due to makeup demands.

   AND

   b. VALID Area Radiation Monitor reading rise on any of the following:

Unit 1	
RE-8009	Spent Fuel Area
RE-8017	Fuel Handling Area
Unit 2	
2RE-8914	Spent Fuel Area
2RE-8915	Spent Fuel Area
2RE-8916	Spent Fuel Area
2RE-8912	Containment Incore Instrumentation

OR

2. UNPLANNED VALID Area Radiation Monitor readings or survey results indicate a rise by a factor of 1000 over normal* levels.

   Note: *For area radiation monitors with ranges incapable of measuring 1000 times normal* levels, classification shall be based on VALID full scale indication unless surveys confirm that area radiation levels are below 1000 times normal* within 15 minutes of the Area Radiation Monitor indications going to full scale indication.*

   * Normal can be considered as the highest reading in the past twenty-four hours excluding the current peak value.

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AU2

Basis:

This IC addresses elevated radiation levels as a result of lowered water level above irradiated fuel or events that have resulted, or may result, in UNPLANNED rises in radiation dose rates within plant buildings. These radiation rises represent a loss of control over radioactive material and represent a potential degradation in the level of safety of the plant.

EAL #1

The refueling pathway is a site specific combination of cavities, tubes, canals and pools. While a radiation monitor could detect a rise in dose rate due to a drop in the water level, it might not be a reliable indication of whether or not the fuel is covered. For example, a refueling bridge ARM reading may rise due to planned evolutions such as head lift, or even a fuel assembly being raised in the manipulator mast. Also, a monitor could in fact be properly responding to a known event involving transfer or relocation of a source, stored in or near the fuel pool or responding to a planned evolution such as removal of the reactor head. Generally, elevated radiation monitor indications will need to be combined with another indicator (or personnel report) of water loss.

For refueling events where the water level drops below the RPV flange classification would be via CU2. This event escalates to an Alert per AA2 if irradiated fuel outside the reactor vessel is uncovered. For events involving irradiated fuel in the reactor vessel, escalation would be via the Fission Product Barrier Matrix for events in operating Modes 1-4.

EAL #2

This EAL addresses rises in plant radiation levels that represent a loss of control of radioactive material resulting in a potential degradation in the level of safety of the plant.

This EAL excludes radiation level rises that result from planned activities such as use of radiographic sources and movement of radioactive waste materials. A specific list of ARMs is not required as it would restrict the applicability of the Threshold. The intent is to identify loss of control of radioactive material in any monitored area.

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AA1

Initiating Condition - ALERT

Any release of gaseous or liquid radioactivity to the environment > 200 times the ODCM limits for ≥ 15 minutes

Operating Mode Applicability: All

Example Emergency Action Level(s): (1 or 2 or 3)

Note: *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the release duration has exceeded, or will likely exceed, the applicable time. In the absence of data to the contrary, assume that the release duration has exceeded the applicable time if an ongoing release is detected and the release start time is unknown.*

1. VALID reading on Channel 7 on any of the following radiation monitors > the reading shown for ≥ 15 minutes:

MONITORS – UNIT 1		LIMIT
RX-9820	Containment Purge	5.90E0 µCi/cc
RX-9825	Radwaste Area	5.36E0 µCi/cc
RX-9830	Fuel Handling Area	4.54E0 µCi/cc
RX-9835	Emergency Penetration Room	9.56E+1 µCi/cc
MONITORS – UNIT 2		**LIMIT**
2RX-9820	Containment Purge	4.46E0 µCi/cc
2RX-9825	Radwaste Area	3.32E0 µCi/cc
2RX-9830	Fuel Handling Area	4.46E0 µCi/cc
2RX-9835	Emergency Penetration Room	8.84E+1 µCi/cc
2RX-9840	Post Accident Sampling Building	4.42E+1 µCi/cc
2RX-9845	Aux. Building Extension	1.26E+1 µCi/cc
2RX-9850	Low Level Radwaste Storage Bldg.	1.77E+1 µCi/cc

OR

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AA1

2. **EITHER** VALID reading on any of the following radiation monitors > 200 times the alarm setpoint established by a current release permit for ≥ 15 minutes **OR** VALID reading greater than the value listed for ≥ 15 minutes.

MONITORS – UNIT 1		LIMIT
RX-9820	Containment Purge (Channel 7 or 9)	N/A
RE-4830	Waste Gas Radiation Monitor	9.5E7 cpm
RE-4642	Liquid Radwaste Monitor	9.5E7 cpm
MONITORS – UNIT 2		**LIMIT**
2RX-9820	Containment Purge (Channel 7 or 9)	N/A
2RE-2429	Waste Gas Monitoring System	9.5E5 cpm
2RE-2330	BMS Liquid Discharge Monitor	9.5E5 cpm
2RE-4423	Regenerative Waste Discharge Monitor	9.5E5 cpm
2RE-4425	SG Blowdown to Flume Radiation Monitor	9.5E5 cpm

OR

3. Confirmed grab sample analyses for gaseous or liquid releases indicates concentrations or release rates > 200 times the applicable values of the ODCM for ≥ 15 minutes.

Basis:

The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.

This IC addresses an actual or substantial potential reduction in the level of safety of the plant as indicated by a radiological release that exceeds regulatory commitments for an extended period of time. ANO incorporates features intended to control the release of radioactive effluents to the environment. Further, there are administrative controls established to prevent unintentional releases, or control and monitor intentional releases. The occurrence of extended, uncontrolled radioactive releases to the environment is indicative of a degradation in these features and/or controls.

The ODCM multiples are specified in AU1 and AA1 only to distinguish between non-emergency conditions, and from each other. While these multiples obviously correspond to an offsite dose or dose rate, the emphasis in classifying these events is the degradation in the level of safety of the plant, NOT the magnitude of the associated dose or dose rate.

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AA1

Releases should not be prorated or averaged. For example, a release exceeding 600 times ODCM limits for 5 minutes does not meet the threshold for this IC.

This Initiating Condition includes any release for which a release permit was not prepared, or a release that exceeds the conditions (e.g., minimum dilution flow, maximum discharge flow, alarm setpoints, etc.) on the applicable permit.

EAL #1

This EAL addresses radioactivity releases, that for whatever reason, cause effluent radiation monitor readings to exceed the threshold identified in the Initiating Condition.

This EAL is intended for sites that have established effluent monitoring on non-routine release pathways for which a discharge permit would not normally be prepared.

EAL #2

This EAL addresses radioactivity releases, that for whatever reason, cause effluent radiation monitor readings to exceed the threshold identified in this Initiating Condition established by the radioactivity discharge permit. This value may be associated with a planned batch release, or a continuous release path. The limit values provided are for those cases in which the maximum monitor range is less than the release permit value multiplied by 200.

EAL #3

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

EAL #1 and #2 directly correlate with the IC since annual average meteorology is required to be used in showing compliance with the ODCM and is used in calculating the alarm setpoints.

Reference Documents:

1. 1604.051, “Eberline Radiation Monitor System”
2. Offsite Dose Calculation Manual

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AA2

Initiating Condition - ALERT

Damage to irradiated fuel or loss of water level that has resulted or will result in the uncovering of irradiated fuel outside the reactor vessel

Operating Mode Applicability: All

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

1. A water level drop in the refueling canal or spent fuel pool that will result in irradiated fuel becoming uncovered.

   OR

2. VALID alarm on any of the following radiation monitors due to damage to irradiated fuel or loss of water level.

Unit 1	
RX-9820	Containment Purge (Channel 7 or 9)
RX-9825	Radwaste Area (Channel 7 or 9)
RX-9830	Fuel Handling Area (Channel 7 or 9)
RE-8060	Containment High Range Radiation Monitors
RE-8061	Containment High Range Radiation Monitors
RE-8009	Spent Fuel Area
RE-8017	Fuel Handling
Unit 2	
2RX-9820	Containment Purge (Channel 7 or 9)
2RX-9825	Radwaste Area (Channel 7 or 9)
2RX-9830	Fuel Handling Area (Channel 7 or 9)
2RE-8905	Containment Equipment Hatch Area
2RE-8909	Containment Personnel Access Area
2RE-8925-1	Containment High Range Radiation Monitors
2RE-8925-2	Containment High Range Radiation Monitors
2RE-8914	Spent Fuel Area
2RE-8915	Spent Fuel Area
2RE-8916	Spent Fuel Area
2RE-8912	Containment Incore Inst.

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AA2

Basis:

This IC addresses rises in radiation dose rates within plant buildings, and may be a precursor to a radioactivity release to the environment. These events represent a loss of control over radioactive material and represent an actual or substantial potential degradation in the level of safety of the plant.

These events escalate from AU2 in that fuel activity has been released, or is anticipated due to fuel heatup. This IC applies to spent fuel requiring water coverage and is not intended to address spent fuel which is licensed for dry storage.

EAL #1

Indications may include instrumentation such as water level and local area radiation monitors, and personnel (e.g., refueling crew) reports. Depending on available level indication, the declaration may be based on indications of water makeup rate or drop in applicable borated water storage tank level. Video cameras (Security or outage-related) may allow remote observation of level.

EAL #2

This EAL addresses radiation monitor indications of fuel uncovery and/or fuel damage.

Elevated ventilation monitor readings may be indication of a radioactivity release from the fuel, confirming that damage has occurred. Elevated background at the ventilation monitor due to water level drop may mask elevated ventilation exhaust airborne activity and needs to be considered.

While a radiation monitor could detect a rise in dose rate due to a drop in the water level, it might not be a reliable indication of whether or not the fuel is covered.

For example, a refueling bridge ARM reading may rise due to planned evolutions such as head lift, or even a fuel assembly being raised in the manipulator mast. Also, a monitor could in fact be properly responding to a known event involving transfer or relocation of a source, stored in or near the fuel pool or responding to a planned evolution such as removal of the reactor head. Generally, elevated radiation monitor indications will need to be combined with another indicator (or personnel report) of water loss.

Escalation of this emergency classification level, if appropriate, would be based on AS1 or AG1.

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AA3

Initiating Condition - ALERT

Rise in radiation levels within the facility that impedes operation of systems required to maintain plant safety functions

Operating Mode Applicability: All

Example Emergency Action Level(s):

Dose rate > 15 mR/hr in any of the following areas requiring continuous occupancy to maintain plant safety functions:

- Unit 1 Control Room
- Unit 2 Control Room
- Central Alarm Station

Basis:

This IC addresses elevated radiation levels that impact continued operation in areas requiring continuous occupancy to maintain safe operation or to perform a safe shutdown.

The cause and/or magnitude of the rise in radiation levels is not a concern of this IC. The SM/TSC Director/EOF Director must consider the source or cause of the elevated radiation levels and determine if any other IC may be involved.

This IC is not meant to apply to rises in the containment dome radiation monitors as these are events which are addressed in the fission product barrier matrix EALs.

Areas requiring continuous occupancy include the Control Rooms and the Central Alarm Station.

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AS1

Initiating Condition -- SITE AREA EMERGENCY

Offsite dose resulting from an actual or IMMINENT release of gaseous radioactivity > 100 mR TEDE or 500 mR child thyroid CDE for the actual or projected duration of the release

Operating Mode Applicability: All

Example Emergency Action Level(s): (1 or 2 or 3)

Note: *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time. If dose assessment results are available, the classification should be based on EAL #2 instead of EAL #1. Do not delay declaration awaiting dose assessment results.*

1. VALID reading on Channel 9 on any of the following radiation monitors > the reading shown for ≥ 15 minutes:

MONITORS – UNIT 1		LIMIT
RX-9820	Containment Purge	5.90E+1 µCi/cc
RX-9825	Radwaste Area	5.36E+1 µCi/cc
RX-9830	Fuel Handling Area	4.54E+1 µCi/cc
RX-9835	Emergency Penetration Room	9.56E+2 µCi/cc
MONITORS – UNIT 2		**LIMIT**
2RX-9820	Containment Purge	4.46E+1 µCi/cc
2RX-9825	Radwaste Area	3.32E+1 µCi/cc
2RX-9830	Fuel Handling Area	4.46E+1 µCi/cc
2RX-9835	Emergency Penetration Room	8.84E+2 µCi/cc
2RX-9840	Post Accident Sampling Building	4.42E+2 µCi/cc
2RX-9845	Aux. Building Extension	1.26E+2 µCi/cc
2RX-9850	Low Level Radwaste Storage Bldg.	1.77E+2 µCi/cc

OR

2. Dose assessment using actual meteorology indicates doses > 100 mR TEDE or 500 mR child thyroid CDE at or beyond the site boundary.

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AS1

OR

3. Field survey results indicate closed window dose rates > 100 mR/hr expected to continue for ≥ 60 minutes; or analyses of field survey samples indicate child thyroid CDE > 500 mR for one hour of inhalation, at or beyond the site boundary.

Basis:

This IC addresses radioactivity releases that result in doses at or beyond the site boundary that exceed 10% of the EPA Protective Action Guides (PAGs). Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public.

EAL #1

The monitor list in EAL #1 includes monitors on all potential release pathways (plant stack, primary-secondary leak, fuel handling accident).

EAL #2

Since dose assessment in EAL #2 is based on actual meteorology, whereas the monitor readings in EAL #1 are not, the results from these assessments may indicate that the classification is not warranted, or may indicate that a higher classification is warranted. For this reason, emergency implementing procedures should call for the timely performance of dose assessments using actual meteorology and release information. If the results of these dose assessments are available when the classification is made (e.g., initiated at a lower classification level), the dose assessment results override the monitor reading EALs.

EAL #3

Field team surveys in EAL #3 should be performed at or beyond the SITE BOUNDARY and at the most accurate indicator of the condition. Field data are independent of release elevation and meteorology. The assumed release duration is one hour. Expected post accident source terms would be dominated by noble gases providing the dose rate value. Sampling of radioiodine by adsorption on a charcoal cartridge should determine the iodine value.

Reference Documents:

1. 1604.051, “Eberline Radiation Monitor System”

2. Offsite Dose Calculation Manual

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AG1

Initiating Condition -- GENERAL EMERGENCY

Offsite dose resulting from an actual or IMMINENT release of gaseous radioactivity > 1000 mR TEDE or 5000 mR child thyroid CDE for the actual or projected duration of the release using actual meteorology

Operating Mode Applicability: All

Example Emergency Action Level(s): (1 or 2 or 3)

Note: *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time. If dose assessment results are available, the classification should be based on EAL #2 instead of EAL #1. Do not delay declaration awaiting dose assessment results.*

1. VALID reading on Channel 9 on any of the following radiation monitors > the reading shown for ≥ 15 minutes:

MONITORS – UNIT 1		LIMIT
RX-9820	Containment Purge	5.90E+2 (µCi/cc)
RX-9825	Radwaste Area	5.36E+2 (µCi/cc)
RX-9830	Fuel Handling Area	4.54E+2 (µCi/cc)
RX-9835	Emergency Penetration Room	9.56E+3 (µCi/cc)
MONITORS – UNIT 2		**LIMIT**
2RX-9820	Containment Purge	4.46E+2 (µCi/cc)
2RX-9825	Radwaste Area	3.32E+2 (µCi/cc)
2RX-9830	Fuel Handling Area	4.46E+2 (µCi/cc)
2RX-9835	Emergency Penetration Room	8.84E+3 (µCi/cc)
2RX-9840	Post Accident Sampling Building	4.42E+3 (µCi/cc)
2RX-9845	Aux. Building Extension	1.26E+3 (µCi/cc)
2RX-9850	Low Level Radwaste Storage Building	1.77E+3 (µCi/cc)

OR

2. Dose assessment using actual meteorology indicates doses > 1000 mR TEDE or 5000 mR child thyroid CDE at or beyond the site boundary.

OR

ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT

AG1

3. Field survey results indicate closed window dose rates > 1000 mR/hr expected to continue for ≥ 60 minutes; or analyses of field survey samples indicate child thyroid CDE > 5000 mR for one hour of inhalation, at or beyond the site boundary.

Basis:

This IC addresses radioactivity releases that result in doses at or beyond the site boundary that exceed the EPA Protective Action Guides (PAGs). Public protective actions will be necessary. Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public and likely involve fuel damage.

EAL #1

The monitor list in EAL #1 includes monitors on all potential release pathways (plant stack, primary-secondary leak, fuel handling accident).

EAL #2

Since dose assessment in EAL #2 is based on actual meteorology, whereas the monitor readings in EAL #1 are not, the results from these assessments may indicate that the classification is not warranted. For this reason, emergency implementing procedures should call for the timely performance of dose assessments using actual meteorology and release information. If the results of these dose assessments are available when the classification is made (e.g., initiated at a lower classification level), the dose assessment results override the monitor reading EALs.

EAL #3

Field team surveys in EAL #3 should be performed at or beyond the SITE BOUNDARY and at the most accurate indicator of the condition. Field data are independent of release elevation and meteorology. The assumed release duration is one hour. Expected post accident source terms would be dominated by noble gases providing the dose rate value. Sampling of radioiodine by adsorption on a charcoal cartridge should determine the iodine value.

Reference Documents:

1. 1604.051, “Eberline Radiation Monitor System”

2. Offsite Dose Calculation Manual

Cold Shutdown / Refueling System Malfunction

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU1

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

RCS leakage

Operating Mode Applicability: Cold Shutdown (Mode 5)

Example Emergency Action Level(s):

Note: *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. RCS leakage results in the inability to maintain or restore level within Pressurizer or RCS level target band for ≥ 15 minutes.

Basis:

This IC is considered to be a potential degradation of the level of safety of the plant. The inability to maintain or restore level is indicative of loss of RCS inventory.

Relief valve normal operation should be excluded from this IC. However, a relief valve that operates and fails to close per design should be considered applicable to this IC if the relief valve cannot be isolated.

Prolonged loss of RCS Inventory may result in escalation to the Alert emergency classification level via either CA1 or CA3.

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COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU2

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

UNPLANNED loss of RCS / reactor vessel inventory

Operating Mode Applicability: Refueling (Mode 6)

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

Note: *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. UNPLANNED RCS / reactor vessel level drop as indicated by either of the following:

   a. RCS / reactor vessel water level drop below the reactor vessel flange for ≥ 15 minutes when the RCS / reactor vessel level band is established above the reactor vessel flange

   OR

   b. RCS / reactor vessel water level drop below the RCS / reactor vessel level band for ≥ 15 minutes or longer when the RCS / reactor vessel level band is established below the reactor vessel flange.

   OR

2. RCS / reactor vessel level cannot be monitored with a loss of RCS / reactor vessel inventory as indicated by an unexplained level rise in (as applicable) the Reactor Building Sump, Reactor Drain Tank, Aux. Building Equipment Drain Tank, Aux. Building Sump, or Quench Tank.

Basis:

This IC is a precursor of more serious conditions and considered to be a potential degradation of the level of safety of the plant.

Refueling evolutions that lower RCS water level below the reactor vessel flange are carefully planned and procedurally controlled. An UNPLANNED event that results in water level dropping below the reactor vessel flange, or below the planned RCS water level for the given evolution (if the planned RCS water level is already below the reactor vessel flange), warrants declaration of an NUE due to the reduced RCS inventory that is available to keep the core covered.

The allowance of 15 minutes was chosen because it is reasonable to assume that level can be restored within this time frame using one or more of the redundant means of refill that should be available. If level cannot be restored in this time frame then it may indicate a more serious condition exists.

Continued loss of RCS Inventory will result in escalation to the Alert emergency classification level via either CA1 or CA3.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU2

EAL #1

This EAL involves a drop in RCS level below the top of the reactor vessel flange that continues for 15 minutes due to an UNPLANNED event. This EAL is not applicable to drops in flooded reactor cavity level, which is addressed by AU2 EAL1, until such time as the level drops to the level of the vessel flange.

If reactor vessel level continues to drop and reaches the Bottom ID of the RCS Loop then escalation to CA1 would be appropriate.

EAL #2

This EAL addresses conditions in the refueling mode when normal means of core temperature indication and RCS level indication may not be available. Redundant means of reactor vessel level indication will normally be installed (including the ability to monitor level visually) to assure that the ability to monitor level will not be interrupted. However, if all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that reactor vessel inventory loss was occurring by observing sump and tank level changes. Sump and tank level rises must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage.

Escalation to the Alert emergency classification level would be via either CA1 or CA3.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU3

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

UNPLANNED loss of decay heat removal capability with irradiated fuel in the reactor vessel

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

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

Note: *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. UNPLANNED event results in RCS temperature exceeding 200 °F.

   OR

2. Loss of all RCS temperature and RCS/reactor vessel level indication for ≥ 15 minutes.

Basis:

This IC is a precursor of more serious conditions and, as a result, is considered to be a potential degradation of the level of safety of the plant. In cold shutdown the ability to remove decay heat relies primarily on forced cooling flow. Operation of the systems that provide this forced cooling may be jeopardized due to the unlikely loss of electrical power or RCS inventory. Since the RCS usually remains intact in the cold shutdown mode a large inventory of water is available to keep the core covered.

During refueling the level in the reactor vessel will normally be maintained above the reactor vessel flange. Refueling evolutions that lower water level below the reactor vessel flange are carefully planned and procedurally controlled. Loss of forced decay heat removal at reduced inventory may result in more rapid rises in RCS/reactor vessel temperatures depending on the time since shutdown.

Normal means of core temperature indication and RCS level indication may not be available in the refueling mode. Redundant means of reactor vessel level indication are therefore procedurally installed to assure that the ability to monitor level will not be interrupted. However, if all level and temperature indication were to be lost in either the cold shutdown of refueling modes, EAL 2 would result in declaration of an NUE if both temperature and level indication cannot be restored within 15 minutes from the loss of both means of indication.

Escalation to Alert would be via CA1 based on an inventory loss or CA3 based on exceeding its temperature criteria.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU5

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

AC power capability to Vital 4.16 KV busses reduced to a single power source ≥ 15 minutes such that any additional single failure would result in station blackout

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

Example Emergency Action Level(s):

Note: *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. a. AC power capability to Vital 4.16 KV busses reduced to a single power source ≥ 15 minutes.

   AND

   b. Any additional single power source failure will result in station blackout.

Basis:

The condition indicated by this IC is the degradation of the offsite and onsite AC power systems such that any additional single failure would result in a station blackout. This condition could occur due to a loss of offsite power with a concurrent failure of all but one emergency generator to supply power to its emergency busses. The subsequent loss of this single power source would escalate the event to an Alert in accordance with CA5.

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

The EAL allows credit for operation of the Alternate AC Diesel Generator.

Reference Documents:

1. 1202.007, "*Degraded Powe*r"
2. 1202.008, "*Blackout"*
3. 2202.007, "*Loss of Off-Site Power"*
4. 2202.008, "*Station Blackout"*
5. 2104.037, "*Alternate AC Diesel Generator Operations"*

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU6

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Loss of required DC power ≥ 15 minutes

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

Example Emergency Action Level(s):

Note: *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. < 105 volts on required Vital DC bus ≥ 15 minutes.

Basis:

The purpose of this IC and its associated EALs is to recognize a loss of DC power compromising the ability to monitor and control the removal of decay heat during Cold Shutdown or Refueling operations.

It is intended that the loss of the operating (operable) train is to be considered. If this loss results in the inability to maintain cold shutdown, the escalation to an Alert will be per CA3.

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

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU7

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Inadvertent criticality

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

Example Emergency Action Level(s):

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

Basis:

This IC addresses criticality events that occur in Cold Shutdown or Refueling modes such as fuel mis-loading events and inadvertent dilution events. This IC indicates a potential degradation of the level of safety of the plant, warranting an NUE classification.

This condition can be identified using the startup rate meter. The term “sustained” is used in order to allow exclusion of expected short term positive startup rates from planned fuel bundle or control rod movements during core alteration. These short term positive startup rates are the result of the rise in neutron population due to subcritical multiplication.

Escalation would be by SM judgment.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU8

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Loss of all onsite or offsite communications capabilities

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)
Defueled

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

1. Loss of all Table C2 onsite communication methods affecting the ability to perform routine operations.

   OR

2. Loss of all Table C3 offsite communication methods affecting the ability to perform offsite notifications.

Table C2 Onsite Communications Methods
Station radio system
Plant paging system
In-plant telephones
Gaitronics

Table C3 Offsite Communications Methods
All telephone lines (commercial and microwave)
ENS

Basis:

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

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

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA1

Initiating Condition - ALERT

Loss of RCS / reactor vessel inventory

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

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

Note: *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. Loss of RCS / reactor vessel inventory as indicated by:

   Unit 1: RVLMS Levels 1 through 8 indicate DRY

   Unit 2: RVLMS Levels 1 through 5 indicate DRY

   OR

   Unit 1: Reactor vessel level < 368 ft., 0 in. (bottom of the hot leg)

   Unit 2: Reactor vessel level < 369 ft., 1.5 in. (bottom of the hot leg)

   OR

2. RCS / reactor vessel level cannot be monitored for ≥ 15 minutes with a loss of RCS / reactor vessel inventory as indicated by an unexplained level rise in (as applicable) the Reactor Building Sump, Reactor Drain Tank, Aux. Building Equipment Drain Tank, Aux. Building Sump, or Quench Tank.

Basis:

These EALs serve as precursors to a loss of ability to adequately cool the fuel. The magnitude of this loss of water indicates that makeup systems have not been effective and may not be capable of preventing further reactor vessel level lowering and potential core uncovery. This condition will result in a minimum emergency classification level of an Alert.

