Entergy

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0CAN120405

December 16, 2004

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

SUBJECT: Arkansas Nuclear One – Response to Request for Additional Information for Proposed Upgraded Emergency Action Levels (EALs) Using NEI 99-01, Revision 4 Methodology

Arkansas Nuclear One
Units 1 and 2
Docket Nos. 50-313 and 50-368
License Nos. DPR-51 and NPF-6

REFERENCES:

1. June 16, 2004, e-mail from T. Alexion, NRC, to L. England, EAL RAIs for ANO and Waterford
2. February 27, 2004 letter to Document Control Desk, Arkansas Nuclear One – Proposed Upgraded Emergency Action Levels (letter number 0CAN020407)
3. NEI 99-01, Rev 4 "Methodology for Development of Emergency Action Levels"

Dear Sir or Madam:

Reference 2 provided Arkansas Nuclear One's (ANO) submittal of proposed EALs using the methodology outlined in NEI 99-01, "Methodology for Development of Emergency Action Levels" (Revision 4, January 2003). Reference 1 contained the NRC Requests for Additional Information (RAIs). This letter provides ANO's response to Reference 1. In responding to the RAIs, Entergy took the opportunity to further standardize our regional approach and made format and editorial changes in addition to addressing the RAI issues. Accordingly, a complete revision to our initial submittal is enclosed that incorporates all changes as described in the attachments to this letter.

AX45

Plant specific information is attached as follows:

- Response to NRC RAI questions
- Proposed Emergency Plan Pages – Changes incorporated
- Proposed EALs – To be incorporated in procedure
- Proposed EAL Bases - To be incorporated in procedure
- NEI 99-01, Rev. 4 to Plant Specific Correlations, Differences, Deviations, and Justifications
- Cross reference matrix from NEI EAL number to Entergy EAL number (i.e., NEI number, previous Entergy number, new Entergy number)

Differences and Deviations from NEI 99-01, Rev 4 are based on NRC guidance contained in Supplement 1 to RIS 2003-00018 dated July 13, 2004.

We request NRC approval of this submittal within 120 days of receipt. ANO plans to implement these new EALs at the earliest opportunity following NRC approval.

This correspondence contains no new regulatory commitments. If you have any questions regarding this submittal, please contact Mr. Robert Holeyfield, Manager, Emergency Planning at (479) 858-4995.

Sincerely,

Dale E. James
Director, Nuclear Safety Assurance (Acting)

DEJ/dwb
Attachments:

Attachment 1 Response to NRC Requests for Additional Information
Attachment 2 Proposed Emergency Plan Pages – Changes incorporated
Attachment 3 Proposed EALs – To be incorporated in procedure
Attachment 4 Proposed EAL Bases – To be incorporated in procedure
Attachment 5 Arkansas Nuclear One Deviations and Differences from NEI 99-01, Rev 4 Emergency Action Levels
Attachment 6 Cross reference matrix from NEI EAL number to Entergy EAL number (i.e., NEI number, previous Entergy number, new Entergy number)

cc: Dr. Bruce S. Mallett
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

NRC Senior Resident Inspector
Arkansas Nuclear One
P.O. Box 310
London, AR 72847

U. S. Nuclear Regulatory Commission
Attn: Mr. Tom Alexion
Mail Stop 0-7 D1
Washington, DC 20555-0001

U. S. Nuclear Regulatory Commission
Attn: Mr. Drew Holland
Mail Stop 0-7 D1
Washington, DC 20555-0001

Attachment 1

0CAN120405

ANO RESPONSES TO NRC REQUESTS FOR ADDITIONAL INFORMATION REGARDING ADOPTION OF NEI 99-01, REVISION 4 FOR ARKANSAS NUCLEAR ONE, UNITS 1 AND 2

ANO RESPONSES TO REQUESTS FOR ADDITIONAL INFORMATION REGARDING ADOPTION OF NEI 99-01, REVISION 4 FOR ARKANSAS NUCLEAR ONE, UNITS 1 AND 2

By letter dated February 27, 2004 (0CAN020407), Entergy Operations, Inc. submitted proposed changes to the Arkansas Nuclear One Emergency Plan, Tables D-1 and D-2, and proposed changes to emergency action levels (EALs) in Emergency Plan Implementing Procedure 1903.010, *Emergency Action Level Classification.* This submittal revises the ANO EALs for Units 1 and 2 from the current NUREG-0654, Appendix 1 basis to Revision 4 to NEI 99-01.

The NRC staff has the following questions related to the February 27, 2004, submittal:

General Comments:

1. 10 CFR 50, Appendix E – Section IV.B (Assessment Actions) states, "...emergency action levels shall be discussed and agreed on by the applicant *[licensee]* and State and local governmental authorities, and approved by NRC." (Italics added) Provide documentation indicating that these discussions have occurred and that there is agreement with State and local governmental authorities on the implementation of the proposed EAL changes based on NEI 99-01, Revision 4.