EAL #1

The bottom of the RCS hot leg penetration into the reactor vessel is approximately RLVMS Level 8 (Unit 1) or RVLMS Level 5 (Unit 2). However, RVLMS may not be available in mode 6. Redundant means level indication is provided in this mode and included in EAL #1. The bottom of the RCS hot leg penetration into the reactor vessel is 368 ft., 0 in. (Unit 1) or 369 ft., 1.5 in. (Unit 2). Below this level, reactor vessel level indication will be lost and loss of suction to decay heat removal systems will occur. The inability to restore and maintain level after reaching this setpoint would be indicative of a failure of the RCS barrier.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA1

EAL #2

In the cold shutdown mode, normal RCS level and reactor vessel level instrumentation systems will usually be available. In the refueling mode, normal means of reactor vessel level indication may not be available. Redundant means of reactor vessel level indication will usually be installed (including the ability to monitor level visually) to assure that the ability to monitor level will not be interrupted. However, if all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that reactor vessel inventory loss was occurring by observing sump and tank level changes. Sump and tank level rises must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage.

If reactor vessel level continues to lower then escalation to Site Area Emergency will be via CS1.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA3

Initiating Condition - ALERT

Inability to maintain plant in Cold Shutdown

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

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

1. An UNPLANNED event results in RCS temperature > 200 °F > the specified duration in Table C1.

Table C1
RCS Reheat Duration Thresholds

RCS	Containment Closure	Duration
Intact (but not RCS Lowered Inventory)	N/A	60 minutes*
Not intact or RCS Lowered Inventory	Established	20 minutes*
	Not Established	0 minutes

* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, the EAL is not applicable.

OR

Note: *EAL #2 does not apply in solid plant conditions.*

2. An UNPLANNED event results in RCS pressure rise > 10 psi due to a loss of RCS cooling.

Basis:

EAL #1

The RCS Reheat Duration Threshold table addresses complete loss of functions required for core cooling for greater than 60 minutes during refueling and cold shutdown modes when RCS integrity is established. RCS integrity should be considered to be in place when the RCS pressure boundary is in its normal condition for the cold shutdown mode of operation (e.g., no freeze seals or nozzle dams). The 60 minute time frame should allow sufficient time to restore cooling without there being a substantial degradation in plant safety.

The RCS Reheat Duration Threshold table also addresses the complete loss of functions required for core cooling for greater than 20 minutes during refueling and cold shutdown modes when CONTAINMENT CLOSURE is established but RCS integrity is not established or RCS inventory is reduced (e.g., mid-loop operation). As discussed above, RCS integrity should be

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA3

assumed to be in place when the RCS pressure boundary is in its normal condition for the cold shutdown mode of operation (e.g., no freeze seals or nozzle dams). The allowed 20 minute time frame was included to allow operator action to restore the heat removal function, if possible.

Finally, the EAL addresses complete loss of functions required for core cooling during refueling and cold shutdown modes when neither CONTAINMENT CLOSURE nor RCS integrity are established.

The (*) indicates that this EAL is not applicable if actions are successful in restoring an RCS heat removal system to operation and RCS temperature is being reduced within the specified time frame.

EAL #2

The 10 psi pressure rise addresses situations where, due to high decay heat loads, the time provided to restore temperature control, should be less than 60 minutes. The RCS pressure setpoint chosen should be 10 psi or the lowest pressure that the site can read on installed Control Board instrumentation that is equal to or greater than 10 psi.

Escalation to Site Area Emergency would be via CS1 should boiling result in significant reactor vessel level loss leading to core uncovery.

A loss of Technical Specification components alone is not intended to constitute an Alert. The same is true of a momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when the heat removal function is available.

The SM / TSC Director / EOF Director must remain alert to events or conditions that lead to the conclusion that exceeding the EAL is IMMINENT. If, in the judgment of the SM / TSC Director / EOF Director, an IMMINENT situation is at hand, the classification should be made as if the threshold has been exceeded.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA5

Initiating Condition - ALERT

Loss of all offsite and all onsite AC power to Vital 4.16KV busses ≥ 15 minutes

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)
Defueled

Example Emergency Action Level(s):

Note: *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. Loss of all offsite and all on-site AC power to Vital 4.16KV busses ≥ 15 minutes.

Basis:

Loss of all AC power compromises all plant safety systems requiring electric power including DHR/shutdown cooling, emergency core cooling, containment cooling, spent fuel pool cooling and the ultimate heat sink.

The event can be classified as an Alert when in cold shutdown, refueling, or defueled mode because of the significantly reduced decay heat and lower temperature and pressure, which allow raising the time to restore one of the emergency busses, relative to that specified for the Site Area Emergency EAL.

Escalating to Site Area Emergency, if appropriate, is by Abnormal Radiation Levels/ Radiological Effluent (TAB A) ICs.

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

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CS1

Initiating Condition - SITE AREA EMERGENCY

Loss of RCS / reactor vessel inventory affecting core decay heat removal capability

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

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

Note: *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. With CONTAINMENT CLOSURE **not** established:

   Unit 1: RVLMS Levels 1 through 9 indicate DRY

   Unit 2: RVLMS Levels 1 through 6 indicate DRY

   OR

2. With CONTAINMENT CLOSURE established, core exit thermocouples indicate superheat.

   OR

3. RCS / reactor vessel level cannot be monitored for ≥ 30 minutes with a loss of RCS / reactor vessel inventory as indicated by any of the following:

   - Containment High Range Radiation Monitor reading > 10 R/hr
   - Erratic source range monitor indication
   - Unexplained level rise in Reactor Building Sump, Reactor Drain Tank, Quench Tank, Aux. Building Equipment Drain Tank, or Aux. Building Sump.

Basis:

Under the conditions specified by this IC, continued lowering in RCS / reactor vessel level is indicative of a loss of inventory control. Inventory loss may be due to an RCS breach, pressure boundary leakage, or continued boiling in the RPV. Thus, declaration of a Site Area Emergency is warranted.

Escalation to a General Emergency is via CG1 or AG1.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CS1

EAL #3

In the cold shutdown mode, normal RCS level and reactor vessel level instrumentation systems will usually be available. In the refueling mode, normal means of reactor vessel level indication may not be available. Redundant means of reactor vessel level indication will usually be installed (including the ability to monitor level visually) to assure that the ability to monitor level will not be interrupted. However, if all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that reactor vessel inventory loss was occurring by observing sump and tank level changes. Sump and tank level rises must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage.

The 30-minute duration allows sufficient time for actions to be performed to recover inventory control equipment.

As water level in the reactor vessel lowers, the dose rate above the core will rise. The dose rate due to this core shine should result in site specific monitor indication and possible alarm.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CG1

Initiating Condition - GENERAL EMERGENCY

Loss of RCS / reactor vessel inventory affecting fuel clad integrity with containment challenged

Operating Mode Applicability: Cold Shutdown (Mode 5)
Refueling (Mode 6)

Example Emergency Action Level(s):

Note: *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.*

1. a. Core exit thermocouples indicate superheat for ≥ 30 minutes.

   AND

   b. Any of the following containment challenge indications:
   - CONTAINMENT CLOSURE not established
   - Explosive mixture inside containment
   - UNPLANNED rise in containment pressure

OR

2. a. RCS / reactor vessel level cannot be monitored with core uncovery indicated by any of the following for ≥ 30 minutes:
   - Containment High Range Radiation Monitor reading > 10R/hr
   - Erratic source range monitor indication
   - UNPLANNED level rise in Reactor Building Sump, Reactor Drain Tank, Quench Tank, Aux. Building Equipment Drain Tank, or Aux. Building Sump

   AND

   b. Any of the following containment challenge indications:
   - CONTAINMENT CLOSURE not established
   - Explosive mixture inside containment
   - UNPLANNED rise in containment pressure

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CG1

Basis:

This IC represents the inability to restore and maintain reactor vessel level to above the top of active fuel with containment challenged. Fuel damage is probable if reactor vessel level cannot be restored, as available decay heat will cause boiling, further reducing the reactor vessel level. With the CONTAINMENT breached or challenged then the potential for unmonitored fission product release to the environment is high. This represents a direct path for radioactive inventory to be released to the environment. This is consistent with the definition of a GE. The GE is declared on the occurrence of the loss or IMMINENT loss of function of all three barriers.

A number of variables can have a significant impact on heat removal capability challenging the fuel clad barrier. Examples include mid-loop, reduced level / flange level, head in place, cavity flooded, RCS venting strategy, decay heat removal system design, vortexing pre-disposition, and steam generator U-tube draining.

Analysis indicates that core damage may occur within an hour following continued core uncovery therefore, 30 minutes was conservatively chosen.

If CONTAINMENT CLOSURE is re-established prior to exceeding the 30 minute core uncovery time limit then escalation to GE would not occur.

In the early stages of a core uncovery event, it is unlikely that hydrogen buildup due to a core uncovery could result in an explosive mixture of dissolved gasses in Containment. However, Containment monitoring and/or sampling should be performed to verify this assumption and a General Emergency declared if it is determined that an explosive mixture exists.

Sump and tank level rises must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage.

In the cold shutdown mode, normal RCS level and reactor vessel level instrumentation systems will usually be available. In the refueling mode, normal means of reactor vessel level indication may not be available. Redundant means of reactor vessel level indication will usually be installed (including the ability to monitor level visually) to assure that the ability to monitor level will not be interrupted. However, if all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that reactor vessel inventory loss was occurring by observing sump and tank level changes. Sump and tank level rises must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage.

As water level in the reactor vessel lowers, the dose rate above the core will rise. The dose rate due to this core shine should result in site specific monitor indication and possible alarm.

Reference Documents:

1. ULD-1-SYS-24, *"Unit 1 Inadequate Core Cooling"*
2. ULD-2-SYS-24, *"Unit 2 Inadequate Core Cooling"*

INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) MALFUNCTION

ISFSI MALFUNCTION

E-HU1

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Damage to a loaded cask CONFINEMENT BOUNDARY

Operating Mode Applicability: All

Example Emergency Action Level(s):

1. Damage to a loaded cask CONFINEMENT BOUNDARY.

Basis:

An NUE in this IC is categorized on the basis of the occurrence of an event of sufficient magnitude that a loaded cask CONFINEMENT BOUNDARY is damaged or violated. This includes classification based on a loaded fuel storage cask CONFINEMENT BOUNDARY loss leading to the degradation of the fuel during storage or posing an operational safety problem with respect to its removal from storage.

This EAL addresses a dropped cask, a tipped over cask, EXPLOSION, PROJECTILE damage, FIRE damage or natural phenomena affecting a cask (e.g., seismic event, tornado, etc.).

FISSION PRODUCT BARRIER DEGRADATION

FISSION PRODUCT BARRIERS

General Bases

The logic used for these initiating conditions reflects the following considerations:

- The Fuel Clad Barrier and the RCS Barrier are weighted more heavily than the Containment Barrier (See Sections 3.4 and 3.8). NUE ICs associated with RCS and Fuel Clad Barriers are addressed under System Malfunction (S) ICs.

- At the Site Area Emergency level, there must be some ability to dynamically assess how far present conditions are from the threshold for a General Emergency. For example, if Fuel Clad and RCS Barrier "Loss" EALs existed, that, in addition to off-site dose assessments, would require continual assessments of radioactive inventory and containment integrity. Alternatively, if both Fuel Clad and RCS Barrier "Potential Loss" EALs existed, the SM / TSC Director / EOF Director would have more assurance that there was no immediate need to escalate to a General Emergency.

- The ability to escalate to higher emergency classes as an event deteriorates must be maintained. For example, RCS leakage steadily increasing would represent an increasing risk to public health and safety.

- The Containment Barrier should not be declared lost or potentially lost based on exceeding Technical Specification action statement criteria, unless there is an event in progress requiring mitigation by the Containment barrier. When no event is in progress (Loss or Potential Loss of either Fuel Clad and/or RCS) the Containment Barrier status is addressed by Technical Specifications.

FISSION PRODUCT BARRIERS

FUEL CLAD

Fuel Clad Barrier Emergency Action Levels: FCB1 **OR** FCB2 **OR** FCB3 **OR** FCB4 **OR** FCB5 **OR** FCB6

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

1. Primary Coolant Activity Level (FCB1)

Loss:

1. Coolant activity > 300 µCi/gm dose equivalent I-131 activity by Chemistry sample

OR

2. Radiation levels > 1000 MR/hr

   Unit 1: at SA-229

   Unit 2: at 2TCD-19

Potential Loss: None

Basis:

Loss

The site specific value corresponds to 300 µCi/gm I-131 equivalent. Assessment by the EAL Task Force indicates that this amount of coolant activity is well above that expected for iodine spikes and corresponds to less than 5% fuel clad damage. This amount of radioactivity indicates significant clad damage and thus the Fuel Clad Barrier is considered lost.

A reading of greater than 1000 mR/hr within at one foot from the RCS sample lines (SA-229 for Unit 1, 2TCD-19 for Unit 2) has been determined to correspond to fuel clad failure of approximately 2-5%, and thus the fuel clad barrier is considered lost. This reading is well above that expected for iodine spikes and thus indicates significant clad damage and thus the fuel clad barrier is considered lost.

Potential Loss

There is no Potential Loss EAL associated with this item.

Reference Documents

1. ANO Calculation 03-E-0002-01, *"Radiation Monitor EAL Setpoints for Fission Product Barrier Degradation"*

FISSION PRODUCT BARRIERS

FUEL CLAD

2. Core Exit Thermocouple Readings (FCB2)

Loss: > 1200 °F CET temperature.

Potential Loss:

Unit 1: ICC exists as evidenced by CETs indicating superheated conditions

Unit 2: Average CETs indicate superheat for current RCS pressure

Basis:

Loss

The Loss EAL of > 1200 °F is consistent with NEI 99-01 and corresponds to significant superheating of the coolant.

Potential Loss

The Potential Loss EAL corresponds to a loss of subcooling margin.

Note that the loss or potential loss EAL for this category will occur after a loss of adequate sub-cooling margin, which represents a loss of the RCS barrier in EAL RCB1, and therefore represents the loss of two barriers, resulting in a Site Area Emergency per FS1. Any loss or potential loss of the containment barrier at that point would escalate to a General Emergency.

Reference Documents

1. Unit 1 EOP 1202.005, “Inadequate Core Cooling”
2. Unit 1 EOP 1202.013, “EOP Figures”
3. Unit 2 OP 2202.009, “Functional Recovery”
4. ANO Procedure OP 1302.022, “Core Damage Assessment”
5. CE-NPSD-241, “Development of the Comprehensive Procedure Guideline for Core Damage Assessment,” Task 467
6. BWOG EOP Technical Bases Document, Vol. 3, Chapter III.F

FISSION PRODUCT BARRIERS

FUEL CLAD

3. Reactor Vessel Water Level (FCB3)

Loss: None

Potential Loss:

Unit 1: RVLMS Levels 1 through 9 indicate DRY

Unit 2: RVLMS Levels 1 through 7 indicate DRY

Basis:

Loss

There is no Loss EAL associated with this item.

Potential Loss

The Reactor Vessel Level Monitoring Systems at ANO do not provide positive indication of core uncovery. The above core level indication provided is used to monitor the approach to and recovery from ICC conditions, but the CETs are used to identify core uncovery, and are the only positive indication of core uncovery.

Per reference document #1, the reactor vessel level indicators installed in Unit 1 extend from the top of the reactor vessel to the fuel alignment plate, and information in reference document #2 indicates that the lowest sensor is greater than 2 feet above the top of active fuel. If any of the 4 RCPs are running, flow induced turbulence produced by the pumps renders the reactor vessel level indicator readings invalid.

Per reference document #3, only the reactor vessel level indicators above the core are considered part of the ICC monitoring system. Per reference document #4, the lowest sensor above the core, RVLMS LVL 6 on the ICC monitoring panel 2C388, is 47 inches above the top of the core. If any of the 4 RCPs are running, flow induced turbulence produced by the pumps renders the reactor vessel level indicator readings invalid.

For either unit then, should CET indication be unavailable and reactor vessel level indication be unavailable due to RCP operation or any other cause, a degraded ability to monitor the barrier would exist.

Reference Documents:

1. ULD-1-SYS-24, *"Unit 1 Inadequate Core Cooling System"*
2. Calculation 84-EQ-0080-02, *"Loop Error Analysis for Reactor Vessel Level Monitoring System"*
3. ULD-2-SYS-24, *"Unit 2 Inadequate Core Cooling Monitoring System"*
4. Calculation 90-E-0116-01, *"Unit 2 EOP Setpoint Document,"* Setpoint R.3

FISSION PRODUCT BARRIERS

FUEL CLAD

4. Containment Radiation Monitoring (FCB4)

Loss: Containment high range radiation monitor reading > 1000 R/hr

Potential Loss: None

Basis:

Loss

The 1000 R/hr reading on the containment high range radiation monitors (RE-8060 or RE-8061 for Unit 1, 2RE-8925-1 or 2RE-8925-2 for Unit 2) is a value which indicates the release of reactor coolant, with elevated activity indicative of fuel damage, into the containment.

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.

This radiation monitor value is higher than that specified for RCS barrier Loss EAL RCB3. Thus, this EAL indicates a loss of both the Fuel Clad barrier and RCS barrier that appropriately escalates the emergency classification to a Site Area Emergency per FS1.

Potential Loss

There is no Potential Loss EAL associated with this item.

Reference Documents:

1. NUREG 1228, *"Source Term Estimation During Incident Response to Severe Nuclear Power Plant Accidents"*

2. ANO Calculation 03-E-0002-01, *"Radiation Monitor EAL Setpoints for Fission Product Barrier Degradation"*

5. Core Damage Assessment (FCB5)

Loss: At least 5% fuel clad damage as determined from core damage assessment

Potential Loss: None

Basis:

Loss

This level is consistent with other fuel clad barrier loss EALs indicative of significant fuel clad damage, but uses core damage assessment evaluations by Technical Support personnel. The fuel clad barrier is considered lost.

FISSION PRODUCT BARRIERS

FUEL CLAD

If this determination is made from the high range containment radiation monitor readings, or if accompanied by other indications of a loss or potential loss of the RCS barrier, this EAL condition represents a Site Area Emergency per FS1.

Potential Loss

There is no potential loss EAL associated with this item.

Reference Documents:

1. ANO Procedure OP-1302.022, *"Core Damage Assessment"*

6. Emergency Director Judgment (FCB6)

Any condition in the opinion of the SM / TSC Director / EOF Director that indicates Loss or Potential Loss of the Fuel Clad barrier.

Basis:

This EAL addresses any other factors that are to be used by the SM / TSC Director / EOF Director in determining whether the Fuel Clad barrier is lost or potentially lost. In addition, the inability to monitor the barrier should also be incorporated in this EAL as a factor in SM / TSC Director / EOF Director judgment that the barrier may be considered lost or potentially lost.

FISSION PRODUCT BARRIERS

RCS

RCS Barrier EALs: RCB1 **OR** RCB2 **OR** RCB3 **OR** RCB4

The RCS Barrier includes the RCS primary side and its connections up to and including the pressurizer safety and relief valves, and other connections up to and including the primary isolation valves.

1. RCS Leak Rate (RCB1)

Loss: RCS leak rate > available makeup capacity as indicated by:

Unit 1: Loss of adequate subcooling margin

Unit 2: RCS subcooling (MTS) can NOT be maintained at least 30 °F

Potential Loss:

Unit 1: UNISOLABLE RCS leak > 50 gpm with Letdown isolated

Unit 2: UNISOLABLE RCS leak > 44 gpm with Letdown isolated

Basis:

Loss

This EAL addresses conditions where leakage from the RCS is greater than available inventory control capacity such that a loss of subcooling has occurred. The loss of subcooling is the fundamental indication that the inventory control systems are inadequate in maintaining RCS pressure and inventory against the mass loss through the leak.

Potential Loss

This EAL is based on the apparent inability to maintain normal liquid inventory within the Reactor Coolant System (RCS) by normal operation of the Makeup and Purification System (Unit 1) or the Chemical and Volume Control System (Unit 2).

For Unit 1 this is based on indications that leakage is greater than normal makeup capacity. The operator could not batch in water and boric acid to the makeup system fast enough to maintain the makeup tank level during a 50 gpm RCS leak. It is not necessary to perform a detailed assessment of the RCS leakrate to implement this EAL. Any event or condition which, in the judgment of the SM / TSC Director / EOF Director, could result in RCS leakage in excess of Unit 1 normal makeup capacity would meet the intent of this EAL; for example:

- Need to open the BWST suction for the operating makeup pump due to lowering makeup tank level
- Full or partial HPI is needed to maintain the RCS pressure or pressurizer level
- Two out of three seal stages failed on any RCP
- RCS pressure lowering due to failure of a primary relief valve to reseat

FISSION PRODUCT BARRIERS

RCS

For Unit 2, this is considered as the capacity of one charging pump discharging to the charging header (44 gpm). Any event or condition which, in the judgment of the SM / TSC Director / EOF Director, could result in RCS leakage in excess of Unit 2 normal makeup capacity would meet the intent of this EAL; for example:

- A second charging pump being required is indicative of a substantial RCS leak
- Three out of four seal stages failed on any RCP
- RCS pressure lowering due to failure of a primary relief valve to reseat

Isolating letdown is a standard abnormal operating procedure action and may prevent unnecessary classifications when a non-RCS leakage path such as a Makeup and Purification System or CVCS leak exists. The intent of this condition is met if attempts to isolate Letdown are NOT successful. Additional charging pumps being required is indicative of a substantial RCS leak.

Reference Documents:

1. Unit 1 EOP 1202.013, Figure 1, *"Saturation and Adequate SCM"*
2. Unit 1 EOP Setpoint Document, Calculation 90-E-0116-07, Setpoint B.19
3. Unit 2 EOP 2202.009, *"Functional Recovery"*
4. Unit 2 EOP Setpoint Document, Calculation 90-E-0116-01
5. Unit 2 SAR Table 9.3-14, Charging Pumps Design Data

2. SG Tube Rupture (RCB2)

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

Potential Loss: None

Basis:

Loss

This EAL addresses the full spectrum of Steam Generator (SG) tube rupture events in conjunction with Containment barrier Loss EALs. It addresses RUPTURED SG(s) for which the leakage is large enough to cause actuation (either automatic or manual) of ECCS (SI). This is consistent to the RCS leak rate barrier Potential Loss EAL.

By itself, this EAL will result in the declaration of an Alert. However, if the SG is also FAULTED (i.e., two barriers failed), the declaration escalates to a Site Area Emergency per Containment barrier Loss EAL CNB3.

FISSION PRODUCT BARRIERS

RCS

Potential Loss

There is no Potential Loss EAL associated with this item.

3. Containment Radiation Monitoring (RCB3)

Loss: Containment high range radiation monitor reading > 100 R/hr.

Potential Loss: None

Basis

Loss

The 100 R/hr reading on the containment high range radiation monitors (RE-8060 or RE-8061 for Unit 1, 2RE-8925-1 or 2RE-8925-2 for Unit 2) is a value which indicates the release of reactor coolant to the containment.

This reading is less than that specified for Fuel Clad barrier EAL FCB4. Thus, this EAL is indicative of a RCS leak only. If the radiation monitor reading rose to that specified by Fuel Clad barrier EAL, fuel damage would also be indicated.

During the initial fifteen minutes after a thermal event inside containment, the high range radiation monitor readings are considered invalid due to possibility of a transient thermally-induced current.

Potential Loss

There is no Potential Loss EAL associated with this item.

Reference Documents:

1. ANO Calculation 03-E-0002-01**,** ***"Radiation Monitor EAL Setpoints for Fission Product Barrier Degradation"***

4. Emergency Director Judgment (RCB4)

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

Basis:

This EAL addresses any other factors that are to be used by the SM / TSC Director / EOF Director in determining whether the RCS barrier is lost or potentially lost. In addition, the inability to monitor the barrier should also be incorporated in this EAL as a factor in SM / TSC Director / EOF Director judgment that the barrier may be considered lost or potentially lost.

FISSION PRODUCT BARRIERS

CONTAINMENT

Containment Barrier EALs: CNB1 **OR** CNB2 **OR** CNB3 **OR** CNB4 **OR** CNB5 **OR** CNB6 **OR** CNB7

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

1. Containment Pressure (CNB1)

Loss:

1. Rapid unexplained drop in containment pressure following an initial rise in containment pressure

   OR

2. Containment pressure or sump level response not consistent with LOCA conditions

Potential Loss:

1. **Unit 1:** Containment pressure > 73.7 PSIA (59 PSIG) and rising

   Unit 2: Containment pressure > 73.7 PSIA (59 PSIG) and rising

   OR

2. Explosive mixture exists inside containment.

   OR

3. a. Containment Pressure > containment spray actuation setpoint

      UNIT 1: 44.7 PSIA (30 PSIG)

      UNIT 2: 23.3 PSIA (8.6 PSIG)

      AND

   b. LESS THAN one full train of spray operating

Basis:

Loss

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

FISSION PRODUCT BARRIERS

CONTAINMENT

This indicator relies on operator recognition of an unexpected response for the condition and therefore, does not have a specific value associated with it. The unexpected response is important because it is the indicator for a containment bypass condition.

Potential Loss 1.

The site specific pressure is based on the containment design pressure.

Potential Loss 2.

Existence of an explosive mixture means a hydrogen and oxygen concentration of at least the lower deflagration limit curve exists. The hydrogen concentration of 4% has been recognized by the NRC staff as a well-established lower flammability limit in air or steam-air atmospheres that is adequately conservative for protecting against an H2 explosion. Hydrogen control systems at ANO are designed and operated as to maintain the containment hydrogen concentration below this level, so that indications of hydrogen concentrations above this are considered a potential challenge to the containment integrity.

Potential Loss 3.

This EAL represents a potential loss of containment in that the containment heat removal/depressurization system (e.g., containment sprays, ice condenser fans, etc., but not including containment venting strategies) are either lost or performing in a degraded manner, as indicated by containment pressure greater than the setpoint at which the equipment was supposed to have actuated.