   ANO Response:

   Please see below for copies of the documentation of State and local government agreement with the proposed change to NEI 99-01 EALs.

NRC Submittal Review

Letter #: 0CAN020401 Response Due: 2/19/04

Date Issued for Review:

Subject: Proposed Upgraded ANO Emergency Action Levels (EALs)

Information Contact / Phone #: Robert Holeyfield / 858-4995

Concurrence and Agreement with the Proposed ANO EALs

	Concurrence	
County / Name	*Action*	*Signature*
Pope Co. / DEWEY TAYLOR	concur YES	Dewey H Taylor
Yell Co. / Charles Smith	concur Yes	Charles B. Smith Sr
Logan Co. / Don Fairbanks	concur Yes	Don Fairbanks
Johnson Co. / FRED TAYLOR	concur YES	Fred Taylor
Conway Co. / Misty Sutton	concur yes	Misty Sutton

COMMENTS

Pursuant to 10 CFR 50, Appendix E, Section IV.B, the above signatures document that the Emergency Action Levels proposed for Arkansas Nuclear One, as presented for NRC review in letter # 0CAN020401, have been discussed and agreed on by appropriate local governmental authorities.

Sent: Monday, February 02, 2004 2:45 PM
To: HOLEYFIELD, ROBERT L
Cc: David Baldwin; Bernard Bevill; Chris Meyer
Subject: Documentation of my review of EALS

Robert,

Per your request. Please note, I talked to Chris and the County Judges have not signed off on EAL changes in the past. Not sure they will have to sign off on this change. I defer to Chris for further guidance.

I am Donald Greene, a Health Physicist with the Arkansas Department of Health.

I am been evolved in the process of rewriting the ANO EALs to reflect NEI 99-01 (NUMARC/NESP-007) from the beginning. I have reviewed all the documentation of the workgroup and agree with the EALs and support documents that have been prepared.

I understand that some of the "abnormal radiation levels" have changed. The new levels meet all the requirements of the State to ensure the public health and safety of citizens in the EPZ and IPZ. These levels will ensure proper Emergency Classification Levels are imposed and Protective Action Advisories and Recommendations are made.

I have briefed Bernie Bevill the Work Unit Leader. Mr.. Bevill will be the Technical Operations Center Director during the State's response to an event at ANO. Mr.. Bevill agrees that the new levels meet all State requirements and will ensure proper protection of the public.

Donald J. Greene, HP
Arkansas Department of Health
Radiation Control & Emergency Management

2. Provide update to Attachment 4 (ANO Deviations and Differences from the NEI 99-01, Revision 4 EALs) based on an evaluation of changes proposed to NEI 99-01 guidance in submittal to ensure that any deletions to NEI 99-01 Initiating Condition (IC) statements, example EALs criterion and basis, or significant content changes (other than format, nomenclature, simple terminology or system names, etc.) that may impact intent or thresholds established or guidance provided in NEI 99-01, are listed as deviations. In addition, provide site-specific technical justification for any deviations, as appropriate. (Specific examples are listed under "Specific Comments", but are not all inclusive.) Also, revise definitions of deviation and difference in Attachment 4, under General Comments, to reflect this logic in identifying a deviation vs. a difference.

   ANO Response:

   The proposed ANO site-specific ICs and EALs were reviewed against the NEI 99-01, Revision 4 guidance.

   ANO used the definitions of deviations and differences as provided in RIS 2003-18, Supplement 1, *Use of Nuclear Energy Institute (NEI) 99-01, "Methodology for Development of Emergency Action Levels,"* Revision 4. These definitions were included in Attachment 4, Arkansas Nuclear One Deviations and Differences from NEI 99-01, Rev 4 Emergency Action Levels."

   As necessary, all instances in which the ANO site-specific ICs and EALs differed from NEI 99-01 guidance were characterized as "deviations" or "differences" and documented in Attachment 4[1], along with the site-specific technical justification.

3. Provide rationale for the inconsistent use of unit nomenclature "ANO-1 / ANO-2" versus "Unit 1 / Unit 2", or revise accordingly to ensure consistency in terminology.

   ANO Response:

   ANO-1 and ANO-2 were changed throughout the document to Unit 1 and Unit 2, respectively.

4. Provide a simplified drawing or schematic illustrating unit auxiliary and start-up transformers and describe inter-relationship regarding conditions needed for a loss of off-site power and the ability of emergency diesel generators to supply only essential busses.

[1] Attachment 4, *Arkansas Nuclear One Deviations and Differences from NEI 99-01, Rev 4 Emergency Action Levels*, included in the February 27, 2004, letter, is Attachment 5 in this submittal.