Reference Documents:

1. Unit 1 OP-1105.003, *"Engineering Safeguards Actuation System"*
2. Unit 1 SAR Sections 1.4.43, 5.2.1.2.1, 14.2.2.5.5.1 (reactor building design pressure)
3. Unit 1 SAR Section 6.6 (Post-Loss of Coolant Accident Hydrogen Control)
4. Unit 1 TS Table 3.3.5-1
5. Unit 2 SAR Section 6.2.5 (Combustible Gas Control In Containment)
6. Unit 2 SAR Section 3.8.1.3.1.D (Containment Design Pressure)
7. Unit 2 TS Table 3.3-4
8. Regulatory Guide 1.7, *"Control of Combustible Gas Concentrations in Containment Following a Loss-of-Coolant Accident, Rev. 2 1978"*

FISSION PRODUCT BARRIERS

CONTAINMENT

2. Core Exit Thermocouple Readings (CNB2)

Loss: None

Potential Loss:

1. a. CETs indicate > 1200 °F

   AND

   b. Restoration procedures not effective within 15 minutes.

   OR

2. a. CETs indicate > 700 °F

   AND

   b. RVLMS indicates:

   Unit 1: Levels 1 through 9 DRY

   Unit 2: Levels 1 through 7 DRY

   AND

   c. Restoration procedures not effective within 15 minutes.

Basis:

Loss

There is no Loss EAL associated with this item.

Potential Loss

The conditions in these EALs represent an IMMINENT core melt sequence which, if not corrected, could lead to vessel failure and a higher potential for containment failure. In conjunction with the Core Cooling and RCS Leakage criteria in the Fuel and RCS barrier columns, this threshold would result in the declaration of a General Emergency, i.e., loss of two barriers and the potential loss of a third. If the function restoration procedures are ineffective, there is no "success" path.

The function restoration procedures are those emergency operating procedures that address the recovery of the core cooling critical safety functions. The procedure is considered effective if the temperature is dropping or if the vessel water level is rising.

Whether or not the procedures will be effective should be apparent within 15 minutes. The SM / TSC Director / EOF Director should make the declaration as soon as it is determined that the procedures have been, or will be ineffective.

FISSION PRODUCT BARRIERS

CONTAINMENT

3. SG Secondary Side Release With Primary-to-Secondary Leakage (CNB3)

Loss:

1. Primary-to-secondary leakrate > 10 gpm

   AND

2. UNISOLABLE steam release from affected steam generator to the environment

Potential Loss: None

Basis:

This loss EAL recognizes that SG tube leakage can represent a bypass of the containment barrier as well as a loss of the RCS barrier.

This EAL results in a NUE for smaller breaks that; (1) do not exceed the Normal Makeup Capacity for Unit 1 or the capacity of one charging pump in the normal charging lineup for Unit 2 EAL in RCS leak rate barrier Potential Loss , or (2) do not result in ECCS actuation in RCS SG tube rupture barrier Loss. For larger breaks, RCS barrier threshold criteria would result in an Alert. For SG tube ruptures which may involve multiple steam generators or UNISOLABLE secondary line breaks, this condition would exist in conjunction with RCS barrier conditions and would result in a Site Area Emergency. Escalation to General Emergency would be based on "Potential Loss" of the Fuel Clad Barrier.

Loss 1.

This EAL addresses the condition in which a RUPTURED steam generator is also FAULTED. This condition represents a bypass of the RCS and containment barriers and is a subset of the second threshold. In conjunction with RCS leak rate barrier loss EAL RCB2, this would always result in the declaration of a Site Area Emergency.

Loss 2.

This EAL addresses SG tube leaks that exceed 10 gpm in conjunction with an UNISOLABLE release path to the environment from the affected steam generator. The threshold for establishing the UNISOLABLE secondary side release is intended to be a prolonged release of radioactivity from the RUPTURED steam generator directly to the environment. This could be expected to occur when the main condenser is unavailable to accept the contaminated steam (i.e., SG tube rupture with concurrent loss of off-site power and the RUPTURED steam generator is required for plant cooldown or a stuck open relief valve). The time it takes to isolate a SG with tube leakage > 10 gpm in accordance with plant specific EOPs is not considered a prolonged release. In this case the SG with tube leakage > 10 gpm with a concurrent loss of offsite power is normally steamed to the environment in a controlled manner to achieve and maintain a RCS Hot Leg temperature below that which corresponds to the Main Steam Safety Valve relief settings. However, if the SG cannot be isolated or if both SGs have tube leakage > 10 gpm, a prolonged release will likely be necessary to support plant cooldown.

FISSION PRODUCT BARRIERS

CONTAINMENT

If the main condenser is available, there may be releases via air ejectors, gland seal exhausters, and other similar controlled, and often monitored, pathways. These pathways do not meet the intent of an UNISOLABLE release path to the environment. These minor releases are assessed using Abnormal Radiation Levels / Radiological Effluent ICs (TAB A).

Potential Loss

There is no Potential Loss EAL associated with this item.

4. Containment Isolation Failure or Bypass (CNB4)

Loss:

1. UNISOLABLE breach of containment

   AND

2. Direct downstream pathway to the environment exists after containment isolation signal

Potential Loss: None

Basis:

Loss

This EAL addresses incomplete containment isolation that allows a direct release to the environment. A breach of containment has also occurred if an inboard and outboard pair of isolation valves fails to close on an automatic actuation signal or from a manual action in the Control Room and opens a release path to the environment.

The breach is not isolable from the Control Room if an attempt for isolation from the Control Room has been made and was unsuccessful. An attempt for isolation should be made prior to the accident classification. If isolable upon identification, then this Initiating Condition is not applicable.

The use of the modifier “direct” in defining the release path discriminates against release paths through interfacing liquid systems. The existence of an in-line charcoal filter does not make a release path indirect since the filter is not effective at removing fission product noble gases. Typical filters have an efficiency of 95-99% removal of iodine. Given the magnitude of the core inventory of iodine, significant releases could still occur.

In addition, since the fission product release would be driven by boiling in the reactor vessel, the high humidity in the release stream can be expected to render the filters ineffective in a short period.

Potential Loss

There is no Potential Loss EAL associated with this item.

FISSION PRODUCT BARRIERS

CONTAINMENT

5. Containment Radiation Monitoring (CNB5)

Loss: None

Potential Loss:

Containment high range radiation monitor reading > 4000 R/hr

Basis:

Loss

There is no Loss EAL associated with this item.

Potential Loss

The 4000 R/hr reading on the containment high range radiation monitors (RE-8060 or RE-8061 for Unit 1, 2RE-8925-1 or 2RE-8925-2 for Unit 2) is a value which indicates significant fuel damage well in excess of the EALs associated with both loss of Fuel Clad and loss of RCS barriers. A major release of radioactivity requiring off-site protective actions from core damage is not possible unless a major failure of fuel cladding allows radioactive material to be released from the core into the reactor coolant.

Regardless of whether containment is challenged, this amount of activity in containment, if released, could have such severe consequences that it is prudent to treat this as a potential loss of containment, such that a General Emergency declaration is warranted.

Because the monitor reading exceeds the readings for Fuel Clad Barrier loss in **FCB4** and RCS Barrier loss in **RCB3**, the SM/TSC Director/EOF Director should declare a General Emergency when this value on the Containment High Range Rad Monitor is exceeded as a loss of two barriers (fuel clad and RCS) and potential loss of the third (containment).

Reference Documents:

1. ANO Calculation 03-E-0002-01, *"Radiation Monitor EAL Setpoints for Fission Product Barrier Degradation"*

2. NUREG 1228, *"Source Term Estimation During Incident Response to Severe Nuclear Power Plant Accidents"*

FISSION PRODUCT BARRIERS

CONTAINMENT

6. Other Indications (CNB6)

Elevated readings on the following radiation monitors that indicate loss or potential loss of the Containment barrier:

MONITORS – UNIT 1	
RX-9820	Containment Purge
RX-9825	Radwaste Area
RX-9830	Fuel Handling Area
RX-9835	Emergency Penetration Room
MONITORS – UNIT 2	
2RX-9820	Containment Purge
2RX-9825	Radwaste Area
2RX-9830	Fuel Handling Area
2RX-9835	Emergency Penetration Room
2RX-9840	Post Accident Sampling Building
2RX-9845	Aux. Building Extension

Basis:

This EAL covers other indications that may unambiguously indicate the loss or potential loss of the containment barrier.

7. Emergency Director Judgment (CNB7)

Any condition in the opinion of the SM / TSC Director / EOF Director that indicates Loss or Potential Loss of the Containment Barrier.

Basis:

This EAL addresses any other factors that are to be used by the SM / TSC Director / EOF Director in determining whether the Containment barrier is lost or potentially lost. In addition, the inability to monitor the barrier should also be incorporated in this EAL as a factor in SM / TSC Director / EOF Director judgment that the barrier may be considered lost or potentially lost.

The Containment barrier should not be declared lost or potentially lost based on exceeding Technical Specification action statement criteria, unless there is an event in progress requiring mitigation by the Containment barrier. When no event is in progress (Loss or Potential Loss of either Fuel Clad and/or RCS) the Containment barrier status is addressed by Technical Specifications.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU1

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Confirmed SECURITY CONDITION or threat which indicates a potential degradation in the level of safety of the plant

Operating Mode Applicability: All

Example Emergency Action Level(s): (1 or 2 or 3)

1. A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by ANO Security Shift Supervision.

   OR

2. A credible site specific security threat notification.

   OR

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

Basis:

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

Security events which do not represent a potential degradation in the level of safety of the plant are reported under 10 CFR 73.71 or in some cases under 10 CFR 50.72. Security events assessed as HOSTILE ACTIONS are classifiable under HA1, HS1 and HG1.

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

EAL #1

The Security Shift Supervisor is the designated individual on-site qualified and trained to confirm that a security event is occurring or has occurred. Training on security event classification confirmation is closely controlled due to the strict secrecy controls placed on the plant Safeguards Contingency Plan.

This EAL is based on the Safeguards Contingency Plan. The Safeguards Contingency Plan is based on guidance provided in NEI 03-12.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU1

EAL #2

This EAL is included to ensure that appropriate notifications for the security threat are made in a timely manner. This includes information of a credible threat. Only the plant to which the specific threat is made need declare the NUE.

The determination of "credible" is made through use of information found in the Safeguards Contingency Plan.

EAL #3

The intent of this EAL is to ensure that notifications for the aircraft threat are made in a timely manner and that Offsite Response Organizations and plant personnel are at a state of heightened awareness regarding the credible threat. It is not the intent of this EAL to replace existing non-hostile related EALs involving aircraft.

This EAL is met when a plant receives information regarding an aircraft threat from NRC. Validation is performed by calling the NRC or by other approved methods of authentication. Only the plant to which the specific threat is made need declare the NUE.

The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an airliner (airliner is meant to be a large aircraft with the potential for causing significant damage to the plant). The status and size of the plane may be provided by NORAD through the NRC.

Escalation to Alert via HA1 would be appropriate if the threat involves an airliner within 30 minutes of the plant.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU2

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Other conditions exist which in the judgment of the SM warrant declaration of an NUE

Operating Mode Applicability: All

Example Emergency Action Level(s):

1. Other conditions exist which in the judgment of the SM indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the SM to fall under the NUE emergency classification level.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU4

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

FIRE within the PROTECTED AREA not extinguished within 15 minutes of detection or EXPLOSION within the PROTECTED AREA

Operating Mode Applicability: All

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

Note: *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the duration has exceeded, or will likely exceed, the applicable time.*

1. FIRE in any **Table H1** structure or area not extinguished 1) within 15 minutes of Control Room notification or 2) within 15 minutes of verification of a Control Room FIRE alarm.

Table H1

Unit 1	Unit 2
CA-1 & HP Office Area	2A3 Room
Condensate Demineralizer Room	2A4, 2D02, & East Battery Room
Corridor 98	2B53 Room
Fire Area C	2B63 Room
Lower North Electrical Penetration Room (LNEPR)	2B9/2B10 Room
Lower South Electrical Equipment Room (LSEER) / Air Compressor Room	2Y11/13 Equipment Room
Lower South Electrical Penetration Room (LSEPR)	Auxiliary Building 317’ General Access
Lower South Piping Penetration Room (LSPPR)	Auxiliary Building 335'
Main Steam Isolation Violation (MSIV) Room	Auxiliary Building 354'
North Engineered Safeguards (ES) SWGR Room (A4)	‘B’ Engineered Safeguards Features (ESF) Room
South ES SWGR Room	Corridor Behind Door 340
Turbine Building • A1, A2, H1, H2 SWGR area • 354' Bowling Alley north end west of Breathing Air compressor room • 368' West Heater Deck from LSEER (orange door) along east wall of ES SWGR Rooms to Corridor 98 door.	Turbine Building • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north Switchgear (SWGR) Room (2A3) and East of LNEPR
Upper North Electrical Penetration Room (UNEPR) / Hot Tool Room / Decon Room	Intake Structure 354' or 366'
Upper South Electrical Penetration Room (USEPR)	LNEPR
Upper South Piping Penetration Room (USPPR)	LSEPR
	Motor-Generator (MG) Set Room
	Steam Pipe Area
	Hot Machine Shop
	UNEPR, UNPPR, LNPPR, USPPR

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU4

OR

2. EXPLOSION within the PROTECTED AREA.

Basis:

This IC addresses the magnitude and extent of FIRES or EXPLOSIONS that may be potentially significant precursors of damage to safety systems. It addresses the FIRE / EXPLOSION, and not the degradation in performance of affected systems that may result.

As used here, detection is visual observation and report by plant personnel or sensor alarm indication.

EAL #1

The 15-minute time period begins with a credible notification that a FIRE is occurring or indication of a fire detection system alarm/actuation. Verification of a fire detection system alarm/actuation includes actions that can be taken within the Control Room or other nearby site specific location to ensure that it is not spurious. An alarm is assumed to be an indication of a FIRE unless it is disproved within the 15-minute period by personnel dispatched to the scene. In other words, a personnel report from the scene may be used to disprove a sensor alarm if received within 15 minutes of the alarm, but shall not be required to verify the alarm.

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

EAL #2

This EAL addresses only those EXPLOSIONS of sufficient force to damage permanent structures or equipment within the PROTECTED AREA.

No attempt is made to assess the actual magnitude of the damage. The occurrence of the EXPLOSION is sufficient for declaration.

The SM also needs to consider any security aspects of the EXPLOSION, if applicable.

Escalation of this emergency classification level, if appropriate, would be based on HA4.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU5

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Release of toxic, corrosive, asphyxiant, or flammable gases deemed detrimental to NORMAL PLANT OPERATIONS.

Operating Mode Applicability: All

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

1. Toxic, corrosive, asphyxiant or flammable gases in amounts that have or could adversely affect NORMAL PLANT OPERATIONS.

   OR

2. Report by Local, County or State officials for evacuation or sheltering of site personnel based on an offsite event.

Basis:

This IC is based on the release of toxic, corrosive, asphyxiant or flammable gases of sufficient quantity to affect NORMAL PLANT OPERATIONS.

The fact that SCBAs may be worn does not eliminate the need to declare the event.

This IC is not intended to require significant assessment or quantification. It assumes an uncontrolled process that has the potential to affect plant operations. This would preclude small or incidental releases, or releases that do not impact structures needed for plant operation.

An asphyxiant is a gas capable of reducing the level of oxygen in the body to dangerous levels. Most commonly, asphyxiants work by merely displacing air in an enclosed environment. This reduces the concentration of oxygen below the normal level of around 19%, which can lead to breathing difficulties, unconsciousness or even death.

Escalation of this emergency classification level, if appropriate, would be based on HA5.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU6

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Natural or destructive phenomena affecting the PROTECTED AREA

Operating Mode Applicability: All

Example Emergency Action Level: (1 or 2 or 3 or 4 or 5 or 6)

1. Seismic event identified by any 2 of the following:
   - Seismic event confirmed by annunciation of the 0.01g acceleration alarm
   - Earthquake felt in plant
   - National Earthquake Center

   OR

2. Tornado striking within PROTECTED AREA boundary or high winds > 67 mph.

   OR

3. Internal flooding that has the potential to affect safety related equipment required by Technical Specifications for the current operating mode in any of the structures or areas in **Table H1.**

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU6

Table H1	
Unit 1	**Unit 2**
CA-1 & HP Office Area	2A3 Room
Condensate Demineralizer Room	2A4, 2D02, & East Battery Room
Corridor 98	2B53 Room
Fire Area C	2B63 Room
Lower North Electrical Penetration Room (LNEPR)	2B9/2B10 Room
Lower South Electrical Equipment Room (LSEER) / Air Compressor Room	2Y11/13 Equipment Room
Lower South Electrical Penetration Room (LSEPR)	Auxiliary Building 317' General Access
Lower South Piping Penetration Room (LSPPR)	Auxiliary Building 335'
Main Steam Isolation Violation (MSIV) Room	Auxiliary Building 354'
North Engineered Safeguards (ES) SWGR Room (A4)	'B' Engineered Safeguards Features (ESF) Room
South ES SWGR Room	Corridor Behind Door 340
Turbine Building • A1, A2, H1, H2 SWGR area • 354' Bowling Alley north end west of Breathing Air compressor room • 368' West Heater Deck from LSEER (orange door) along east wall of ES SWGR Rooms to Corridor 98 door.	Turbine Building • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north Switchgear (SWGR) Room (2A3) and East of LNEPR
Upper North Electrical Penetration Room (UNEPR) / Hot Tool Room / Decon Room	Intake Structure 354' or 366'
Upper South Electrical Penetration Room (USEPR)	LNEPR
Upper South Piping Penetration Room (USPPR)	LSEPR
	Motor-Generator (MG) Set Room
	Steam Pipe Area
	Hot Machine Shop
	UNEPR, UNPPR, LNPPR, USPPR

OR

4. Turbine failure resulting in casing penetration or damage to turbine or generator seals.

OR

5. Lake Dardanelle level < 335 feet.

OR

6. Lake Dardanelle level > 345 feet.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU6

Basis:

These EALs are categorized on the basis of the occurrence of an event of sufficient magnitude to be of concern to plant operators.

EAL #1

Damage may be caused to some portions of the site, but should not affect ability of safety functions to operate.

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

The National Earthquake Center can confirm if an earthquake has occurred in the area of the plant.

EAL #2

This EAL is based on a tornado striking (touching down) or high winds within the PROTECTED AREA.

The high wind value in EAL #2 is conservatively based on the SAR design basis for Unit 1 of 67 mph. Unit 2 Design basis is 80 mph.

Escalation of this emergency classification level, if appropriate, would be based on VISIBLE DAMAGE, or by other in plant conditions, via HA6.

EAL #3

This EAL addresses the effect of internal flooding caused by events such as component failures, equipment misalignment, or outage activity mishaps.

Escalation of this emergency classification level, if appropriate, would be via HA6, or by other plant conditions.

EAL #4

This EAL addresses main turbine rotating component failures of sufficient magnitude to cause observable damage to the turbine casing or to the seals of the turbine generator. Generator seal damage observed after generator purge does not meet the intent of this EAL because it did not impact normal operation of the plant.

Of major concern is the potential for leakage of combustible fluids (lubricating oils) and gases (hydrogen cooling) to the plant environs. Actual FIRES and flammable gas build up are appropriately classified via HU4 and HU5.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU6

This EAL is consistent with the definition of an NUE while maintaining the anticipatory nature desired and recognizing the risk to non-safety related equipment.

Escalation of this emergency classification level, if appropriate, would be to HA6 based on damage done by PROJECTILES generated by the failure or in conjunction with a steam generator tube rupture. These latter events would be classified by the radiological (A) ICs or Fission Product Barrier (F) ICs.

EALs #5 and #6

EALs #5 and #6 are based on the levels of Lake Dardanelle at which the site will take specific action to reduce the impact of the lake level on plant safety by initiating plant shutdown.

Reference Documents:

1. OP-1203.025, *"Natural Emergencies"*
2. OP-2203.008, *"Natural Emergencies"*
3. Unit 1 FSAR
4. Unit 2 FSAR

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA1

Initiating Condition - ALERT

HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat

Operating Mode Applicability: All

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

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

   OR

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

Basis:

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

These EALs address the contingency for a very rapid progression of events, such as that experienced on September 11, 2001. They are not premised solely on the potential for a radiological release. Rather the issue includes the need for rapid assistance due to the possibility for significant and indeterminate damage from additional air, land or water attack elements.

The fact that the site is under serious attack or is an identified attack target with minimal time available for further preparation or additional assistance to arrive requires a heightened state of readiness and implementation of protective measures that can be effective (such as on-site evacuation, dispersal or sheltering).

EAL #1

This EAL addresses the potential for a very rapid progression of events due to a HOSTILE ACTION. It is not intended to address incidents that are accidental events or acts of civil disobedience, such as small aircraft impact, hunters, or physical disputes between employees within the OWNER CONTROLLED AREA. Those events are adequately addressed by other EALs.

Note that this EAL is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OWNER CONTROLLED AREA. This includes Independent Spent Fuel Storage Installations that may be outside the PROTECTED AREA but still in the OWNER CONTROLLED AREA.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA1

EAL #2

This EAL addresses the immediacy of an expected threat arrival or impact on the site within a relatively short time.

The intent of this EAL is to ensure that notifications for the airliner attack threat are made in a timely manner and that Offsite Response Organizations and plant personnel are at a state of heightened awareness regarding the credible threat. Airliner is meant to be a large aircraft with the potential for causing significant damage to the plant.

This EAL is met when a plant receives information regarding an airliner attack threat from NRC and the airliner is within 30 minutes of the plant. Only the plant to which the specific threat is made need declare the Alert.

The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an airliner (airliner is meant to be a large aircraft with the potential for causing significant damage to the plant). The status and size of the plane may be provided by NORAD through the NRC.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA2

Initiating Condition - ALERT

Other conditions exist which in the judgment of the SM / TSC Director / EOF Director warrant declaration of an Alert

Operating Mode Applicability: All

Example Emergency Action Level(s):

1. Other conditions exist which in the judgment of the SM / TSC Director / EOF Director indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere, but that warrant declaration of an emergency because conditions exist which are believed by the SM / TSC Director / EOF Director to fall under the Alert emergency classification level.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA3

Initiating Condition - ALERT

Control room evacuation has been initiated

Operating Mode Applicability: All

Example Emergency Action Level(s):

1. Alternate Shutdown procedure requires Control Room evacuation:

   Unit 1: 1203.002, “Alternate Shutdown”

   Unit 2: 2203.014, “Alternate Shutdown”

Basis:

With the Control Room evacuated, additional support, monitoring and direction through the Technical Support Center and/or other emergency response facilities may be necessary.

Inability to establish plant control from outside the Control Room will escalate this event to a Site Area Emergency.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA4

Initiating Condition - ALERT

FIRE or EXPLOSION affecting the operability of plant safety systems required to establish or maintain safe shutdown

Operating Mode Applicability: All

Example Emergency Action Level(s):

1. FIRE or EXPLOSION resulting in VISIBLE DAMAGE to any Table H1 structure or area containing safety systems or components or Control Room indication of degraded performance of those safety systems.

Table H1	
Unit 1	**Unit 2**
CA-1 & HP Office Area Condensate Demineralizer Room Corridor 98 Fire Area C Lower North Electrical Penetration Room (LNEPR) Lower South Electrical Equipment Room (LSEER) / Air Compressor Room Lower South Electrical Penetration Room (LSEPR) Lower South Piping Penetration Room (LSPPR) Main Steam Isolation Violation (MSIV) Room North Engineered Safeguards (ES) SWGR Room (A4) South ES SWGR Room Turbine Building • A1, A2, H1, H2 SWGR area • 354' Bowling Alley north end west of Breathing Air compressor room • 368' West Heater Deck from LSEER (orange door) along east wall of ES SWGR Rooms to Corridor 98 door. Upper North Electrical Penetration Room (UNEPR) / Hot Tool Room / Decon Room Upper South Electrical Penetration Room (USEPR) Upper South Piping Penetration Room (USPPR)	2A3 Room 2A4, 2D02, & East Battery Room 2B53 Room 2B63 Room 2B9/2B10 Room 2Y11/13 Equipment Room Auxiliary Building 317’ General Access Auxiliary Building 335' Auxiliary Building 354' ‘B’ Engineered Safeguards Features (ESF) Room Corridor Behind Door 340 Turbine Building • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north Switchgear (SWGR) Room (2A3) and East of LNEPR Intake Structure 354' or 366' LNEPR LSEPR Motor-Generator (MG) Set Room Steam Pipe Area Hot Machine Shop UNEPR, UNPPR, LNPPR, USPPR

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA4

Basis:

VISIBLE DAMAGE is used to identify the magnitude of the FIRE or EXPLOSION and to discriminate against minor FIRES and EXPLOSIONS.

The reference to structures or areas containing safety systems or components is included to discriminate against FIRES or EXPLOSIONS in areas having a low probability of affecting safe operation. The significance here is not that a safety system was degraded but the fact that the FIRE or EXPLOSION was large enough to cause damage to these systems.

The use of VISIBLE DAMAGE should not be interpreted as mandating a lengthy damage assessment prior to classification. The declaration of an Alert and the activation of the Technical Support Center will provide the SM/TSC Director/EOF Director with the resources needed to perform detailed damage assessments.

The SM / TSC Director / EOF Director also needs to consider any security aspects of the EXPLOSION.

Escalation of this emergency classification level, if appropriate, will be based on System Malfunction (S), Fission Product Barrier Degradation (F) or Abnormal Radiation Levels / Radiological Effluent (A) ICs.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA5

Initiating Condition - ALERT

Access to a VITAL AREA is prohibited due to toxic, corrosive, asphyxiant or flammable gases which jeopardize operation of operable equipment required to maintain safe operations or safely shutdown the reactor

Operating Mode Applicability: All

Example Emergency Action Level(s):

Note: *If the equipment in the stated area was already inoperable, or out of service, before the event occurred, then this EAL should not be declared as it will have no adverse impact on the ability of the plant to safely operate or safely shutdown beyond that already allowed by Technical Specifications at the time of the event.*

1. Access to a VITAL AREA is prohibited due to toxic, corrosive, asphyxiant or flammable gases which jeopardize operation of systems required to maintain safe operations or safely shutdown the reactor.

Basis:

Gases in a VITAL AREA can affect the ability to safely operate or safely shutdown the reactor. The fact that SCBAs may be worn does not eliminate the need to declare the event.

Declaration should not be delayed for confirmation from atmospheric testing if the atmosphere poses an immediate threat to life and health or an immediate threat of severe exposure to gases. This could be based upon documented analysis, indication of personal ill effects from exposure, or operating experience with the hazards.

If the equipment in the stated area was already inoperable, or out of service, before the event occurred, then this EAL should not be declared as it will have no adverse impact on the ability of the plant to safely operate or safely shutdown beyond that already allowed by 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.

An uncontrolled release of flammable gasses within a facility structure has the potential to affect safe operation of the plant by limiting either operator or equipment operations due to the potential for ignition and resulting equipment damage/personnel injury. Flammable gasses, such as hydrogen and acetylene, are routinely used to maintain plant systems (hydrogen) or to repair equipment/components (acetylene - used in welding). This EAL assumes concentrations of flammable gasses which can ignite/support combustion.

Escalation of this emergency classification level, if appropriate, will be based on System Malfunction (S), Fission Product Barrier Degradation (F) or Abnormal Radiation Levels / Radioactive Effluent (A) ICs.

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HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA6

Initiating Condition - ALERT

Natural or destructive phenomena affecting VITAL AREAS

Operating Mode Applicability: All

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

1. a. Seismic event > Operating Basis Earthquake (OBE) as indicated by annunciation of the 0.1g acceleration alarm.

   AND

   b. Earthquake confirmed by any of the following:

   - Earthquake felt in plant
   - National Earthquake Center
   - Control Room indication of degraded performance of systems required for the safe shutdown of the plant

OR

2. Tornado striking or high winds > 67 mph resulting in VISIBLE DAMAGE to any of the following structures/equipment containing safety systems or components or Control Room indication of degraded performance of those safety systems:

Reactor Building	Turbine Building
Intake Structure	Q Condensate Storage Tank (QCST)
Ultimate Heat Sink	Control Room
Startup Transformers	Auxiliary Building
Diesel Fuel Vault	Borated Water Storage Tank (BWST)
Refueling Water Tank (RWT)	

OR

3. Internal flooding in any of the following areas resulting in an electrical shock hazard that precludes access to operate or monitor safety equipment or Control Room indication of degraded performance of those safety systems:

Intake Structure	Turbine Building
Ultimate Heat Sink	Control Room
BWST / RWT	Startup Transformers
Auxiliary Building	Diesel Fuel Vault
QCST	

OR

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA6

4. Turbine failure-generated PROJECTILES resulting in VISIBLE DAMAGE to or penetration of any of the structures/equipment in **Table H2** containing safety systems or components or Control Room indication of degraded performance of those safety systems:

Table H2	
Reactor Building	Turbine Building
Intake Structure	QCST
Ultimate Heat Sink	Control Room
BWST/RWT	Startup Transformers
Auxiliary Building	Diesel Fuel Vault

OR

5. Lake Dardanelle level < 335 feet and Emergency Cooling Pond inoperable.

OR

6. Vehicle crash resulting in VISIBLE DAMAGE to any of the structures/equipment in **Table H2** containing safety systems or components or Control Room indication of degraded performance of those safety systems:

Table H2	
Reactor Building	Turbine Building
Intake Structure	QCST
Ultimate Heat Sink	Control Room
BWST/RWT	Startup Transformers
Auxiliary Building	Diesel Fuel Vault

Basis:

These EALs escalate from HU6 in that the occurrence of the event has resulted in VISIBLE DAMAGE to plant structures or areas containing equipment necessary for a safe shutdown, or has caused damage to the safety systems in those structures evidenced by Control Room indications of degraded system response or performance. The occurrence of VISIBLE DAMAGE and/or degraded system response is intended to discriminate against lesser events. The initial report should not be interpreted as mandating a lengthy damage assessment prior to classification. No attempt is made in this EAL to assess the actual magnitude of the damage. The significance here is not that a particular system or structure was damaged, but rather, that the event was of sufficient magnitude to cause this degradation.

Escalation of this emergency classification level, if appropriate, would be based on System Malfunction (S) ICs.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA6

EAL #1

Seismic events of this magnitude can result in a VITAL AREA being subjected to forces beyond design limits, and thus damage may be assumed to have occurred to plant safety systems.

The National Earthquake Center can confirm if an earthquake has occurred in the area of the plant.

EAL #2

This EAL is based on a tornado striking (touching down) or high winds that have caused VISIBLE DAMAGE to structures containing functions or systems required for safe shutdown of the plant. The high wind value in EAL #2 is conservatively based on the SAR design basis for Unit 1 of 67 mph. Unit 2 Design basis is 80 mph.

EAL #3

This EAL addresses the effect of internal flooding caused by events such as component failures, equipment misalignment, or outage activity mishaps. It is based on the degraded performance of systems, or has created industrial safety hazards (e.g., electrical shock) that preclude necessary access to operate or monitor safety equipment. The inability to access, operate or monitor safety equipment represents an actual or substantial potential degradation of the level of safety of the plant.

Flooding as used in this EAL describes a condition where water is entering the room faster than installed equipment is capable of removal, resulting in a rise of water level within the room. Classification of this EAL should not be delayed while corrective actions are being taken to isolate the water source.

EAL #4

This EAL addresses the threat to safety related equipment imposed by PROJECTILEs generated by main turbine rotating component failures. Therefore, this EAL is consistent with the definition of an ALERT in that the potential exists for actual or substantial potential degradation of the level of safety of the plant.

EAL #5

This EAL addresses vehicle crashes within the PROTECTED AREA that result in VISIBLE DAMAGE to VITAL AREAS or indication of damage to safety structures, systems, or components containing functions and systems required for safe shutdown of the plant.

EAL #6

EAL #6 addresses site specific phenomena which has the potential for the loss of primary and secondary heat sink.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA6

Reference Documents:

1. OP-1203.025, “Natural Emergencies”
2. OP-2203.008, “Natural Emergencies”
3. Unit 1 FSAR
4. Unit 2 FSAR

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS1

Initiating Condition - SITE AREA EMERGENCY

HOSTILE ACTION within the PROTECTED AREA

Operating Mode Applicability: All

Example Emergency Action Level(s):

1. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by ANO Security Shift Supervision.

Basis:

This condition represents an escalated threat to plant safety above that contained in the Alert in that a HOSTILE FORCE has progressed from the OWNER CONTROLLED AREA to the PROTECTED AREA.

This EAL addresses the contingency for a very rapid progression of events, such as that experienced on September 11, 2001. It is not premised solely on the potential for a radiological release. Rather the issue includes the need for rapid assistance due to the possibility for significant and indeterminate damage from additional air, land or water attack elements.

The fact that the site is under serious attack with minimal time available for further preparation or additional assistance to arrive requires Offsite Response Organization readiness and preparation for the implementation of protective measures.

This EAL addresses the potential for a very rapid progression of events due to a HOSTILE ACTION. It is not intended to address incidents that are accidental events or acts of civil disobedience, such as small aircraft impact, hunters, or physical disputes between employees within the PROTECTED AREA. Those events are adequately addressed by other EALs.

Escalation of this emergency classification level, if appropriate, would be based on actual plant status after impact or progression of attack.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS2

Initiating Condition - SITE AREA EMERGENCY

Other conditions exist which in the judgment of the SM / TSC Director / EOF Director warrant declaration of a Site Area Emergency

Operating Mode Applicability: All

Example Emergency Action Level(s):

1. Other conditions exist which in the judgment of the SM / TSC Director / EOF Director indicate that events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts; (1) toward site personnel or equipment that could lead to the likely failure of or; (2) that prevent effective access to equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the site boundary.

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the SM / TSC Director / EOF Director to fall under the emergency classification level description for Site Area Emergency.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS3

Initiating Condition - SITE AREA EMERGENCY

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

Operating Mode Applicability: All

Example Emergency Action Level(s):

1. a. Control room evacuation has been initiated

   AND

   b. Control of the plant cannot be established in accordance with the following procedures within 15 minutes:

      Unit 1: 1203.002, “Alternate Shutdown”

      Unit 2: 2203.014, “Alternate Shutdown”

Basis:

The intent of this IC is to capture those events where control of the plant cannot be reestablished in a timely manner. In this case, expeditious transfer of control of safety systems has not occurred (although fission product barrier damage may not yet be indicated).

The intent of the EAL is to establish control of important plant equipment and knowledge of important plant parameters in a timely manner. Primary emphasis should be placed on those components and instruments that supply protection for and information about safety functions such as reactivity control (ability to shutdown the reactor and maintain it shutdown), RCS inventory (ability to cool the core), and decay heat removal (ability to maintain a heat sink).

The determination of whether or not control is established at the remote shutdown panel is based on SM / TSC Director / EOF Director judgment. The SM / TSC Director / EOF Director is expected to make a reasonable, informed judgment within 15 minutes that the plant staff has control of the plant from the remote shutdown panel.

Escalation of this emergency classification level, if appropriate, would be by Fission Product Barrier Degradation (F) or Abnormal Radiation Levels/Radiological Effluent (A) EALs.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HG1

Initiating Condition - GENERAL EMERGENCY

HOSTILE ACTION resulting in loss of physical control of the facility

Operating Mode Applicability: All

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

1. A HOSTILE ACTION has occurred such that plant personnel are unable to operate equipment required to maintain safety functions.

   OR

2. A HOSTILE ACTION has caused failure of Spent Fuel Cooling Systems and IMMINENT fuel damage is likely for a freshly off-loaded reactor core in pool.

Basis:

EAL #1

This EAL encompasses conditions under which a HOSTILE ACTION has resulted in a loss of physical control of VITAL AREAS (containing vital equipment or controls of vital equipment) required to maintain safety functions and control of that equipment cannot be transferred to and operated from another location. These safety functions are reactivity control (ability to shut down the reactor and keep it shutdown) RCS inventory (ability to cool the core), and secondary heat removal (ability to maintain a heat sink).

Loss of physical control of the Control Room or remote shutdown/alternate shutdown capability alone may not prevent the ability to maintain safety functions per se. Design of the remote shutdown/alternate shutdown capability and the location of the transfer switches should be taken into account. Primary emphasis should be placed on those components and instruments that supply protection for and information about safety functions.

If control of the plant equipment necessary to maintain safety functions can be transferred to another location, then the threshold is not met.

EAL #2

This EAL addresses failure of spent fuel cooling systems as a result of HOSTILE ACTION if IMMINENT fuel damage is likely, such as when a freshly off-loaded reactor core is in the spent fuel pool. At ANO, the term “freshly off-loaded reactor core” refers to fuel that has been discharged from the core and stored in the spent fuel pool for a period of LESS THAN one year.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HG2

Initiating Condition - GENERAL EMERGENCY

Other conditions exist which in the judgment of the SM / TSC Director / EOF Director warrant declaration of a General Emergency

Operating Mode Applicability: All

Example Emergency Action Level(s):

1. Other conditions exist which in the judgment of the SM / TSC Director / EOF Director indicate that events are in progress or have occurred which involve actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the SM / TSC Director / EOF Director to fall under the emergency classification level description for General Emergency.

SYSTEM MALFUNCTION

SYSTEM MALFUNCTION

SU1

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Loss of all offsite AC power to Vital 4.16 KV busses ≥ 15 minutes

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

Example Emergency Action Level(s):

Note: *The SM 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.*

1. Loss of all offsite AC power to Vital 4.16 KV busses ≥ 15 minutes.

Basis:

Prolonged loss of offsite AC power reduces required redundancy and potentially degrades the level of safety of the plant by rendering the plant more vulnerable to a complete loss of AC power to emergency busses.

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

Reference Documents:

1. 1202.007, “Degraded Power”
2. 1202.008, “Blackout”
3. 2202.007, “Loss of Off-Site Power”
4. 2202.008, “Station Blackout”

SYSTEM MALFUNCTION

SU6

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

UNPLANNED loss of safety system annunciation or indication in the Control Room ≥ 15 minutes

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

Example Emergency Action Level(s):

Note: *The SM 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.*

1. UNPLANNED Loss of > approximately 75% of the following > 15 minutes:

   a. Control Room annunciators associated with safety systems.

   OR

   b. Control Room safety system indication.

Basis:

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

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

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

Quantification is arbitrary, however, it is estimated that if approximately 75% of the safety system annunciators or indicators are lost, there is an increased risk that a degraded plant condition could go undetected. It is not intended that plant personnel perform a detailed count of the instrumentation lost but use the value as a judgment threshold for determining the severity of the plant conditions.

It is further recognized that most plant designs provide redundant safety system indication powered from separate uninterruptible power supplies. While failure of a large portion of annunciators is more likely than a failure of a large portion of indications, the concern is included in this EAL due to difficulty associated with assessment of plant conditions. The loss of specific, or several, safety system indicators should remain a function of that specific system or component operability status. This will be addressed by the specific Technical Specification.

SYSTEM MALFUNCTION

SU6

The initiation of a Technical Specification imposed plant shutdown related to the instrument loss will be reported via 10 CFR 50.72. If the shutdown is not in compliance with the Technical Specification action, the NUE is based on SU11 "Inability to reach required operating mode within Technical Specification limits."

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

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

This NUE will be escalated to an Alert based on a concurrent loss of compensatory indications or if a SIGNIFICANT TRANSIENT is in progress during the loss of annunciation or indication (SA6).

Reference Documents:

1. 1203.043, “Loss Control Room Annunciators”

2. 2203.042, “Loss of Control Room Annunciators”

SYSTEM MALFUNCTION

SU7

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

RCS leakage

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

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

1. Unidentified or pressure boundary leakage > 10 gpm.

   OR

2. Identified leakage > 25 gpm.

Basis:

With respect to this IC, RCS leakage is defined as a loss of RCS inventory due to a leak in the RCS or a supporting system that is not or cannot be isolated within 10 minutes. For example, isolation of the RCS Letdown (purification) system is a standard abnormal operating procedure action and may prevent unnecessary classifications when a non-RCS leakage path leak exists. However, the intent of this condition is met if attempts to isolate the RCS leak are NOT successful.

This IC is included as an NUE because it may be a precursor of more serious conditions and, as result, is considered to be a potential degradation of the level of safety of the plant. The 10 gpm value for the unidentified or pressure boundary leakage was selected as it is observable with normal Control Room indications. Lesser values must generally be determined through time-consuming surveillance tests (e.g., mass balances).

Relief valve normal operation should be excluded from this IC. However, a relief valve that operates and fails to close per design should be considered applicable to this IC if the relief valve cannot be isolated.

The EAL for identified leakage is set at a higher value due to the lesser significance of identified leakage in comparison to unidentified or pressure boundary leakage. Steam generator tube leakage is identified leakage. In either case, escalation of this IC to the Alert level is via Fission Product Barrier Degradation (F) ICs.

SYSTEM MALFUNCTION

SU8

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Loss of all onsite or offsite communications capabilities

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

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

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

   OR

2. Loss of all Table M2 offsite communications methods affecting the ability to perform offsite notifications.

Table M1 Onsite Communications Methods
Station radio system
Plant paging system
In-plant telephones
Gaitronics

Table M2 Offsite Communications Methods
All telephone lines (commercial and microwave)
ENS

Basis:

The purpose of this IC and its associated EALs is to recognize a loss of communications capability that either defeats the plant operations staff ability to perform routine tasks necessary for plant operations or the ability to communicate issues with offsite authorities.

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

Reference Documents:

1. 1903.062, “Communications System Operating Procedure”

SYSTEM MALFUNCTION

SU9

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Fuel clad degradation

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

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

1. Failed Fuel Iodine radiation monitor reading indicates fuel clad degradation > Technical Specification allowable limits:

   Unit 1:

   RI-1237S reads > 1.3 x 10^5 counts per minute

   Unit 2:

   2RITS-4806B reads > .65 x 10^5 counts per minute

   OR

2. RCS sample activity value indicating fuel clad degradation > Technical Specification allowable limits:

   - uCi/gm Dose Equivalent I-131 for more than 48 hours

     OR

   - **Unit 1:**

     ≥ 60 uCi/gm Dose Equivalent I-131

     Unit 2:

     > 60 uCi/gm Dose Equivalent I-131

     OR

   - **Unit 1:**

     > 2200 µCi/gm Dose Equivalent Xe-133 for more than 48 hours

     Unit 2:

     > 3100 µCi/gm Dose Equivalent Xe-133 for more than 48 hours

SYSTEM MALFUNCTION

SU9

Basis:

This IC is included because it is a precursor of more serious conditions and, as result, is considered to be a potential degradation of the level of safety of the plant.

EAL #1

This threshold addresses the Letdown Radiation Monitor readings that provide indication of a degradation of fuel clad integrity.

EAL #2

This EAL addresses coolant samples exceeding coolant technical specifications for transient iodine spiking limits and coolant samples exceeding coolant Technical Specifications for nominal operating limits for the time period specified in the Technical Specifications.

Escalation of this IC to the Alert level is via the Fission Product Barriers (F).

Reference Documents:

1. ANO1 Technical Specifications
2. ANO2 Technical Specifications

SYSTEM MALFUNCTION

SU10

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Inadvertent criticality

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

Example Emergency Action Level(s):

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

Basis:

This IC addresses inadvertent criticality events. This IC indicates a potential degradation of the level of safety of the plant, warranting an NUE classification. This IC excludes inadvertent criticalities that occur during planned reactivity changes associated with reactor startups (e.g., criticality earlier than estimated).

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

Escalation would be by the Fission Product Barrier Table (F), as appropriate to the operating mode at the time of the event.

Reference Documents:

1. 1203.012G, “Annunciator K08 Corrective Action”

2. 2203.012D, “Annunciator 2K04 Corrective Action”

SYSTEM MALFUNCTION

SU11

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Inability to reach required operating mode within Technical Specification limits

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

Example Emergency Action Level(s):

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

Basis:

Limiting Conditions of Operation (LCOs) require the plant to be brought to a required operating mode when the Technical Specification required configuration cannot be restored. Depending on the circumstances, this may or may not be an emergency or precursor to a more severe condition. In any case, the initiation of plant shutdown required by the site Technical Specifications requires a four hour report under 10 CFR 50.72 (b) Non-emergency events. The plant is within its safety envelope when being shut down within the allowable action statement time in the Technical Specifications. An immediate NUE is required when the plant is not brought to the required operating mode within the allowable action statement time in the Technical Specifications. Declaration of an NUE is based on the time at which the LCO-specified action statement time period elapses under the site Technical Specifications and is not related to how long a condition may have existed.

Reference Documents:

1. ANO2 Technical Specifications

2. ANO1 Technical Specifications

SYSTEM MALFUNCTION

SA1

Initiating Condition - ALERT

AC power capability to Vital 4.16 KV busses reduced to a single power source ≥ 15 minutes such that any additional single failure would result in station blackout

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

Example Emergency Action Level(s):

Note: *The SM / TSC Director / EOF Director 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.*

1. a. AC power capability to Vital 4.16 KV busses reduced to a single power source ≥ 15 minutes.

   AND

   b. Any additional single power source failure will result in station blackout.

Basis:

The condition indicated by this IC is the degradation of the offsite and onsite AC power systems such that any additional single failure would result in a station blackout. This condition could occur due to a loss of offsite power with a concurrent failure of all but one emergency generator to supply power to its emergency busses. Another related condition could be the loss of all offsite power and loss of onsite emergency generators with only one train of emergency busses being backfed from the unit main generator, or the loss of onsite emergency generators with only one train of emergency busses being backfed from offsite power. The subsequent loss of this single power source would escalate the event to a Site Area Emergency in accordance with **SS1**.

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

The EAL allows credit for operation of the Alternate AC Diesel Generator.

Reference Documents:

1. 1202.007, “Degraded Power”
2. 1202.008, “Blackout”
3. 2202.007, “Loss of Off-Site Power”
4. 2202.008, “Station Blackout”
5. 2104.037, “Alternate AC Diesel Generator Operations”

SYSTEM MALFUNCTION

SA3

Initiating Condition - ALERT

Automatic trip fails to shutdown the reactor and the manual actions taken from the reactor control console are successful in shutting down the reactor

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

Example Emergency Action Level(s):

1. a. An automatic trip failed to shutdown the reactor as indicated by reactor power ≥ 5%.

   AND

   b. Manual actions taken at the reactor control console successfully shutdown the reactor as indicated by reactor power < 5%.

Basis:

Manual trip actions taken at the reactor control console are any set of actions by the Reactor Operator(s) which causes or should cause control rods to be rapidly inserted into the core and shuts down the reactor. Any action taken to trip the reactor from any location other than panel C03 (Unit 1) or 2C03/2C14 (Unit 2) constitutes a failure of the manual trip function. Failure of manual trip would escalate the event to a Site Area Emergency (**SS3**).

This condition indicates failure of the automatic protection system to trip the reactor. This condition is more than a potential degradation of a safety system in that a front line automatic protection system did not function in response to a plant transient. Thus the plant safety has been compromised because design limits of the fuel may have been exceeded. An Alert is indicated because conditions may exist that lead to potential loss of fuel clad or RCS and because of the failure of the Reactor Protection System to automatically shutdown the plant.

If manual actions taken at the reactor control console fail to shutdown the reactor, the event would escalate to a Site Area Emergency.

SYSTEM MALFUNCTION

SA6

Initiating Condition - ALERT

UNPLANNED loss of safety system annunciation or indication in the Control Room with either (1) a SIGNIFICANT TRANSIENT in progress, or (2) compensatory indicators unavailable

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

Example Emergency Action Level(s):

Note: *The SM/TSC Director/EOF Director 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.*

1. a. UNPLANNED loss of > approximately 75% of the following ≥ 15 minutes:

   - Control Room annunciators associated with safety systems

   OR

   - Control Room safety system indication

   AND

   b. Either of the following:

   - A SIGNIFICANT TRANSIENT is in progress

   OR

   - Compensatory indications are unavailable.

Basis:

This IC is intended to recognize the difficulty associated with monitoring changing plant conditions without the use of a major portion of the annunciation or indication equipment during a SIGNIFICANT TRANSIENT.

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

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

SYSTEM MALFUNCTION

SA6

Quantification is arbitrary, however, it is estimated that if approximately 75% of the safety system annunciators or indicators are lost, there is an increased risk that a degraded plant condition could go undetected. It is not intended that plant personnel perform a detailed count of the instrumentation lost but use the value as a judgment threshold for determining the severity of the plant conditions. It is also not intended that the Shift Manager be tasked with making a judgment decision as to whether additional personnel are required to provide increased monitoring of system operation.

It is further recognized that most plant designs provide redundant safety system indication powered from separate uninterruptible power supplies. While failure of a large portion of annunciators is more likely than a failure of a large portion of indications, the concern is included in this EAL due to difficulty associated with assessment of plant conditions. The loss of specific, or several, safety system indicators should remain a function of that specific system or component operability status. This will be addressed by the specific Technical Specification. The initiation of a Technical Specification imposed plant shutdown related to the instrument loss will be reported via 10 CFR 50.72. If the shutdown is not in compliance with the Technical Specification action, the NUE is based on SU11 "Inability to reach required operating mode within Technical Specification limits."

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

"Compensatory indications" in this context includes computer based information such as SPDS, QSPDS, COLSS, etc. If both a major portion of the annunciation system and all computer monitoring are unavailable, the Alert is required.

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

This Alert will be escalated to a Site Area Emergency if the operating crew cannot monitor the transient in progress due to a concurrent loss of compensatory indications with a SIGNIFICANT TRANSIENT in progress during the loss of annunciation or indication.

Reference Documents:

1. 1015.037, “Post Transient Review”
2. 1203.043, “Loss of Control Room Annunciators”
3. 2203.042, “Loss of Control Room Annunciators”

SYSTEM MALFUNCTION

SS1

Initiating Condition - SITE AREA EMERGENCY

Loss of all offsite and all onsite AC power to Vital 4.16 KV busses ≥ 15 minutes

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

Example Emergency Action Level(s):

Note: *The SM / TSC Director / EOF Director 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.*

1. Loss of all offsite and all onsite AC power to Vital 4.16 KV busses ≥ 15 minutes.

Basis:

Loss of all AC power to emergency busses compromises all plant safety systems requiring electric power including Shutdown Cooling, ECCS, Containment Heat Removal and the Ultimate Heat Sink. Prolonged loss of all AC power to emergency busses will lead to loss of Fuel Clad, RCS, and Containment, thus this event can escalate to a General Emergency.

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

Escalation to General Emergency is via Fission Product Barrier Degradation (F) or IC SG1, "Prolonged loss of all offsite and all onsite AC power to Vital 4.16 KV busses."

Reference Documents:

1. 1202.007, “Degraded Power”
2. 1202.008, “Blackout”
3. 2202.007, “Loss of Off-Site Power”
4. 2202.008, “Station Blackout”
5. 2104.037, “Alternate AC Diesel Generator Operations”

SYSTEM MALFUNCTION

SS3

Initiating Condition - SITE AREA EMERGENCY

Automatic trip fails to shutdown the reactor and manual actions taken from the reactor control console are not successful in shutting down the reactor

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

Example Emergency Action Level(s):

1. a. An automatic trip failed to shutdown the reactor.

   AND

   b. Manual actions taken at the reactor control console do not shutdown the reactor as indicated by reactor power ≥ 5%.

Basis:

Under these conditions, the reactor is producing more heat than the maximum decay heat load for which the safety systems are designed and efforts to bring the reactor subcritical are unsuccessful. A Site Area Emergency is warranted because conditions exist that lead to IMMINENT loss or potential loss of both fuel clad and RCS.

Manual trip actions taken at the reactor control console are any set of actions by the Reactor Operator(s) which causes or should cause control rods to be rapidly inserted into the core and shuts down the reactor.

Manual trip actions are not considered successful if action away from panel C03 (Unit 1) or panels 2C03/2C14 (Unit 2) is required to trip the reactor. This EAL is still applicable even if actions taken away from panel C03 (Unit 1) or panels 2C03/2C14 (Unit 2) are successful in shutting the reactor down because the design limits of the fuel may have been exceeded or because of the gross failure of the Reactor Protection System to shutdown the plant.

Escalation of this event to a General Emergency would be due to a prolonged condition leading to an extreme challenge to either core-cooling or heat removal.

SYSTEM MALFUNCTION

SS4

Initiating Condition - SITE AREA EMERGENCY

Loss of all vital DC power ≥ 15 minutes

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

Example Emergency Action Level(s):

Note: *The SM / TSC Director / EOF Director 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.*

1. < 105 volts on all Vital DC busses ≥ 15 minutes.

Basis:

Loss of all DC power compromises ability to monitor and control plant safety functions. Prolonged loss of all DC power will cause core uncovering and loss of containment integrity when there is significant decay heat and sensible heat in the reactor system.

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

Escalation to a General Emergency would occur by Abnormal Radiation Levels/Radiological Effluent (A), Fission Product Barrier Degradation (F).

SYSTEM MALFUNCTION

SS6

Initiating Condition - SITE AREA EMERGENCY

Inability to monitor a SIGNIFICANT TRANSIENT in progress

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

Example Emergency Action Level(s):

Note: *The SM / TSC Director / EOF Director 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.*

1. a. Loss of > approximately 75% of the following ≥ 15 minutes:

   - Control Room annunciators associated with safety systems

   OR

   - Control Room safety system indication

   AND

   b. A SIGNIFICANT TRANSIENT is in progress.

   AND

   c. Compensatory indications are unavailable.

Basis:

This IC is intended to recognize the threat to plant safety associated with the complete loss of capability of the control room staff to monitor plant response to a SIGNIFICANT TRANSIENT.

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

Quantification is arbitrary, however, it is estimated that if approximately 75% of the safety system annunciators or indicators are lost, there is an increased risk that a degraded plant condition could go undetected. It is not intended that plant personnel perform a detailed count of the instrumentation lost but use the value as a judgment threshold for determining the severity of the plant conditions. It is also not intended that the Shift Manager be tasked with making a judgment decision as to whether additional personnel are required to provide increased monitoring of system operation.

SYSTEM MALFUNCTION

SS6

It is further recognized that most plant designs provide redundant safety system indication powered from separate uninterruptible power supplies. While failure of a large portion of annunciators is more likely than a failure of a large portion of indications, the concern is included in this EAL due to difficulty associated with assessment of plant conditions. The loss of specific, or several, safety system indicators should remain a function of that specific system or component operability status. This will be addressed by the specific Technical Specification. The initiation of a Technical Specification imposed plant shutdown related to the instrument loss will be reported via 10 CFR 50.72. If the shutdown is not in compliance with the Technical Specification action, the NUE is based on SU11 "Inability to reach required operating mode within Technical Specification limits."

A Site Area Emergency is considered to exist if the Control Room staff cannot monitor safety functions needed for protection of the public while a significant transient is in progress.

Site specific indications needed to monitor safety functions necessary for protection of the public must include Control Room indications, computer generated indications and dedicated annunciation capability.

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

"Compensatory indications" in this context includes computer based information such as SPDS, QSPDS, COLSS, etc. This should include all computer systems available for this use depending on specific plant design and subsequent retrofits.

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

Reference Documents:

1. 015.037, “Post Transient Review”
2. 1203.043, “Loss of Control Room Annunciators”
3. 2203.042, “Loss of Control Room Annunciators”

SYSTEM MALFUNCTION

SG1

Initiating Condition - GENERAL EMERGENCY

Prolonged loss of all offsite and all onsite AC power to safety busses

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

Example Emergency Action Level(s):

1. a. Loss of all offsite and all onsite AC power to safety busses.

   AND

   b. Either of the following:

   - Restoration of at least one safety bus in < 4 hours is not likely.

     OR

   - Continuing degradation of core cooling based on Fission Product Barrier monitoring as indicated by CETs ≥ 700 °F.

Basis:

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

This IC is specified to assure that in the unlikely event of a prolonged station blackout, timely recognition of the seriousness of the event occurs and that declaration of a General Emergency occurs as early as is appropriate, based on a reasonable assessment of the event trajectory.

The likelihood of restoring at least one emergency bus should be based on a realistic appraisal of the situation since a delay in an upgrade decision based on only a chance of mitigating the event could result in a loss of valuable time in preparing and implementing public protective actions.

In addition, under these conditions, fission product barrier monitoring capability may be degraded.

SYSTEM MALFUNCTION

SG1

Although it may be difficult to predict when power can be restored, it is necessary to give the SM / TSC Director / EOF Director a reasonable idea of how quickly (s)he may need to declare a General Emergency based on two major considerations:

1. Are there any present indications that core cooling is already degraded to the point that loss or potential loss of Fission Product Barriers is IMMINENT?

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

Thus, indication of continuing core cooling degradation must be based on Fission Product Barrier monitoring with particular emphasis on SM / TSC Director / EOF Director judgment as it relates to IMMINENT loss or potential loss of fission product barriers and degraded ability to monitor fission product barriers.

Reference Documents:

1. Unit 1 Calculation 85-E-0072-02, “Time from Loss of All AC Power to Loss of Subcooling”

2. Unit 2 Calculation 85-E-0072-01, “Time from Loss of All AC Power to Loss of Subcooling”

SYSTEM MALFUNCTION

SG3

Initiating Condition - GENERAL EMERGENCY

Automatic trip and all manual actions fail to shutdown the reactor and indication of an extreme challenge to the ability to cool the core exists

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

Example Emergency Action Level(s):

1. a. An automatic trip failed to shutdown the reactor

   AND

   b. All manual actions do not shutdown the reactor as indicated by reactor power ≥ 5%.

   AND

   c. Either of the following exist or have occurred due to continued power generation:

   - CET temperatures at or approaching 1200 °F

     OR

   - Feedwater flow rate less than:

     Unit 1: 430 gpm

     Unit 2: 485 gpm

Basis:

Under these conditions, the reactor is producing more heat than the maximum decay heat load for which the safety systems are designed and efforts to bring the reactor subcritical are unsuccessful.

In the event either of these challenges exists at a time that the reactor has not been brought below the power associated with the safety system design a core melt sequence exists. In this situation, core degradation can occur rapidly. For this reason, the General Emergency declaration is intended to be anticipatory of the fission product barrier table declaration to permit maximum off-site intervention time.

Attachment 4 to

0CAN121102

Proposed EAL Matrix Chart and Review Table (for information)

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT

ABNORMAL RADIOLOGICAL EFFLUENTS

AG1

1 2 3 4 5 6 D

Offsite dose resulting from an actual or IMMINENT release of gaseous radioactivity > 1000 mR TEDE or 5000 mR child thyroid CDE for the actual or projected duration of the release using actual meteorology

Emergency Action Level(s):

NOTE:

The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time. If dose assessment results are available, the classification should be based on EAL #2 instead of EAL #1. Do not delay declaration awaiting dose assessment results.

1. VALID reading on Channel 9 on any of the following radiation monitors > the reading shown for ≥ 15 minutes:

MONITORS – Unit 1		LIMIT
RX-9820	Containment Purge	5.90E+2 µCi/cc
RX-9825	Radwaste Area	5.36E+2 µCi/cc
RX-9830	Fuel Handling Area	4.54E+2 µCi/cc
RX-9835	Emerg. Penetration Room	9.56E+3 µCi/cc
MONITORS – Unit 2		**LIMIT**
2RX-9820	Containment Purge	4.46E+2 µCi/cc
2RX-9825	Radwaste Area	3.32E+2 µCi/cc
2RX-9830	Fuel Handling Area	4.46E+2 µCi/cc
2RX-9835	Emerg. Penetration Room	8.84E+3 µCi/cc
2RX-9840	PASS Building	4.42E+3 µCi/cc
2RX-9845	Aux. Building Extension	1.26E+3 µCi/cc
2RX-9850	LLRW Storage Building	1.77E+3 µCi/cc

AS1

1 2 3 4 5 6 D

Offsite dose resulting from an actual or IMMINENT release of gaseous radioactivity > 100 mR TEDE or 500 mR child thyroid CDE for the actual or projected duration of the release

Emergency Action Level(s):

NOTE:

The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time. If dose assessment results are available, the classification should be based on EAL #2 instead of EAL #1. Do not delay declaration awaiting dose assessment results.

1. VALID reading on Channel 9 on any of the following radiation monitors > the reading shown for ≥ 15 minutes:

MONITORS – Unit 1		LIMIT
RX-9820	Containment Purge	5.90E+1 µCi/cc
RX-9825	Radwaste Area	5.36E+1 µCi/cc
RX-9830	Fuel Handling Area	4.54E+1 µCi/cc
RX-9835	Emerg. Penetration Room	9.56E+2 µCi/cc
MONITORS – Unit 2		**LIMIT**
2RX-9820	Containment Purge	4.46E+1 µCi/cc
2RX-9825	Radwaste Area	3.32E+1 µCi/cc
2RX-9830	Fuel Handling Area	4.46E+1 µCi/cc
2RX-9835	Emerg. Penetration Room	8.84E+2 µCi/cc
2RX-9840	PASS Building	4.42E+2 µCi/cc
2RX-9845	Aux. Building Extension	1.26E+2 µCi/cc
2RX-9850	LLRW Storage Building	1.77E+2 µCi/cc

AA1

1 2 3 4 5 6 D

Any release of gaseous or liquid radioactivity to the environment > 200 times the ODCM limits for ≥ 15 minutes

Emergency Action Level(s):

NOTE:

The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the release duration has exceeded, or will likely exceed, the applicable time. In the absence of data to the contrary, assume that the release duration has exceeded the applicable time if an ongoing release is detected and the release start time is unknown.

1. VALID reading on Channel 7 on any of the following radiation monitors > the reading shown for ≥ 15 minutes:

MONITORS – Unit 1		LIMIT
RX-9820	Containment Purge	5.90E0 µCi/cc
RX-9825	Radwaste Area	5.36E0 µCi/cc
RX-9830	Fuel Handling Area	4.54E0 µCi/cc
RX-9835	Emerg. Penetration Room	9.56E+1 µCi/cc
MONITORS – Unit 2		**LIMIT**
2RX-9820	Containment Purge	4.46E0 µCi/cc
2RX-9825	Radwaste Area	3.32E0 µCi/cc
2RX-9830	Fuel Handling Area	4.46E0 µCi/cc
2RX-9835	Emerg. Penetration Room	8.84E+1 µCi/cc
2RX-9840	PASS Building	4.42E+1 µCi/cc
2RX-9845	Aux. Building Extension	1.26E+1 µCi/cc
2RX-9850	LLRW Storage Building	1.77E+1 µCi/cc

OR

AU1

1 2 3 4 5 6 D

Any release of gaseous or liquid radioactivity to the environment > 2 times the ODCM limits for ≥ 60 minutes

Emergency Action Level(s):

NOTE:

The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the release duration has exceeded, or will likely exceed, the applicable time. In the absence of data to the contrary, assume that the release duration has exceeded the applicable time if an ongoing release is detected and the release start time is unknown.

1. VALID reading on Channel 7 on any of the following radiation monitors > the reading shown for ≥ 60 minutes:

MONITORS – Unit 1		LIMIT
RX-9820	Containment Purge	5.90E-2 µCi/cc
RX-9825	Radwaste Area	5.36E-2 µCi/cc
RX-9830	Fuel Handling Area	4.54E-2 µCi/cc
RX-9835	Emerg. Penetration Room	9.56E-1 µCi/cc
MONITORS – Unit 2		**LIMIT**
2RX-9820	Containment Purge	4.46E-2 µCi/cc
2RX-9825	Radwaste Area	3.32E-2 µCi/cc
2RX-9830	Fuel Handling Area	4.46E-2 µCi/cc
2RX-9835	Emerg. Penetration Room	8.84E-1 µCi/cc
2RX-9840	PASS Building	4.42E-1 µCi/cc
2RX-9845	Aux. Building Extension	1.26E-1 µCi/cc
2RX-9850	LLRW Storage Building	1.77E-1 µCi/cc

OR

ABNORMAL RADIOLOGICAL EFFLUENTS

GENERAL EMERGENCY

AG1 *(continued)*

OR

2. Dose assessment using actual meteorology indicates doses > 1000 mR TEDE or 5000 mR child thyroid CDE at or beyond the site boundary.

OR

3. Field survey results indicate closed window dose rates > 1000 mR/hr expected to continue for ≥ 60 minutes; or analyses of field survey samples indicate child thyroid CDE > 5000 mR for one hour of inhalation, at or beyond the site boundary.

SITE AREA EMERGENCY

AS1 *(continued)*

OR

2. Dose assessment using actual meteorology indicates doses > 100 mR TEDE or 500 mR child thyroid CDE at or beyond the site boundary.

OR

3. Field survey results indicate closed window dose rates > 100 mR/hr expected to continue for ≥ 60 minutes; or analyses of field survey samples indicate child thyroid CDE > 500 mR for one hour of inhalation, at or beyond the site boundary.

ALERT

AA1 *(continued)*

2. **EITHER** VALID reading on any of the following radiation monitors > 200 times the alarm setpoint established by a current release permit for ≥ 15 minutes **OR** VALID reading greater than the value listed for≥ 15 minutes:

MONITORS – Unit 1		LIMIT
RX-9820	Cont. Purge (Ch. 7 or 9)	N/A
RX-4830	Waste Gas Monitor	9.5E7 cpm
RX-4642	Liquid Radwaste Monitor	9.5E7 cpm
RX-9835	Emerg. Penetration Room	N/A
MONITORS – Unit 2		**LIMIT**
2RX-9820	Cont. Purge (Ch. 7 or 9)	N/A
2RX-2429	Waste Gas Monitor	9.5E5 cpm
2RX-2330	BMS Discharge Monitor	9.5E5 cpm
2RX-4423	LRW Discharge Monitor	9.5E5 cpm
2RX-4425	SG BD to Flume Monitor	9.5E5 cpm

OR

3. Confirmed grab sample analyses for gaseous or liquid releases indicates concentrations or release rates > 200 times the applicable values of the ODCM for ≥ 15 minutes.

UNUSUAL EVENT

AU1 *(continued)*

2. VALID reading on any of the following radiation monitors > 2 times the alarm setpoint established by a current release permit for ≥ 60 minutes:

MONITORS – Unit 1	
RX-9820	Cont. Purge (Ch. 7 or 9)
RX-4830	Waste Gas Monitor
RX-4642	Liquid Radwaste Monitor
RX-9835	Emerg. Penetration Room
MONITORS – Unit 2	
2RX-9820	Cont. Purge (Ch. 7 or 9)
2RX-2429	Waste Gas Monitor
2RX-2330	BMS Discharge Monitor
2RX-4423	LRW Discharge Monitor
2RX-4425	SG BD to Flume Monitor

OR

3. Confirmed grab sample analyses for gaseous or liquid releases indicates concentrations or release rates > 2 times the applicable values of the ODCM for ≥ 60 minutes.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
ABNORMAL RADIATION LEVELS			

AA2 1 2 3 4 5 6 D

Damage to irradiated fuel or loss of water level that has resulted or will result in the uncovering of irradiated fuel outside the reactor vessel

Emergency Action Level(s):

1. A water level drop in the refueling canal or spent fuel pool that will result in irradiated fuel becoming uncovered.

   OR

2. VALID alarm on any of the following radiation monitors due to damage to irradiated fuel or loss of water level:

	MONITORS – Unit 1
RX-9820	Containment Purge (Channel 7 or 9)
RX-9825	Radwaste Area (Channel 7 or 9)
RX-9830	Fuel Handling Area (Channel 7 or 9)
RE-8060	Containment High Range Monitor
RE-8061	Containment High Range Monitor
RE-8009	Spent Fuel Area
RE-8017	Fuel Handling
	MONITORS – Unit 2
2RX-9820	Containment Purge (Channel 7 or 9)
2RX-9825	Radwaste Area (Channel 7 or 9)
2RX-9830	Fuel Handling Area (Channel 7 or 9)
2RE-8905	Containment Equipment Hatch Area
2RE-8909	Containment Personnel Hatch Area
2RE-8925-1/2	Containment High Range Monitors
2RE-8914/15/16	Spent Fuel Area Monitors
2RE-8912	Containment Incore Instruments

AU2 1 2 3 4 5 6 D

Unexpected rise in plant radiation levels

Emergency Action Level(s):

1. a. UNPLANNED lowering of water level in the refueling canal or spent fuel pool as indicated by:

   - Personnel observation, refueling crew report, indication on area security camera, borated water source (BWST or RWT) level drop due to makeup demands.

   AND

   b. VALID Area Radiation Monitor reading rise on any of the following:

	MONITORS – Unit 1
RE-8009	Spent Fuel Area
RE-8017	Fuel Handling Area
	MONITORS – Unit 2
2RE-8914	Spent Fuel Area
2RE-8915	Spent Fuel Area
2RE-8916	Spent Fuel Area
2RE-8912	Containment Incore Instrumentation

OR

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
ABNORMAL RADIATION LEVELS			
		AA3 1 2 3 4 5 6 D Rise in radiation levels within the facility that impedes operation of systems required to maintain plant safety functions. **Emergency Action Level(s):** 1. Dose rate > 15 mR/hr in any of the following areas requiring continuous occupancy to maintain plant safety functions: • Unit 1 Control Room • Unit 2 Control Room • Central Alarm Station	**AU2** *(continued)* 2. UNPLANNED VALID Area Radiation Monitor readings or survey results indicate a rise by a factor of 1000 over normal* levels. **NOTE:** *For area radiation monitors with ranges incapable of measuring 1000 times normal* levels, classification shall be based on VALID full scale indication unless surveys confirm that area radiation levels are below 1000 times normal* within 15 minutes of the Area Radiation Monitor indications going to full scale indication.* * Normal can be considered as the highest reading in the past twenty-four hours excluding the current peak value.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION – Loss of RCS / Reactor Vessel Inventory			
CG1 5 6 Loss of RCS / reactor vessel inventory affecting fuel clad integrity with containment challenged **Emergency Action Level(s):** **NOTE:** *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.* 1. a. Core exit thermocouples indicate superheat for > 30 minutes. **AND** b. Any of the following containment challenge indications: • CONTAINMENT CLOSURE not established • Explosive mixture inside containment • UNPLANNED rise in containment pressure **OR** 2. a. RCS / reactor vessel level cannot be monitored with core uncovery indicated by any of the following for ≥ 30 minutes:	**CS1** 5 6 Loss of RCS / reactor vessel inventory affecting core decay heat removal capability **Emergency Action Level(s):** **NOTE:** *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.* 1. With CONTAINMENT CLOSURE **not** established: Loss of RCS / reactor vessel level as indicated by: **Unit 1:** RVLMS Levels 1 through 9 indicate DRY **Unit 2:** RVLMS Levels 1 through 6 indicate DRY **OR** 2. With CONTAINMENT CLOSURE established, core exit thermocouples indicate superheat. **OR**	**CA1** 5 6 Loss of RCS / reactor vessel inventory **Emergency Action Level(s):** **NOTE:** *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.* 1. Loss of RCS / reactor vessel inventory as indicated by: **Unit 1:** RVLMS Levels 1 through 8 indicate DRY **Unit 2:** RVLMS Levels 1 through 5 indicate DRY **OR** **Unit 1:** Reactor vessel level < 368 ft., 0 in. (bottom of the hot leg) **Unit 2:** Reactor vessel level < 369 ft., 1.5 in. (bottom of the hot leg) **OR**	**CU1** 5 RCS leakage **Emergency Action Level(s):** **NOTE:** *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.* 1. RCS leakage results in the inability to maintain or restore level within Pressurizer or RCS level target band for ≥ 15 minutes. **CU2** 6 UNPLANNED loss of RCS / reactor vessel Inventory **Emergency Action Level(s):** **NOTE:** *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.* 1. UNPLANNED RCS / reactor vessel level drop as indicated by either of the following:

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION – Loss of RCS / Reactor Vessel Inventory			
CG1 *(continued)* • Containment High Range Radiation Monitor reading >10 R/hr • Erratic source range monitor indication • Unexplained level rise in Reactor Building Sump, Reactor Drain Tank, Quench Tank, Aux. Building Equipment Drain Tank, or Aux. Building Sump **AND** b. Any of the following containment challenge indications: • CONTAINMENT CLOSURE not established • Explosive mixture inside containment • UNPLANNED rise in containment pressure	**CS1** *(continued)* 3. RCS / reactor vessel level cannot be monitored for ≥ 30 minutes with a loss of RCS / reactor vessel inventory as indicated by any of the following: • Containment High Range Radiation Monitor reading > 10 R/hr • Erratic source range monitor indication • Unexplained level rise in Reactor Building Sump, Reactor Drain Tank, Quench Tank, Aux. Building Equipment Drain Tank, or Aux. Building Sump	**CA1** *(continued)* 2. RCS / reactor vessel level cannot be monitored for ≥ 15 minutes with a loss of RCS / reactor vessel inventory as indicated by an unexplained level rise in the Reactor Building Sump, Reactor Drain Tank, Aux. Building Equipment Drain Tank, Aux. Building Sump, or Quench Tank.	**CU2** *(continued)* a. RCS / reactor vessel water level drop below the reactor vessel flange for ≥15 minutes when the RCS / reactor vessel level band is established above the reactor vessel flange. **OR** b. RCS / reactor vessel water level drop below the RCS / reactor vessel level band for ≥ 15 minutes when the RCS / reactor vessel level band is established below the reactor vessel flange. 2. RCS / reactor vessel level cannot be monitored with a loss of RCS / reactor vessel inventory as indicated by an unexplained level rise in (as applicable) the Reactor Building Sump, Reactor Drain Tank, Aux. Building Equipment Drain Tank, Aux. Building Sump, or Quench Tank.

<table>
<tr><th>GENERAL EMERGENCY</th><th>SITE AREA EMERGENCY</th><th>ALERT</th><th>UNUSUAL EVENT</th></tr>
<tr><td colspan="4">COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION – Loss of Decay Heat Removal</td></tr>
<tr><td></td><td></td><td>
CA3 5 6

Inability to maintain plant in Cold Shutdown

<u>Emergency Action Level(s):</u>

1. An UNPLANNED event results in RCS temperature > 200 °F > the specified duration in Table C1.

<table>
<tr><th colspan="3">Table C1
RCS Reheat Duration Thresholds</th></tr>
<tr><th>RCS</th><th>Containment Closure</th><th>Duration</th></tr>
<tr><td>Intact (but not RCS reduced inventory)</td><td>N/A</td><td>60 minutes*</td></tr>
<tr><td rowspan="2">Not intact or RCS reduced inventory</td><td>Established</td><td>20 minutes*</td></tr>
<tr><td>Not Established</td><td>0 minutes</td></tr>
<tr><td colspan="3">*If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, the EAL is not applicable.</td></tr>
</table>
<u>OR</u>

NOTE: EAL #2 does not apply in solid plant conditions.

2. An UNPLANNED event results in RCS pressure rise > 10 psi due to a loss of RCS cooling.
</td><td>
CU3 5 6

UNPLANNED loss of decay heat removal capability with irradiated fuel in the reactor vessel

<u>Emergency Action Level(s):</u>

NOTE:

The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.

1. UNPLANNED event results in RCS temperature exceeding 200 °F.

<u>OR</u>

2. Loss of all RCS temperature and RCS / reactor vessel level indication for ≥ 15 minutes.
</td></tr>
</table>

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION – Loss of AC Power			
		CA5 5 6 D Loss of all offsite and all onsite AC power to Vital 4.16 KV busses ≥ 15 minutes **Emergency Action Level(s):** **NOTE:** *The SM / TSC Director / EOF Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.* 1. Loss of all offsite and all onsite AC power to Vital 4.16KV busses ≥ 15 minutes.	**CU5** 5 6 AC power capability to Vital 4.16 KV busses reduced to a single power source ≥ 15 minutes such that any additional single failure would result in station blackout **Emergency Action Level(s):** **NOTE:** *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.* 1. a. AC power capability to Vital 4.16 KV busses reduced to a single power source ≥ 15 minutes. **AND** b. Any additional single power source failure will result in station blackout.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION – Loss of DC Power			
			CU6 5 6 Loss of required DC power ≥ 15 minutes **Emergency Action Level(s):** **NOTE:** *The SM should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition will likely exceed the applicable time.* 1. < 105 volts on required Vital DC bus ≥ 15 minutes.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION – Inadvertant Criticality			
			CU7 5 6 Inadvertent criticality **Emergency Action Level(s):** 1. UNPLANNED sustained positive startup rate observed on nuclear instrumentation.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION – Loss of Communications			
			CU8 5 6 D Loss of all onsite or offsite communications capabilities **Emergency Action Level(s):** 1. Loss of all Table C2 onsite communication methods affecting the ability to perform routine operations. **Table C2** **Onsite Communications Equipment** Station radio system Plant paging system In-plant telephones Gaitronics **OR** 2. Loss of all Table C3 offsite communication methods affecting the ability to perform offsite notifications. **Table C3** **Offsite Communications Equipment** All telephone lines (commercial and microwave) ENS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
ISFSI MALFUNCTION – Cask Damage			
			E-HU1 1 2 3 4 5 6 D Damage to a loaded cask CONFINEMENT BOUNDARY **Emergency Action Level(s):** 1. Damage to a loaded cask CONFINEMENT BOUNDARY.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
FISSION PRODUCT BARRIER MALFUNCTION – Barriers			
FG1 1 2 3 4 Loss of ANY two barriers AND loss or potential loss of third barrier	**FS1** 1 2 3 4 Loss or potential loss of ANY two barriers	**FA1** 1 2 3 4 ANY loss or ANY potential loss of EITHER fuel clad or RCS	**FU1** 1 2 3 4 ANY loss or ANY potential loss of containment

Note: Determine which combination of the three barriers are lost or have a potential loss and use the above key to classify the event. Also, multiple events could occur which result in the conclusion that exceeding the loss or potential loss EALs is IMMINENT. In this IMMINENT loss situation use judgment and classify as if the EALs are exceeded.

Fuel Clad Barrier EALs		RCS Barrier EALs		Containment Barrier EALs	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
1. Primary Coolant Activity Level (FCB1)		**1. RCS Leak Rate (RCB1)**		**1. Containment Pressure (CNB1)**	
1. Coolant activity > 300 µCi/gm dose equivalent I-131 activity by Chemistry sample **OR** 2. Radiation levels > 1000 MR/hr **Unit 1:** at SA-229 **Unit 2:** at 2TCD-19	None	RCS leak rate > available makeup capacity as indicated by: **Unit 1:** Loss of adequate subcooling margin **Unit 2:** RCS subcooling (MTS) can NOT be maintained at least 30 °F	**Unit 1:** UNISOLABLE RCS leak > 50 gpm with Letdown isolated **Unit 2:** UNISOLABLE RCS leak > 44 gpm with Letdown isolated	1. Rapid unexplained drop in containment pressure following an initial rise in containment pressure **OR** 2. Containment pressure or sump level response not consistent with LOCA conditions	1. **Unit 1:** Containment pressure 73.7 PSIA (59 PSIG) and rising **Unit 2:** Containment pressure 73.7 PSIA and rising **OR** 2. Explosive mixture exists inside Containment **OR** 3. a. Containment Pressure > containment spray actuation setpoint **Unit 1:** 44.7 PSIA (30 PSIG) **Unit 2:** 23.3 PSIA **AND** b. LESS THAN one full train of spray operating

Fuel Clad Barrier EALs		RCS Barrier EALs		Containment Barrier EALs	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
2. Core Exit Thermocouple Readings (FCB2)		**2. SG Tube Rupture (RCB2)**		**2. Core Exit Thermocouple Readings (CNB2)**	
> 1200 °F CET temperature	**Unit 1:** ICC exists as evidenced by CETs indicating superheated conditions **Unit 2:** Average CETs indicate superheat for current RCS pressure	SGTR that results in an ECCS (SI) actuation	None	None	1. a. CETs indicate > 1200 °F **AND** b. Restoration procedures not effective within 15 minutes **OR** 2. a. CETs indicate > 700 °F **AND** b. RVLMS indicates **Unit 1:** Levels 1 through 9 DRY **Unit 2:** Levels 1 through 7 DRY **AND** c. Restoration procedures not effective within 15 minutes
3. Reactor Vessel Water Level (FCB3)		**3. Containment Radiation Monitoring (RCB3)**		**3. SG Secondary Side Release With Primary-to-Secondary Leakage (CNB3)**	
None	**Unit 1:** RVLMS Levels 1 through 9 indicate DRY **Unit 2:** RVLMS Levels 1 through 7 indicate DRY	Containment high range radiation monitor reading > 100 R/hr	None	1. Primary-to-secondary leakrate > 10 gpm **AND** 2. UNISOLABLE steam release from affected steam generator to the environment	None

<table>
<tr><th colspan="2">Fuel Clad Barrier EALs</th><th colspan="2">RCS Barrier EALs</th><th colspan="2">Containment Barrier EALs</th></tr>
<tr><th>LOSS</th><th>POTENTIAL LOSS</th><th>LOSS</th><th>POTENTIAL LOSS</th><th>LOSS</th><th>POTENTIAL LOSS</th></tr>
<tr><td colspan="2">4. Containment Radiation Monitoring (FCB4)</td><td colspan="2">4. Emergency Director Judgment (RCB4)</td><td colspan="2">4. Containment Isolation Failure or Bypass (CNB4)</td></tr>
<tr><td>Containment high range radiation monitor reading > 1000 R/hr</td><td>None</td><td colspan="2">Any condition in the opinion of the SM / TSC Director / EOF Director that indicates Loss or Potential Loss of the RCS barrier</td><td>1. UNISOLABLE breach of containment
<u>AND</u>
2. Direct downstream pathway to the environment exists after containment isolation signal</td><td>None</td></tr>
<tr><td colspan="2">5. Core Damage Assessment (FCB5)</td><td colspan="2"></td><td colspan="2">5. Containment Radiation Monitoring (CNB5)</td></tr>
<tr><td>At least 5% fuel clad damage as determined from core damage assessment</td><td>None</td><td colspan="2"></td><td>None</td><td>Containment high range radiation monitor reading > 4000 R/hr</td></tr>
<tr><td colspan="2">6. Emergency Director Judgment (FCB6)</td><td colspan="2"></td><td colspan="2">6. Other Indications (CNB6)</td></tr>
<tr><td colspan="2">Any condition in the opinion of the SM/TSC Director/EOF Director that indicates Loss or Potential Loss of the fuel clad barrier</td><td colspan="2"></td><td colspan="2">Elevated readings on the following radiation monitors that indicate loss or potential loss of the Containment barrier:
<table>
<tr><th colspan="2">MONITORS – Unit 1</th></tr>
<tr><td>RX-9820</td><td>Containment Purge</td></tr>
<tr><td>RX-9825</td><td>Radwaste Area</td></tr>
<tr><td>RX-9830</td><td>Fuel Handling Area</td></tr>
<tr><td>RX-9835</td><td>Emergency Penetration Room</td></tr>
<tr><th colspan="2">MONITORS – Unit 2</th></tr>
<tr><td>2RX-9820</td><td>Containment Purge</td></tr>
<tr><td>2RX-9825</td><td>Radwaste Area</td></tr>
<tr><td>2RX-9830</td><td>Fuel Handling Area</td></tr>
<tr><td>2RX-9835</td><td>Emergency Penetration Room</td></tr>
<tr><td>2RX-9840</td><td>Post Accident Sampling Building</td></tr>
<tr><td>2RX-9845</td><td>Auxiliary Building Extension</td></tr>
</table></td></tr>
</table>

Fuel Clad Barrier EALs		RCS Barrier EALs		Containment Barrier EALs	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
				7. Emergency Director Judgment (CNB7)	
				Any condition in the opinion of the SM / TSC Director / EOF Director that indicates Loss or Potential Loss of the containment barrier	

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY – Security			
HG1 1 2 3 4 5 6 D HOSTILE ACTION resulting in loss of physical control of the facility **Emergency Action Level(s):** 1. A HOSTILE ACTION has occurred such that plant personnel are unable to operate equipment required to maintain safety functions. **OR** 2. A HOSTILE ACTION has caused failure of Spent Fuel Cooling Systems and IMMINENT fuel damage is likely for a freshly off-loaded reactor core in pool.	**HS1** 1 2 3 4 5 6 D HOSTILE ACTION within the PROTECTED AREA **Emergency Action Level(s):** 1. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by ANO Security Shift Supervision.	**HA1** 1 2 3 4 5 6 D HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat **Emergency Action Level(s):** 1. A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by ANO Security Shift Supervision. **OR** 2. A validated notification from NRC of an airliner attack threat within 30 minutes of the site.	**HU1** 1 2 3 4 5 6 D Confirmed SECURITY CONDITION or threat which indicates a potential degradation in the level of safety of the plant **Emergency Action Level(s):** 1. A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by ANO Security Shift Supervision. **OR** 2. A credible site specific security threat notification. **OR** 3. A validated notification from NRC providing information of an aircraft threat.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY – Discretionary			
HG2 1 2 3 4 5 6 D Other conditions exist which in the judgment of the SM / TSC Director / EOF Director warrant declaration of General Emergency **Emergency Action Level(s):** 1. Other conditions exist which in the judgment of the SM / TSC Director / EOF Director indicate that events are in progress or have occurred which involve actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.	**HS2** 1 2 3 4 5 6 D Other conditions exist which in the judgment of the SM / TSC Director / EOF Director warrant declaration of a Site Area Emergency **Emergency Action Level(s):** 1. Other conditions exist which in the judgment of the SM / TSC Director / EOF Director indicate that events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts; (1) toward site personnel or equipment that could lead to the likely failure of or; (2) that prevent effective access to equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the site boundary.	**HA2** 1 2 3 4 5 6 D Other conditions exist which in the judgment of the SM / TSC Director / EOF Director warrant declaration of an Alert **Emergency Action Level(s):** 1. Other conditions exist which in the judgment of the SM / TSC Director / EOF Director indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.	**HU2** 1 2 3 4 5 6 D Other conditions exist which in the judgment of the SM warrant declaration of an NUE **Emergency Action Level(s):** 1. Other conditions exist which in the judgment of the SM 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.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY – Control Room Evacuation			
	HS3 1 2 3 4 5 6 D Control Room evacuation has been initiated and plant control cannot be established **Emergency Action Level(s):** 1. a. Control Room evacuation has been initiated. **AND** b. Control of the plant cannot be established in accordance with the following procedures within 15 minutes: **Unit 1:** 1203.002, "Alternate Shutdown" **Unit 2:** 2203.014, "Alternate Shutdown"	**HA3** 1 2 3 4 5 6 D Control Room evacuation has been initiated **Emergency Action Level(s):** 1. Alternate Shutdown procedure requires Control Room evacuation: **Unit 1:** 1203.002, "Alternate Shutdown" **Unit 2:** 2203.014, "Alternate Shutdown"	

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

Table H1

Unit 1	Unit 2
CA-1 & HP Office Area	2A3 Room
Condensate Demineralizer Room	2A4, 2D02, & East Battery Room
Corridor 98	2B53 Room
Fire Area C	2B63 Room
Lower North Electrical Penetration Room (LNEPR)	2B9/2B10 Room
Lower South Electrical Equipment Room (LSEER) / Air Compressor Room	2Y11/13 Equipment Room
Lower South Electrical Penetration Room (LSEPR)	Auxiliary Building 317' General Access
Lower South Piping Penetration Room (LSPPR)	Auxiliary Building 335'
Main Steam Isolation Violation (MSIV) Room	Auxiliary Building 354'
North Engineered Safeguards (ES) SWGR Room (A4)	'B' Engineered Safeguards Features (ESF) Room
South ES SWGR Room	Corridor Behind Door 340
Turbine Building • A1, A2, H1, H2 SWGR area • 354' Bowling Alley north end west of Breathing Air compressor room • 368' West Heater Deck from LSEER (orange door) along east wall of ES SWGR Rooms to Corridor 98 door	Turbine Building • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north Switchgear (SWGR) Room (2A3) and East of LNEPR
Upper North Electrical Penetration Room (UNEPR) / Hot Tool Room / Decon Room	Intake Structure 354' or 366'
Upper South Electrical Penetration Room (USEPR)	LNEPR
Upper South Piping Penetration Room (USPPR)	LSEPR
	Motor-Generator (MG) Set Room
	Steam Pipe Area
	Hot Machine Shop
	UNEPR, UNPPR, LNPPR, USPPR

Fire

HA4 1 2 3 4 5 6 D

FIRE or EXPLOSION affecting the operability of plant safety systems required to establish or maintain safe shutdown

Emergency Action Level(s):

1. FIRE or EXPLOSION resulting in VISIBLE DAMAGE to any **Table H1** structure or area containing safety systems or components or Control Room indication of degraded performance of those safety systems:

HU4 1 2 3 4 5 6 D

FIRE within the PROTECTED AREA not extinguished within 15 minutes of detection or EXPLOSION within the PROTECTED AREA

Emergency Action Level(s):

NOTE:

The SM 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.

1. FIRE in any **Table H1** structure or area not extinguished 1) within 15 minutes of Control Room notification or 2) within 15 minutes of verification of a Control Room FIRE alarm.

   OR

2. EXPLOSION within the PROTECTED AREA.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

Table H1

Unit 1	Unit 2
CA-1 & HP Office Area	2A3 Room
Condensate Demineralizer Room	2A4, 2D02, & East Battery Room
Corridor 98	2B53 Room
Fire Area C	2B63 Room
Lower North Electrical Penetration Room (LNEPR)	2B9/2B10 Room
Lower South Electrical Equipment Room (LSEER) / Air Compressor Room	2Y11/13 Equipment Room
Lower South Electrical Penetration Room (LSEPR)	Auxiliary Building 317' General Access
Lower South Piping Penetration Room (LSPPR)	Auxiliary Building 335'
Main Steam Isolation Violation (MSIV) Room	Auxiliary Building 354'
North Engineered Safeguards (ES) SWGR Room (A4)	'B' Engineered Safeguards Features (ESF) Room
South ES SWGR Room	Corridor Behind Door 340
Turbine Building • A1, A2, H1, H2 SWGR area • 354' Bowling Alley north end west of Breathing Air compressor room • 368' West Heater Deck from LSEER (orange door) along east wall of ES SWGR Rooms to Corridor 98 door	Turbine Building • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north Switchgear (SWGR) Room (2A3) and East of LNEPR
Upper North Electrical Penetration Room (UNEPR) / Hot Tool Room / Decon Room	Intake Structure 354' or 366'
Upper South Electrical Penetration Room (USEPR)	LNEPR
Upper South Piping Penetration Room (USPPR)	LSEPR
	Motor-Generator (MG) Set Room
	Steam Pipe Area
	Hot Machine Shop
	UNEPR, UNPPR, LNPPR, USPPR

Toxic Gas

HA5 1 2 3 4 5 6 D

Access to a VITAL AREA is prohibited due to toxic, corrosive, asphyxiant, or flammable gases which jeopardize operation of operable equipment required to maintain safe operations or safely shutdown the reactor

Emergency Action Level(s):

NOTE:

If the equipment in the stated area was already inoperable, or out of service, before the event occurred, then this EAL should not be declared as it will have no adverse impact on the ability of the plant to safely operate or safely shutdown beyond that already allowed by Technical Specifications at the time of the event.

1. Access to a VITAL AREA is prohibited due to toxic, corrosive, asphyxiant, or flammable gases which jeopardize operation of systems required to maintain safe operations or safely shutdown the reactor.

HU5 1 2 3 4 5 6 D

Release of toxic, corrosive, asphyxiant, or flammable gases deemed detrimental to NORMAL PLANT OPERATIONS

Emergency Action Level(s):

1. Toxic, corrosive, asphyxiant, or flammable gases in amounts that have or could adversely affect NORMAL PLANT OPERATIONS.

   OR

2. Report by Local, County or State officials for evacuation or sheltering of site personnel based on an offsite event.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

Table H1

Unit 1	Unit 2
CA-1 & HP Office Area	2A3 Room
Condensate Demineralizer Room	2A4, 2D02, & East Battery Room
Corridor 98	2B53 Room
Fire Area C	2B63 Room
Lower North Electrical Penetration Room (LNEPR)	2B9/2B10 Room
Lower South Electrical Equipment Room (LSEER) / Air Compressor Room	2Y11/13 Equipment Room
Lower South Electrical Penetration Room (LSEPR)	Auxiliary Building 317' General Access
Lower South Piping Penetration Room (LSPPR)	Auxiliary Building 335'
Main Steam Isolation Violation (MSIV) Room	Auxiliary Building 354'
North Engineered Safeguards (ES) SWGR Room (A4)	'B' Engineered Safeguards Features (ESF) Room
South ES SWGR Room	Corridor Behind Door 340
Turbine Building • A1, A2, H1, H2 SWGR area • 354' Bowling Alley north end west of Breathing Air compressor room • 368' West Heater Deck from LSEER (orange door) along east wall of ES SWGR Rooms to Corridor 98 door	Turbine Building • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north Switchgear (SWGR) Room (2A3) and East of LNEPR
Upper North Electrical Penetration Room (UNEPR) / Hot Tool Room / Decon Room	Intake Structure 354' or 366'
Upper South Electrical Penetration Room (USEPR)	LNEPR
Upper South Piping Penetration Room (USPPR)	LSEPR
	Motor-Generator (MG) Set Room
	Steam Pipe Area
	Hot Machine Shop
	UNEPR, UNPPR, LNPPR, USPPR

Natural or Destructive Phenomena

HA6 1 2 3 4 5 6 D

Natural or destructive phenomena affecting VITAL AREAS

Emergency Action Level(s):

1. a. Seismic event > Operating Basis Earthquake (OBE) as indicated by annunciation of the 0.1g acceleration alarm.

   AND

   b. Earthquake confirmed by ANY of the following:
   - Earthquake felt in plant
   - National Earthquake Center
   - Control Room indication of degraded performance of systems required for the safe shutdown of the plant

   OR

2. Tornado striking or high winds > 67 mph resulting in VISIBLE DAMAGE to any of the following structures/equipment containing safety systems or components or Control Room indication of degraded performance of those safety systems:

HU6 1 2 3 4 5 6 D

Natural or destructive phenomena affecting the PROTECTED AREA

Emergency Action Level(s):

1. Seismic event identified by any 2 of the following:
   - Seismic event confirmed by annunciation of the 0.01g acceleration alarm
   - Earthquake felt in plant
   - National Earthquake Center

   OR

2. Tornado striking within PROTECTED AREA boundary or high winds > 67 mph.

   OR

3. Internal flooding that has the potential to affect safety related equipment required by Technical Specifications for the current operating mode in any of the structures or areas in **Table H1.**

   OR

4. Turbine failure resulting in casing penetration or damage to turbine or generator seals.

   OR

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY			
		Natural or Destructive Phenomena	
		HA6 *(continued)* • Reactor Building • Intake Structure • Ultimate Heat Sink • BWST/RWT • Auxiliary Building • Turbine Building • QCST • Control Room • Startup Transformers • Diesel Fuel Vault **OR** 3. Internal flooding in any of the following areas resulting in an electrical shock hazard that precludes access to operate or monitor safety equipment or Control Room indication of degraded performance of those safety systems: • Intake Structure • Ultimate Heat Sink • BWST/RWT • Auxiliary Building • Turbine Building • QCST • Control Room • Startup Transformers • Diesel Fuel Vault	**HU6** *(continued)* 5. Lake Dardanelle level < 335 feet. **OR** 6. Lake Dardanelle level > 345 feet.

Table H2

Reactor Building	Turbine Building
Intake Structure	QCST
Ultimate Heat Sink	Control Room
BWST/RWT	Startup Transformers
Auxiliary Building	Diesel Fuel Vault

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY			
		Natural or Destructive Phenomena	
		HA6 *(continued)* **OR** 4. Turbine failure-generated PROJECTILES resulting in VISIBLE DAMAGE to or penetration of any of the structures/equipment in **Table H2** containing safety systems or components or Control Room indication of degraded performance of those safety systems. **OR** 5. Lake Dardanelle level < 335 feet and Emergency Cooling Pond inoperable. **OR** 6. Vehicle crash resulting in VISIBLE DAMAGE to any of the structures/equipment in **Table H2** containing safety systems or components or Control Room indication of degraded performance of those safety systems.	

Table H2

Reactor Building	Turbine Building
Intake Structure	QCST
Ultimate Heat Sink	Control Room
BWST/RWT	Startup Transformers
Auxiliary Building	Diesel Fuel Vault

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SYSTEM MALFUNCTION – Loss of AC Power			
SG1 1 2 3 4 Prolonged loss of all offsite and all onsite AC power to Vital 4.16 KV busses **Emergency Action Level(s):** 1. a. Loss of all offsite and all onsite AC power to Vital 4.16 KV busses. **AND** b. Either of the following: • Restoration of at least one Vital 4.16 KV bus in < 4 hours is not likely. **OR** • Continuing degradation of core cooling based on Fission Product Barrier monitoring as indicated by CETs ≥ 700 °F.	**SS1** 1 2 3 4 Loss of all offsite and all onsite AC power to Vital 4.16 KV busses ≥ 15 minutes **Emergency Action Level(s):** **NOTE:** *The SM / TSC Director / EOF Director 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.* 1. Loss of all offsite and all onsite AC power to Vital 4.16 KV busses ≥ 15 minutes.	**SA1** 1 2 3 4 AC power capability to Vital 4.16 KV busses reduced to a single power source ≥ 15 minutes such that any additional single failure would result in station blackout **Emergency Action Level(s):** **NOTE:** *The SM / TSC Director / EOF Director 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.* 1. a. AC power capability to Vital 4.16 KV busses reduced to a single power source ≥ 15 minutes. **AND** b. Any additional single power source failure will result in station blackout.	**SU1** 1 2 3 4 Loss of all offsite AC power to Vital 4.16 KV busses ≥ 15 minutes **Emergency Action Level(s):** **NOTE:** *The SM / TSC Director / EOF Director 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.* 1. Loss of all offsite AC power to Vital 4.16 KV busses ≥ 15 minutes.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SYSTEM MALFUNCTION – Failure of Reactor Protection System			
SG3 1 2	**SS3** 1 2	**SA3** 1 2	
Automatic trip and all manual actions fail to shutdown the reactor and indication of an extreme challenge to the ability to cool the core exists **Emergency Action Level(s):** 1. a. An automatic trip failed to shutdown the reactor. **AND** b. All manual actions do not shutdown the reactor as indicated by reactor power ≥ 5%. **AND** c. Either of the following exist or have occurred due to continued power generation: • CET temperatures at or approaching 1200 °F. **OR** • Feedwater flow rate less than: **Unit 1:** 430 gpm **Unit 2:** 485 gpm	Automatic trip fails to shutdown the reactor and manual actions taken from the reactor control console are not successful in shutting down the reactor **Emergency Action Level(s):** 1. a. An automatic trip failed to shutdown the reactor. **AND** b. Manual actions taken at panel C03 (Unit 1) or panels 2C03/2C14 (Unit 2) do not shutdown the reactor as indicated by reactor power ≥ 5%.	Automatic trip fails to shutdown the reactor and the manual actions taken from the reactor control console are successful in shutting down the reactor **Emergency Action Level(s):** 1. a. An automatic trip failed to shutdown the reactor as indicated by reactor power ≥ 5%. **AND** b. Manual actions taken at panel C03 (Unit 1) or panels 2C03/2C14 (Unit 2) successfully shutdown the reactor as indicated by reactor power < 5%.	

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SYSTEM MALFUNCTION – Loss of DC Power			
	SS4 1 2 3 4 Loss of all Vital DC power ≥ 15 minutes **Emergency Action Level(s):** **NOTE:** *The SM / TSC Director / EOF Director 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.* 1. < 105 volts on all Vital DC busses ≥ 15 minutes.		

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SYSTEM MALFUNCTION – Loss of Annunciators			
	SS6 1 2 3 4 Inability to monitor a SIGNIFICANT TRANSIENT in progress **Emergency Action Level(s):** **NOTE:** *The SM / TSC Director / EOF Director 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.* 1. a. UNPLANNED loss of > approximately 75% of the following ≥ 15 minutes: • Control Room annunciators associated with safety systems. **OR** • Control Room safety system indication. **AND** b. A SIGNIFICANT TRANSIENT in progress. **AND** c. Compensatory indications are unavailable.	**SA6** 1 2 3 4 UNPLANNED loss of safety system annunciation or indication in the Control Room with either (1) a SIGNIFICANT TRANSIENT in progress, or (2) compensatory indicators unavailable **Emergency Action Level(s):** **NOTE:** *The SM / TSC Director / EOF Director 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.* 1. a. UNPLANNED loss of > approximately 75% of the following ≥ 15 minutes: • Control Room annunciators associated with safety systems. **OR** • Control Room safety system indication. **AND** b. Either of the following: • A SIGNIFICANT TRANSIENT is in progress **OR** • Compensatory indications are unavailable	**SU6** 1 2 3 4 UNPLANNED loss of safety system annunciation or indication in the Control Room for ≥ 15 minutes **Emergency Action Level(s):** **NOTE:** *The SM / TSC Director / EOF Director 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.* 1. UNPLANNED loss of > approximately 75% of the following ≥ 15 minutes: a. Control Room annunciators associated with safety systems. **OR** b. Control Room safety system indication.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SYSTEM MALFUNCTION – RCS Leakage			
			SU7 1 2 3 4 RCS leakage **Emergency Action Level(s):** 1. Unidentified or pressure boundary leakage > 10 gpm. **OR** 2. Identified leakage > 25 gpm.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SYSTEM MALFUNCTION – Loss of Communications			
			SU8 1 2 3 4 Loss of all onsite or offsite communications capabilities **Emergency Action Level(s):** 1. Loss of all Table M1 onsite communications methods affecting the ability to perform routine operations. **Table M1** **Onsite Communications Methods** Station radio system Plant paging system In-plant telephones Gaitronics **OR** 2. Loss of all Table M2 offsite communications methods affecting the ability to perform offsite notifications. **Table M2** **Offsite Communications Methods** All telephone lines (commercial and microwave) ENS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SYSTEM MALFUNCTION – Fuel Clad Degradation			
			SU9 1 2 3 4 Fuel clad degradation **Emergency Action Level(s):** 1. Failed Fuel Iodine radiation monitor reading indicates fuel clad degradation > Technical Specification allowable limits: **Unit 1:** RI-1237S reads > 1.3×10^5 cpm **Unit 2:** 2RITS-4806B reads > $.65 \times 10^5$ cpm **OR** 2. RCS sample activity value indicating fuel clad degradation > Technical Specification allowable limits: • > 1.0 uCi/gm Dose Equivalent I-131 for more than 48 hours **OR** • **Unit 1:** ≥ 60 uCi/gm Dose Equivalent I-131 **Unit 2:** > 60 uCi/gm Dose Equivalent I-131 **OR**

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SYSTEM MALFUNCTION – Fuel Clad Degradation			
			SU9 *(continued)* • **Unit 1:** > 2200 µCi/gm Dose Equivalent Xe-133 for more than 48 hours **Unit 2:** > 3100 µCi/gm Dose Equivalent Xe-133 for more than 48 hours
SYSTEM MALFUNCTION – Inadvertant Criticality			
			SU10 3 4 Inadvertent criticality **Emergency Action Level(s):** 1. An UNPLANNED sustained positive startup rate observed on nuclear instrumentation.
SYSTEM MALFUNCTION – Failure to Shutdown			
			SU11 1 2 3 4 Inability to reach required operating mode within Technical Specification limits **Emergency Action Level(s):** 1. A Plant is not brought to required operating mode within Technical Specifications LCO action statement time.

Attachment 5 to

0CAN121102

Supporting Referenced Document Pages

Arkansas Nuclear One (ANO) Units 1 and 2
NEI 99-01 Revision 5 EAL Supporting Document Table

ANO IC/EAL	Subject	Supporting Document	Page Number(s)
FCBI, FCB5, RCB4, CNB6	Fuel cladding radiation monitoring system/survey readings	Calculation 03-E-0002-01	22, 27, 38, 42, 54, 46, 49, 60
FCB4	Reactor vessel levels	Calculation 90-E-01 16-01 Calculation 84-EQ-0080-02 ULD-1-SYS-24 ULD-2-SYS-24	238 16 11 9
RCB2	Subcooling margin	Calculation 90-E-0116-07 Calculation 90-E-0116-01	74, 75 196, 197
SGI	Loss of offsite power	Calculation 85-E-0072-02 Calculation 85-E-0072-01	1 1

Attachment 1, Calculation No. 90-E-0116-01, Page 238

OP Setpoint No.: R.3 **Revision:** 10

Parameter: RVLMS

Setpoint Value: RVLMS LVL 06 or higher elevation indicates WET

Applicability:

Associated System/Component: RVLMS

Description:

RVLMS level which indicates the core is covered with coolant. This value is used to verify RCS inventory control.

Key Assumptions:

Basis:

The lowest reactor vessel level sensor is #7, and is 47 inches above the top of the core (ref. 1). Sensor #7 corresponds to RVLMS LVL 06 on the ICC monitoring panel 2C388 (ref. 2).

The only instrument uncertainty associated with the RVLMS is the response time of the level probes and the discrete layout of the sensors (ref. 1). Since this value is used during relatively steady state conditions no uncertainty was incorporated

- Note, this is not an instrument alarm or actuation setpoint but a value to be used by the operator in the control room to determine required actions within the EOPs or adequacy of equipment operation.

References:

1) Calculation No. 84-EQ-0080-01, Rev. 2, Determination of Reactor Vessel Level Measurement Uncertainties.

2) TM T068.0040, Technical Manual For Reactor Vessel Monitoring System ANO Unit 2, Rev. 2, 1/2/91.

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1 SENSOR # AND TYPE	2 SENSOR LOC REF. RVL (FEET)	3 REGION	4 DRN RATE @ SNS FT/S	5 COLL LVL @ SNS SEC.	6 MAN. ERR. FT.	7 MAN. DEL. SEC.	8 TC ERR DEGF	9 TC OUT DELAY SEC.
2 SLOW	36.50	DOME	0.105	342.86	0.33	3.14	10	101.79
3 SLOW	34.88	DOME	0.105	358.28	0.33	3.14	10	101.79
4 SLOW	33.13	DOME	0.105	374.89	0.33	3.14	10	101.79
5 SLOW	31.38	DOME	0.105	391.50	0.33	3.14	10	101.79
6 SLOW	29.63	PLENUM	0.105	408.11	0.42	4.01	10	101.79
7 SLOW	27.88	PLENUM	0.025	428.52	0.42	16.84	10	101.79
8 SLOW	26.13	PLENUM	0.025	498.36	0.42	16.84	10	101.79
9 SLOW	24.29	PLENUM	0.025	571.51	0.42	16.84	10	101.79
10 SLOW	22.46	PLENUM	0.025	644.71	0.42	16.84	10	101.79

10 DAS ERR DEGF	11 DAS ERR DEL SEC.	12 DAS UNCOV TIME SEC.	13 LVL AT DAS UNC FT.	14 DAS UNC UNCERT FT.	15 SPDS DEL. SEC.	16 SPDS UNCOV TIME SEC.	17 LVL @ SPDS UNC FT.	18 SPDS UNC. UNCERT FT.
8.96	43.93	491.72	26.30	-10.20	30	521.72	25.55	-10.95
8.96	43.93	507.14	25.91	-8.97	30	537.14	25.16	-9.72
8.96	43.93	523.75	25.49	-7.63	30	553.75	24.74	-8.38
8.96	43.93	540.36	25.08	-6.30	30	570.36	24.33	-7.05
8.96	43.93	557.83	24.64	-4.98	30	587.83	23.89	-5.73
8.96	43.93	591.08	23.81	-4.06	30	621.08	23.06	-4.81
8.96	43.93	660.92	22.07	-4.06	30	690.92	21.32	-4.81
8.96	43.93	734.07	20.24	-4.06	30	764.07	19.49	-4.81
8.96	43.93	807.27	18.41	-4.05	30	837.27	17.66	-4.80

2

The ATC sensor in the RLI just under the reactor head provides a unique benefit. The sensor monitors temperature at the metal-to-liquid interface of the reactor head, which is influenced by the sensible heat stored in the reactor head. Use of this reactor vessel head fluid temperature measurement by operators helps to prevent inadvertent steam bubble formation during natural circulation cooldown and during RCS depressurization. **(REF. 21, 24, 63)**

B. The RGT sensors installed in the reactor vessel dome and upper plenum regions will give an early warning of the approach to inadequate core cooling. The sensors are axially located to provide optimum resolution in the areas of most concern. **(REF. 21, 25, 26)**

The collapsed liquid level indication provided by the RGT sensors of the RVLMS portion of ICCMDS furnishes the operators with reactor coolant inventory trend information during the approach to an ICC event and the recovery from an ICC event. The level information allows the operators to determine if reactor vessel inventory is increasing or decreasing. **(REF. 21, 27)**

Reactor Coolant Pumps (RCP) status is used to validate hot leg water level and reactor vessel level, in that with any of the four RCPs running, flow induced turbulence produced by the pumps results in inaccurate sensed level. Therefore, when any of the RCPs are running the hot leg water level displays and the reactor vessel level sensors in the plenum are invalid. Inventory measurements in the upper head region are not seriously affected by the operation of the RCPs and so will be available to give advanced warning of an approach to ICC. **(REF. 19, 27, 28, 29, 73)** This operation is confirmed by surveillance testing utilizing simulated RCP field inputs. **(REF. 49)**

C. The RLIs presently installed in ANO-1 extend from the top of the reactor vessel to the fuel alignment plate. The above-core level indication provided by the RLIs is used to monitor the approach to and recovery from ICC conditions. The CET portion of ICCMDS is utilized to identify core uncovery (fuel rod cladding temperature) when reactor coolant level drops below the top of the core. **(REF. 8, 19, 27, 30)**

D. The 24 radially distributed CETs (six per each core quadrant) provide indication of the temperature rise across representative regions of the core. These CETs are part of and are located in the upper portion of the incore neutron detector assembly. **(REF. 7, 17, 18)** Note, temporary CETs, with associated raceways, are installed in the reactor building. These temporary CET5 are used to monitor core conditions via ICCMDS during refueling conditions. **(REF. 77)**

GL 88-17 requirements are met as follows:

A. Two independent indications of average CET temperature information is readily available for display at any time via the LMD and is logged every hour during cold shutdown. CET temperature information is also continuously available on the Mimic Display Monitor. Additionally, contingency steps exist for monitoring CET temperatures should LMD indications become unavailable. **(REF. 59, 60, 62, 63)**

The ATC sensor in the RLI just under the reactor head provides a unique benefit. The sensor monitors temperature at the metal-to-liquid interface of the reactor head, which is influenced by the sensible heat stored in the reactor head. This temperature measurement provides valuable information concerning the influence of this sensible heat on coolant conditions at the metal-to-liquid interface. Use of these temperature measurements by operators helps to prevent inadvertent steam bubble formation during natural circulation cooldown and during repressurization after a small break LOCA. **(REF. 1, 25)**

B. The RGT sensors installed in the reactor vessel head will give an early warning of the approach to inadequate core cooling. The sensors are axially located to provide optimum resolution in the areas of most concern. **(REF. 1, 6, 24)**

The collapsed liquid level indication provided by the RGT sensors of the RVLMS furnishes the operators with reactor coolant inventory trend information during the approach to an ICC event and the recovery from an ICC event. The level information allows the operators to determine if reactor vessel inventory is increasing or decreasing. **(REF. 1, 6, 20)**

Process inputs to DAS consists of “slow” and “fast” RGT sensors. These inputs are differential temperature signals which correspond to the temperature difference across the argon gas annulus in a “slow” sensor or the difference in surface and interior temperatures in the “fast” sensor. The slow and fast sensors are used to determine “WET”, “DRY” and “QUENCH” states for output to the level display. These signals also generate a display alarm on a “DRY” state for either sensor type. **(REF. 1, 6, 20)**

When the Reactor Coolant Pumps (RCPs) are running, all except the upper head region (dome) sensors are interlocked **(REF. 16, 26)** to read “INVALID” due to flow induced turbulence that may offset the sensor outputs **(REF. 1, 20, 24)**. Inventory measurements in the upper head region are not seriously affected by the operation of the RCPs and so will be available to give advanced warning of an approach to ICC.

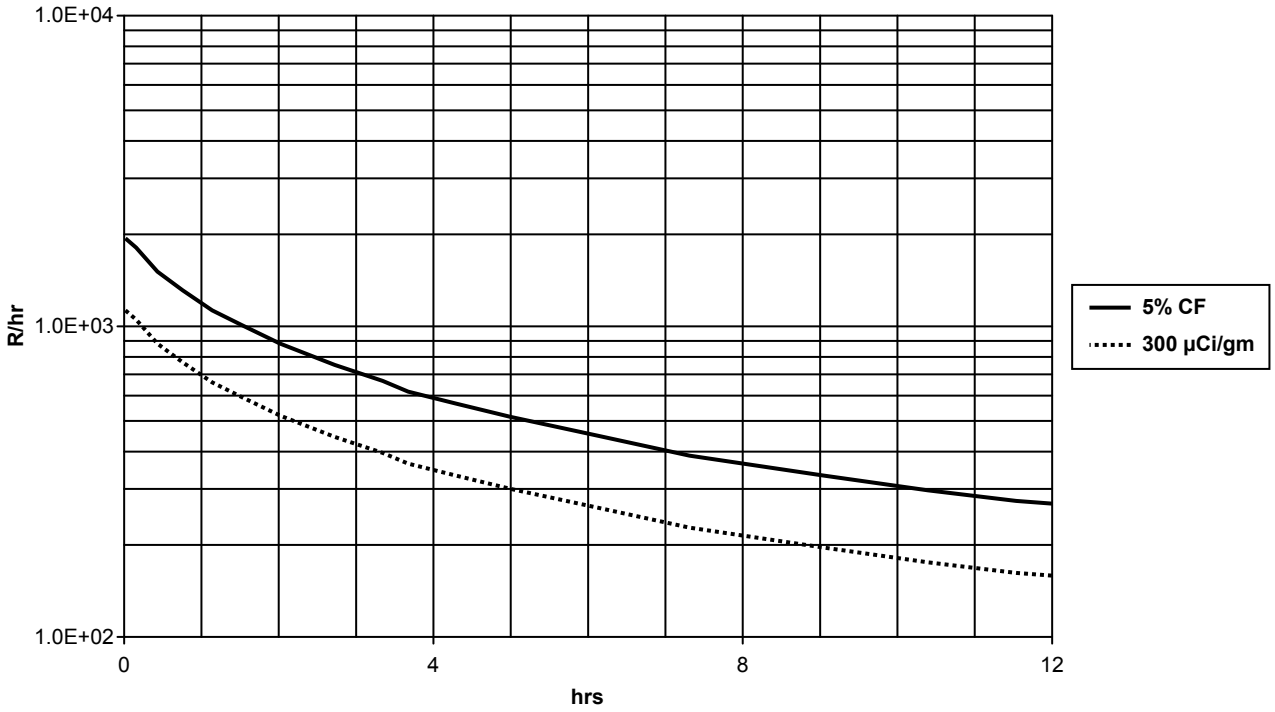
C. The RLIs presently installed in ANO-2 extend from the top of the reactor vessel to the bottom of the core. However, for ICC monitoring, only the portions of the RLIs above the core’ (from the top of the reactor vessel to the absolute thermocouples located at the core exit) are considered part of the ICC Monitoring System. The above-core portions of the RLIs are used to monitor the approach to and recovery from ICC conditions. The CETs are utilized to estimate core uncovery (fuel rod cladding temperature) when reactor coolant level drops below the top of the core. The in-core portions of the RLIs are used for core heat-transfer trending, DT measurement across the core, and local power monitoring. **(REF. 1, 6, 20, 21)**

D. The 42 radially distributed CETs provide indication of the temperature rise across representative regions of the core. These CETs are part of and are located in the upper portion of the in-core neutron detectors. **(REF. 1, 17, 27)**

The ATC sensors of the RVLMS can satisfy one of the requirements for continuous temperature indication of core exit conditions whenever the RCS is in a reduced inventory condition and the head is on **(REF. 48, 49)**.

A plot of the response is shown below.

Figure 1: Unit 1 RB @ 300 µCi/gm DEQ I-131 & 5% Clad Failure

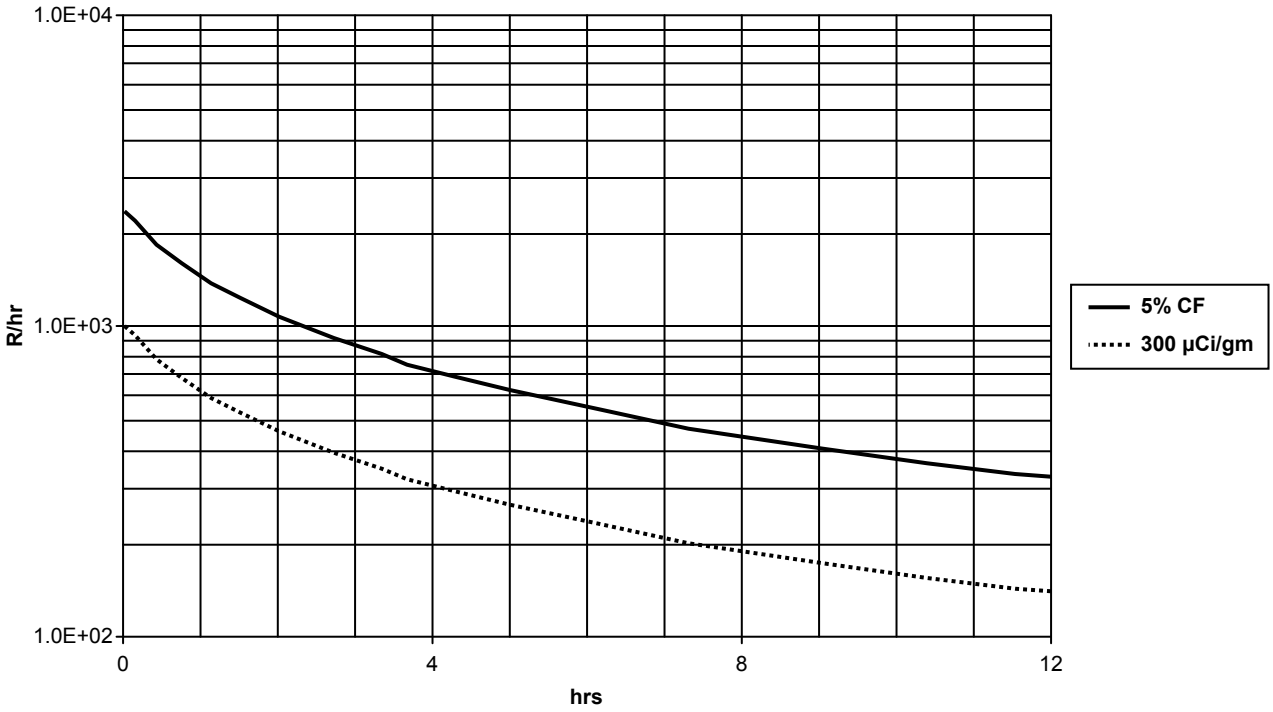


For simplicity of presentation to the Shift Manager acting as the Site Emergency Coordinator, a high range radiation monitor reading of at least 1000 rem/hr between 15 minutes and 2 hours following reactor shutdown would adequately represent 2-5% cladding failure. The two hour point is chosen because it allows ample time for the transfer of Site Emergency Coordinator duties to outside the control room. According to reference 23, during the initial fifteen minutes after a thermal event inside containment, the high range radiation monitor readings are considered invalid due to possibility of a transient thermally induced current.

This value is therefore recommended as the EAL setpoint for containment high range radiation monitors indicating a loss of the fuel cladding barrier.

A plot of the response is shown below.

Figure 2: Unit 2 RB @ 300 µCi/gm DEQ I-131 & 5% Clad Failure

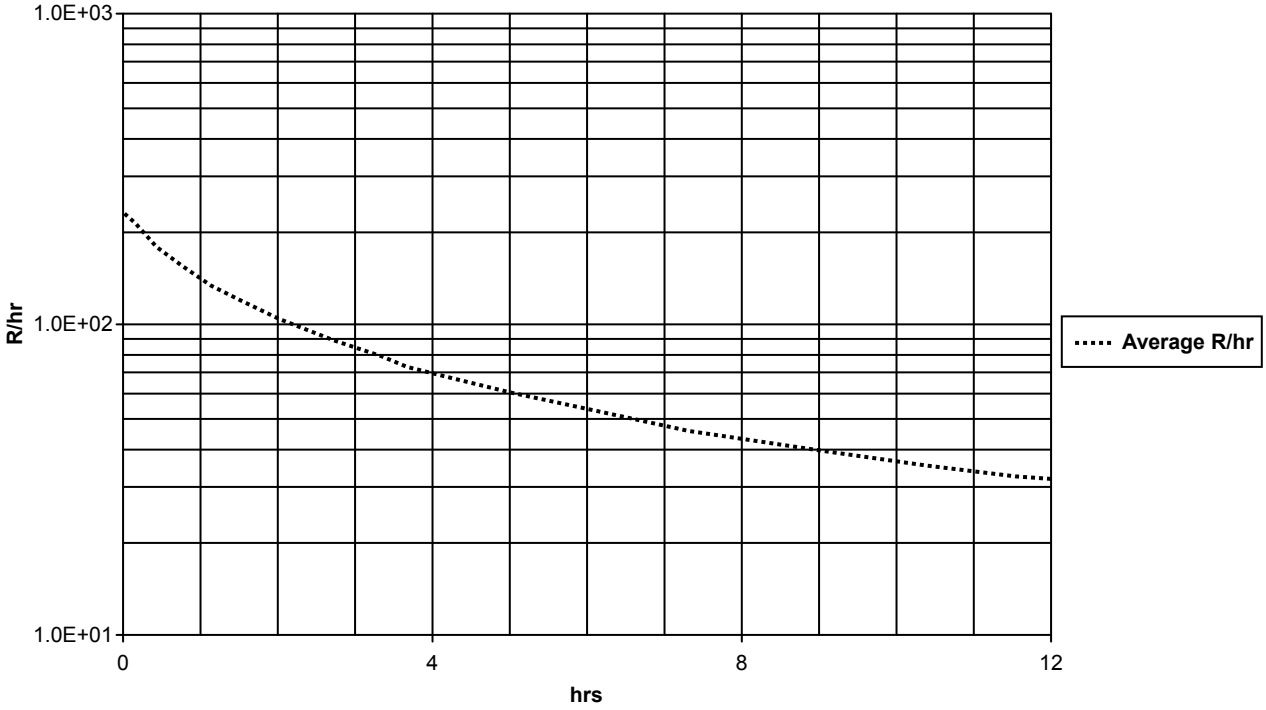


For simplicity of presentation to the Shift Manager acting as the Site Emergency Coordinator, a high range radiation monitor reading of at least 1000 rem/hr between 15 minutes and 2 hours after reactor shutdown would adequately represent 2-5% cladding failure. The two hour point is chosen because it allows ample time for the transfer of Site Emergency Coordinator duties to outside the control room. According to reference 23, during the initial fifteen minutes after a thermal event inside containment, the high range radiation monitor readings are considered invalid due to possibility of a transient thermally induced current.

This value is therefore recommended as the EAL setpoint for containment high range radiation monitors indicating a loss of the fuel cladding barrier.

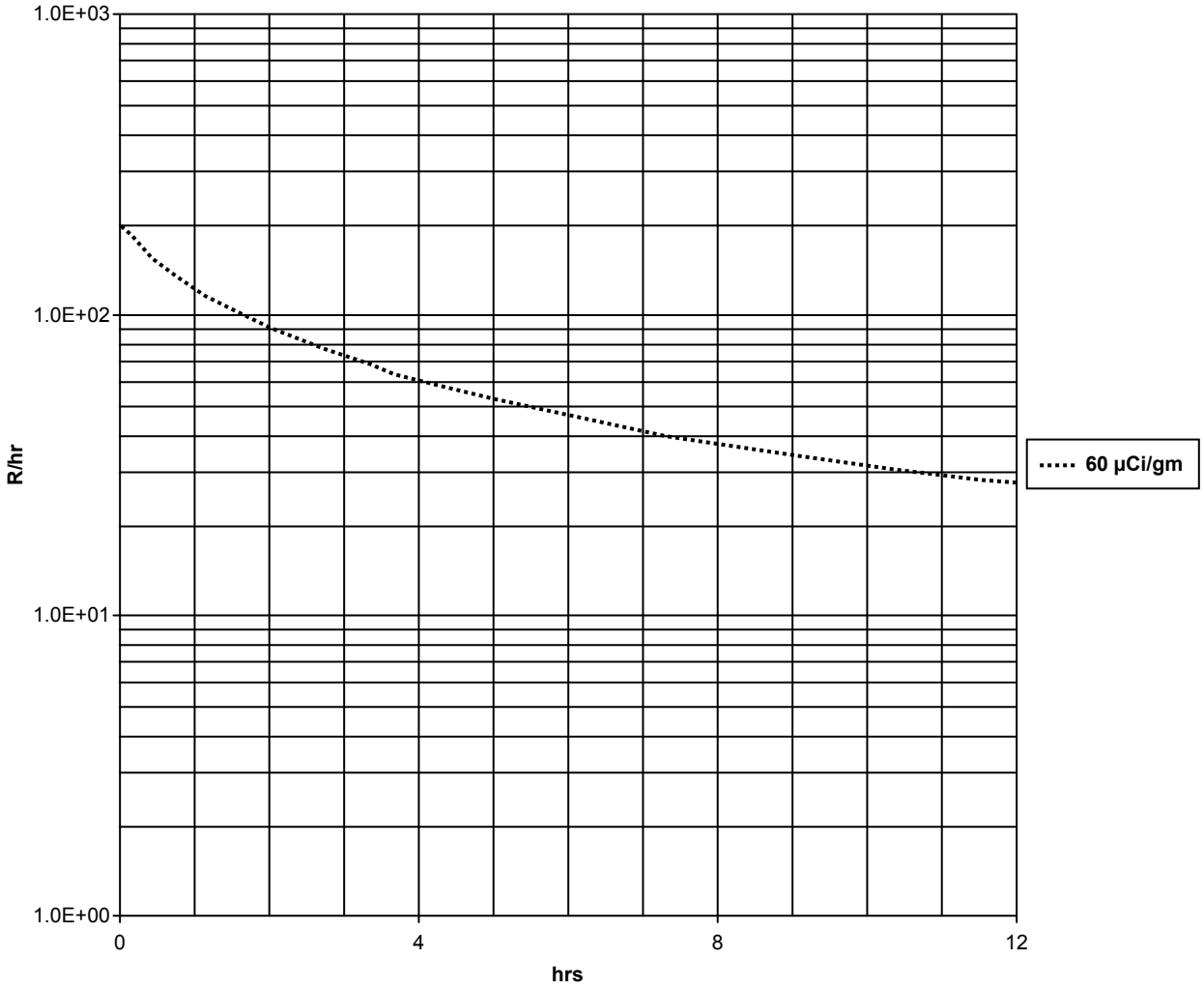
A plot of the response is shown below.

Figure 5: Unit 1 RB After RCS Blowdown at 60 µCi/gm



A high range radiation monitor reading of ≥ 100 R/hr between 15 minutes and 2 hours following reactor shutdown would adequately represent the release of reactor coolant of 60 µCi/gm DEQ I-131 due to iodine spiking into the containment. This reading is an order of magnitude lower than that specified for the Fuel Clad Barrier EAL. This corresponds to the intent of NEI 99-01 PWR RCS Barrier EAL #4.

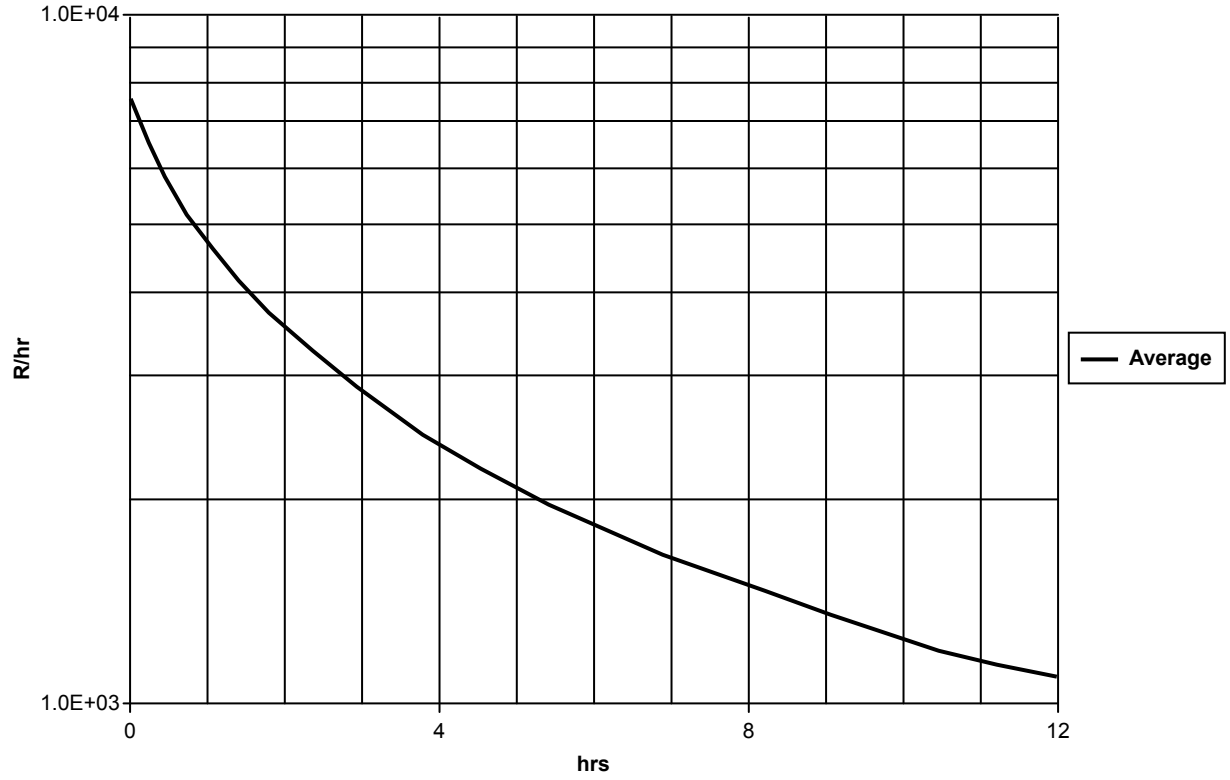
Figure 6: Unit 2 RB After RCS Blowdown at 60 µCi/gm



A high range radiation monitor reading of 100 R/hr between 15 minutes and 2 hours following reactor shutdown would adequately represent the release of reactor coolant of 60 µCi/gm DEQ I-131 due to iodine spiking into the containment. This reading is an order of magnitude lower than that specified for the Fuel Clad Barrier EAL. This corresponds to the intent of NEI 99-01 PWR RCS Barrier EAL #4.

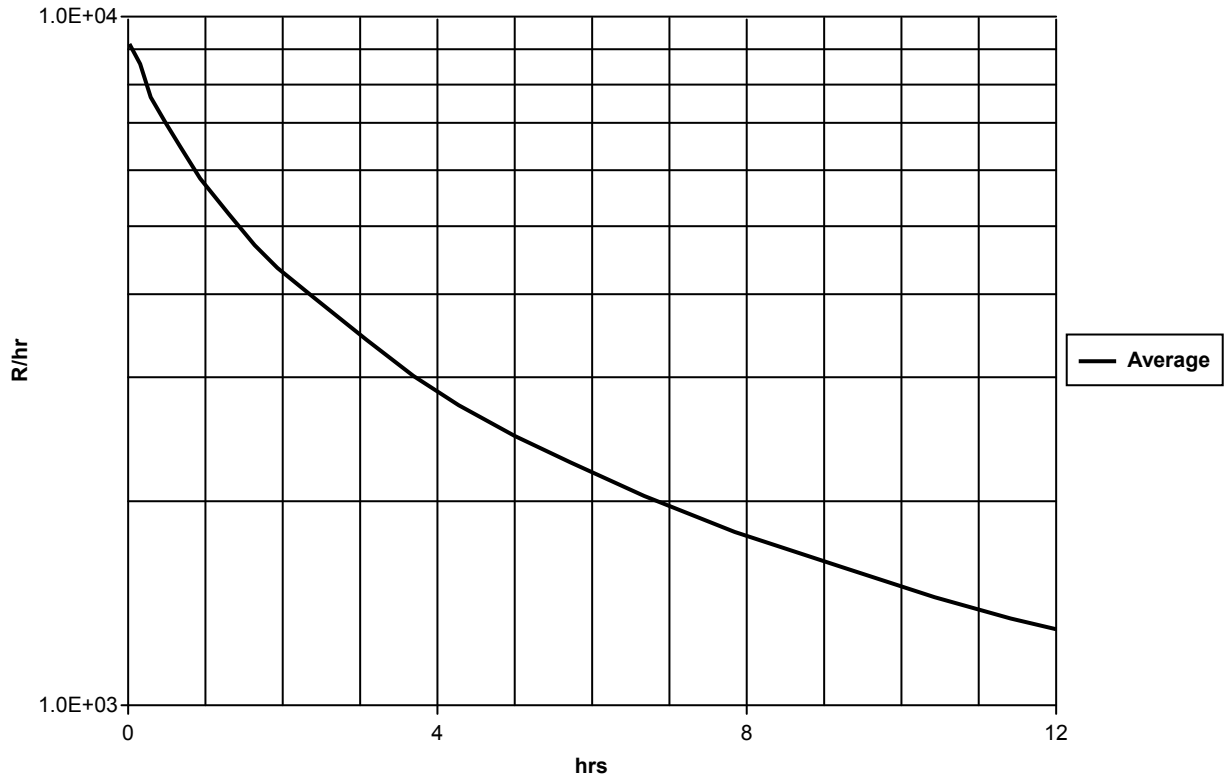
The two hour point is chosen because it allows ample time for the transfer of Site Emergency Coordinator duties to outside the control room. According to reference 23, during the initial fifteen minutes after a thermal event inside containment, the high range radiation monitor readings are considered invalid due to possibility of a transient thermally induced current.

Figure 7: Unit 1 RB After RCS Blowdown @ 20% Clad Failure



For simplicity of presentation to the Shift Manager acting as the Site Emergency Coordinator, a high range radiation monitor reading of at least 4000 rem/hr between 15 minutes and 2 hours after reactor shutdown would adequately represent 20% cladding failure. The two hour point is chosen because it allows ample time for the transfer of Site Emergency Coordinator duties to outside the control room. According to reference 23, during the initial fifteen minutes after a thermal event inside containment, the high range radiation monitor readings are considered invalid due to possibility of a transient thermally induced current. While the above plot shows the radiation levels dropping below 4000 R/hr at about 1.5 hours, this setpoint is judged to be adequate, for the purpose of the EAL, which is to indicate significant fuel damage well in excess of the EAL associated with loss of Fuel Clad, and as a decision point for declaration of a General Emergency. The situation will likely be diagnosed from radiation levels in less than 1.5 hours.

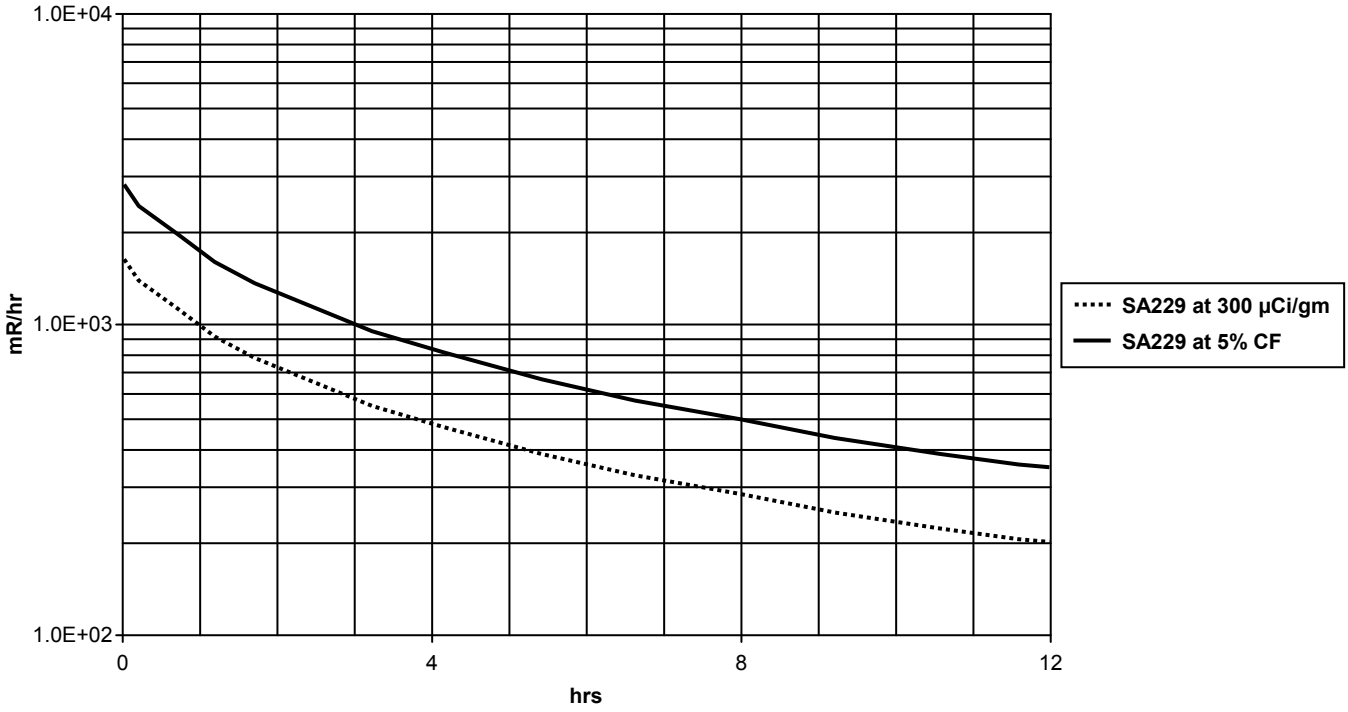
Figure 8: Unit 2 RB After RCS Blowdown @ 20% Clad Failure



For simplicity of presentation to the Shift Manager acting as the Site Emergency Coordinator, a high range radiation monitor reading of at least 4000 rem/hr between 15 minutes and 2 hours after reactor shutdown would adequately represent 20% cladding failure. This EAL setpoint is used to indicate significant fuel damage well in excess of the EAL associated with loss of Fuel Clad, and as a decision point for declaration of a General Emergency.

The two hour point is chosen because it allows ample time for the transfer of Site Emergency Coordinator duties to outside the control room. According to reference 23, during the initial fifteen minutes after a thermal event inside containment, the high range radiation monitor readings are considered invalid due to possibility of a transient thermally induced current.

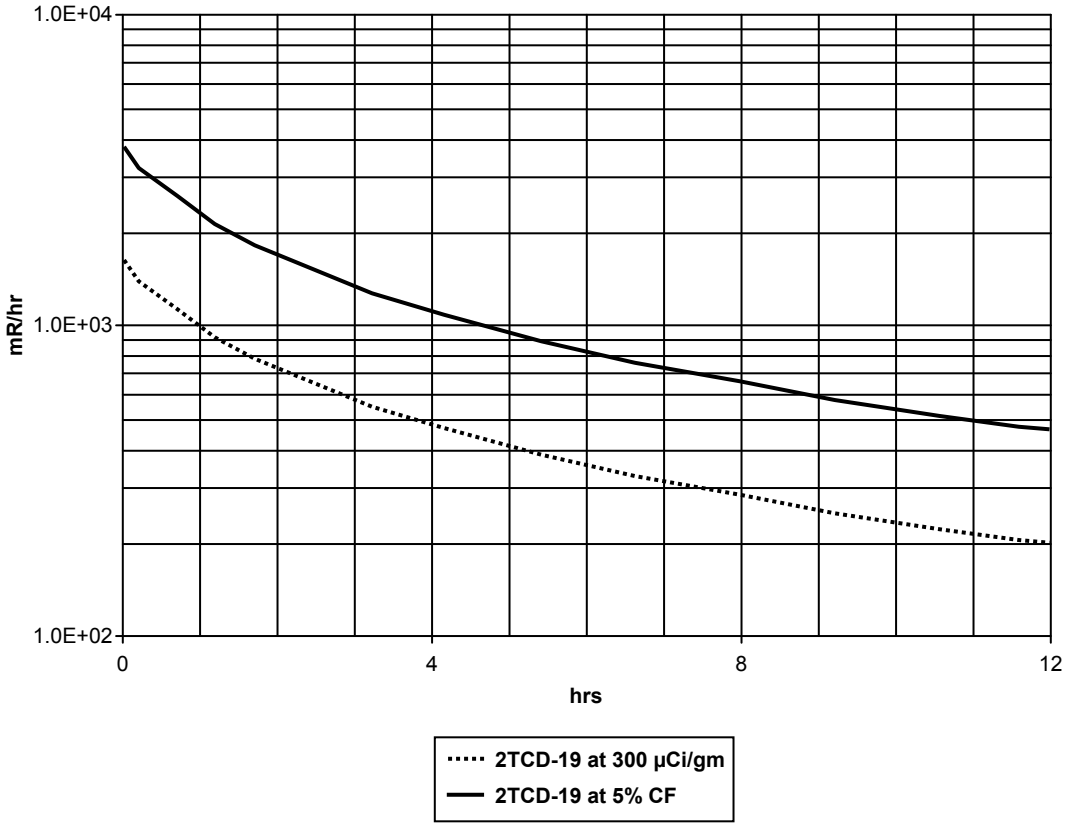
Figure 9: SA-229 Dose Rate at 300 µCi/gm and 5% Clad Failure in Unit 1 RCS



For simplicity of presentation to the Shift Manager acting as the Site Emergency Coordinator, a reading of at least 1000 mRem/hr within 2 hours after reactor shutdown measured at 1 foot from SA-229, six inches from the end of the piping, would adequately represent 2-5% cladding failure. The two hour point is chosen because it allows ample time for the transfer of Site Emergency Coordinator duties to outside the control room. This value is therefore recommended as the EAL setpoint indicating a loss of the fuel cladding barrier.

Figure 11:

2TCD-19 Dose Rate at 300 µCi/gm DEQ I-131 and 5% Clad Failure in Unit 2 RCS



For simplicity of presentation to the Shift Manager acting as the Site Emergency Coordinator, a reading of > 1000 mR/hr within 2 hours after reactor shutdown measured at 1 foot from the midpoint of 2TCD-19 would adequately represent 2-5% cladding failure. The two hour point is chosen because it allows ample time for the transfer of Site Emergency Coordinator duties to outside the control room. This value is therefore recommended as the EAL setpoint indicating a loss of the fuel cladding barrier.

OP Setpoint No.: B.19 **Revision:** 3

Parameter: MINIMUM SUBCOOLING MARGIN

Setpoint Value: EOP Figure 1

Applicability:

Associated System/Component: RCS

Description:

Minimum Subcooling Margin according to RCS pressure.

Key Assumptions: NONE

Basis:

The basis for this curve (Figure 1, curve 1) in the EOP is the instrument error for accident conditions associated with CET temperature indications. During natural circulation, CET subcooling margin is utilized, while the T-hot indications are utilized when RCP's are running. CET subcooling margin errors were utilized, because they are slightly more conservative than those incorporating T-hot. These errors were extracted from Reference 1, pages 32-36 for pressures < 500 psig and Reference 3 for pressures > 500 psig. The data points for the curve in Figure 1 are given below by the "Bounding Error" Column:

RCS Pressure (psig)	RCS Temperature (°F) Bounding Error	RCS Temperature (°F) Actual Error
2500	639	~~653~~652
2000	607	~~620~~619
1500	567	~~578~~577
1000	516 (496)	522
500	420	~~433~~432
400	398	408
350	386 (366)	392
300	352	375
200	318	328
150	296*	296
100	268*	251
50	228*	178

* 70 °F subcooling margin is incorporated below 150 psig, since the actual error is too prohibitive. See below for further explanation.

At 1000 psig and 350 psig the instrument error applied to the saturation curve changes to a higher value (indicated by number in parentheses). The bounding error to 1000 psig is 30 °F, 50°F to 350 psig, and 70 °F to just below 150 psig. The calculated accident condition error becomes too prohibitive to include below 150 psig, therefore 70 °F will be assumed below this pressure until boiling is no longer a possibility below 200 °F (since the maximum instrument error associated with the CETs is less than 10 °F from Ref 3 and the boiling point at atmospheric pressure is 212 °F). At 150 psig the combined accident error in the positive direction applied to the minimum subcooling margin curve and the accident error in the negative direction applied to the maximum 200 °F subcooling margin PTS curve would allow for little to no maneuverability. Also, below 150 psig, DHR will most likely have been initiated and temperature indications from the DHR loop along with an alarm for DH pump suction temperature greater than 280 °F will be available providing corroboration (Reference 2).

Note: Since this curve incorporates accident error, it is very conservative for non-accident conditions. However, it will be used for both abnormal and accident conditions in the interest of simplicity.

References:

1) Engineering Report 91-R-1011-01, Rev. ~~11~~12, “Instrumentation Error Evaluation for ANO-1 EOP Setpoint Verification Project per IRF No. 6051, 6078 and 6095.”

2) Drawing M-418, sheet 2, Rev. 16, “Functional Description And Logic Diagram - Decay Heat Removal System.”

3) Engineering calculation 88-EQ-0006-01, Rev. 1, including DRN 0~~5-2991~~6-2677, “ICC Tsat Loop Accuracy.”

Attachment 1, CALCULATION 90-E-0116-01, Page 196

OP Setpoint No.: M.1 **Revision:** 11

Parameter: RCS SUBCOOLED MARGIN

Setpoint Value: 30 °F

Applicability:

Associated System/Component: RCS/SMM

Description:

Margin to saturation, taken from 2XI-4612-3,-4, 2XR-4612, or SPDS with or without forced coolant flow, with the saturation margin monitor in Tsat mode, which indicates that the RCS is subcooled.

Key Assumptions:

Basis:

This value is based on providing assurance of adequate RCS subcooling with consideration given to the instrument inaccuracy of the above instruments. The worst case uncertainties, with a harsh containment environment, of the instruments mentioned above occur on 2XR-4612 and are tabulated below (ref. 1 and 2):

Inaccuracy (°F)	Pressure (psia)
13.50	2500
17.41	1500
21.74	1000
26.90	700
29.62	600
31.28	550
33.28	500
38.52	400
46.90	300

The historical value used for this setpoint is 30 °F. The instrument inaccuracy exceeds this value at just below 600 psia. Therefore the value of 30 °F bounds the uncertainty over most of the range except below approximately 600 psia. This is acceptable as most operator actions based on this setpoint occur at higher RCS pressures and utilize criteria in addition to margin to saturation. For instance, HPSI termination and RCP restart criteria include, among other things, margin to saturation greater than 30 °F. Below 1000 psia or so the RCP NPSH limits for one RCP or two RCPs in opposite loops in operation are more restrictive anyway. The Safety

Function Status Check (SFSC) uses this value to verify RCS inventory control. It is not the only parameter monitored to check inventory control as pressurizer level and reactor vessel level are also monitored. The reactor vessel level monitoring system should provide sufficient corroborative measures to counteract the higher uncertainties in margin to saturation at lower pressures.

In FRP, IC-2 there is a step which directs the operator to reduce RCS pressure to less than 600 psia to attempt to discharge the SITs if MTS is less than 30 °F. However, whenever the pressure is below 600 psia the 30 °F may not be bounding depending on the actual accident conditions. Other corroborative measures are present which will support the use of this setpoint value. This step will also restore the MTS. In blackout there is a step which directs the operator to reduce RCS temperature if MTS is less than 30 °F (due to RCS pressure decay). Again, this action is taken at higher RCS pressures, hence the 30 °F setpoint should still be bounding.

Note: SPDS instrument uncertainty for subcooled margin based on CETs or Thot is bounded by the uncertainty discussed above (ref. 1).

References:

1) Calculation No. 85-EQ-0004-21, Rev. 7(1), Loop Error Analysis for Subcooling Margin Monitor.

2) ER980574 I204 Rev. 0 “EOP”

CALCULATION COVER SHEET FORM 203F2 Rev. 7/15/85

Page 1 of 1

Proj. No. – Calc. No.: 85-E-00072-02 **Plant/Unit:** ANO-1

Calc. Title: Time from Loss of All AC Power to Loss of Subcooling

Proj. Title:

☐ Q
☒ Non-Q
☐ Seis. I
☐ Seis. II
☐ Non-Seis
☐ Fire
☐ Other

Calc. Type (Chk. & Provide Information)	**Calc. Status (Chk. & Provide Info.)**
☐ **ANO Piping T W S O HGR**	☒ **New Calc.**
Line Class:	☐ **Supercedes Calc #** _____
☒ **ANO General – Log Sect:** Nuclear Engineering	☐ **Amends Calc #** _____
☐ **Foss. Piping T W S O HGR**	☐ **Voids Calc #** _____
_____	
☐ **Foss. General – Log Sect:**	
Verification Method: ☐ **Design Review** ☐ **Alternate Calcs.** ☐ **Qual. Testing**	

Purpose: To determine how long following loss of all AC till charging of the RCS must be accomplished to avoid losing subcooling.

Results: In the above described scenario, subcooling will not be lost if charging of the RCS is accomplished within 4½ hours.

Revision No.		**0**		
Orig. Displn.	**Pgs. Rev'd or added**			
	By/Init./date	(signature on file)		
	Chk/Init./date			
	Rvw/Init./date	(signature on file)		
	Apv/Init./date	(signature on file)		
Supp. Displn.	**Pgs. affected**			
	By/Init./date			
	Chk/Init./date			
	Rvw/Init./date			
	Apv/Init./date			

CALCULATION COVER SHEET FORM 203F2 Rev. 7/15/85

Page 1 of 1

Proj. No. – Calc. No.: 85-E-00072-01 **Plant/Unit:** ANO-2

Calc. Title: Time from Loss of All AC Power to Loss of Subcooling

Proj. Title:

☐ Q
☒ Non-Q
☐ Seis. I
☐ Seis. II
☐ Non-Seis
☐ Fire
☐ Other

Calc. Type (Chk. & Provide Information)	**Calc. Status (Chk. & Provide Info.)**
☐ **ANO Piping T W S O HGR**	☒ **New Calc.**
Line Class:	☐ **Supercedes Calc #** _____
☒ **ANO General – Log Sect:** Nuclear Engineering	☐ **Amends Calc #** _____
☐ **Foss. Piping T W S O HGR**	☐ **Voids Calc #** _____
_____	
☐ **Foss. General – Log Sect:**	
Verification Method: ☐ **Design Review** ☐ **Alternate Calcs.** ☐ **Qual. Testing**	

Purpose: To determine how long following loss of all AC till charging of the RCS must be accomplished to avoid losing subcooling.

Results: In the above described scenario, subcooling will not be lost if charging of the RCS is accomplished within 6½ hours and appropriate operator actions are taken.

Revision No.		**0**		
Orig. Displn.	**Pgs. Rev'd or added**			
	By/Init./date	(signature on file)		
	Chk/Init./date			
	Rvw/Init./date	(signature on file)		
	Apv/Init./date	(signature on file)		
Supp. Displn.	**Pgs. affected**			
	By/Init./date			
	Chk/Init./date			
	Rvw/Init./date			
	Apv/Init./date			

**CROSS REFERENCE MATRIX FROM
NEI EAL NUMBER TO ENTERGY EAL NUMBER**

ANO IC	NEI 99-01 IC	Diff. Doc. Page	Clean Basis Page No
AU1	AU1	5	10
AU2	AU2	8	13
AA1	AA1	11	15
AA2	AA2	14	18
AA3	AA3	16	20
AS1	AS1	18	21
AG1	AG1	21	23
CU1	CU1	23	26
CU2	CU2	24	27
CU3	CU4	26	29
CU5	CU3	27	30
CU6	CU7	28	31
CU7	CU8	29	32
CU8	CU6	30	33
CA1	CA1	32	34
CA3	CA4	35	36
CA5	CA3	36	38
CS1	CS1	38	39
CG1	CG1	41	41
E-HU1	E-HU1	43	44
FU1	FU1	44	N/A
FA1	FA1	45	N/A
FS1	FS1	46	N/A
FG1	FG1	47	N/A
Fuel Clad EALs	Fuel Clad EALs	49	47
RCS EALs	RCS EALs	53	53
Containment EALs	Containment EALs	58	57
HU1	HU4	62	66
HU2	HU5	63	68
HU4	HU4	65	69

**CROSS REFERENCE MATRIX FROM
NEI EAL NUMBER TO ENTERGY EAL NUMBER**

ANO IC	NEI 99-01 IC	Diff. Doc. Page	Clean Basis Page No
HU5	HU3	67	71
HU6	HU1	68	72
HA1	HA4	71	76
HA2	HA6	72	78
HA3	HA5	73	79
HA4	HA2	75	80
HA5	HA3	77	82
HA6	HA1	79	83
HS1	HS4	82	87
HS2	HS3	83	88
HS3	HS2	84	89
HG1	HG1	85	90
HG2	HG2	86	91
SU1	SU1	87	93
SU6	SU3	89	94
SU7	SU5	90	96
SU8	SU6	91	97
SU9	SU4	93	98
SU10	SU8	95	100
SU11	SU2	96	101
SA1	SA5	98	102
SA3	SA2	99	103
SA6	SA4	101	104
SS1	SS1	102	106
SS3	SS2	103	107
SS4	SS3	104	108
SS6	SS6	106	109
SG1	SG1	108	111
SG3	SG2	110	113