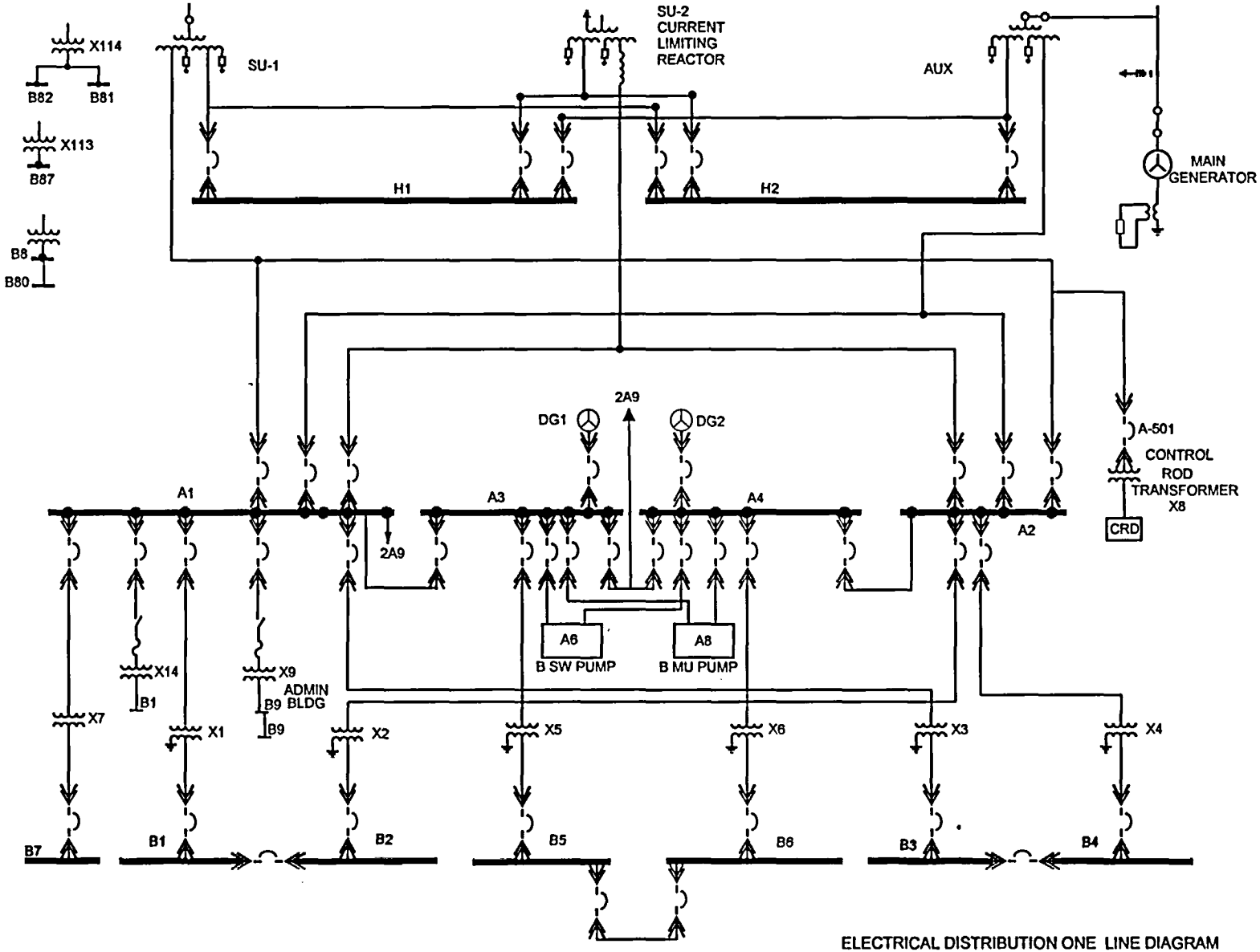
ANO Response:

Both units receive offsite power from a common switchyard via stepdown transformers, Startup (SU) #1, 2 and 3. (S/U #1 for Unit 1 and S/U #3 for Unit 2 with S/U #2 available to both units to power safety-related equipment during events or limited non-vital loads in non-emergency situations). S/U #1 and #3 are supplied by an autotransformer, which is normally supplied from the switchyard 500KV distribution system (which has 3 separate 500KV sources). The autotransformer can also be supplied by a separate 161KV distribution system; however, loading restrictions will be placed on S/U #1 and #3 if the autotransformer is supplied by the 161KV distribution system. S/U #2 is powered directly from the 161KV distribution system. To completely lose all offsite power would require the loss of all three 500KV power supplies or a loss of the entire 500KV ring bus in the switchyard AND a loss of the 161KV ring bus. ANO also has an Alternate AC Diesel Generator with a 4,400 kilowatt capacity that can supply one non-vital and two vital busses on each unit. Both units have the ability to backfeed non-vital buses from the emergency diesel generators and have emergency operating procedure guidance to do this.

For Unit 1, the Unit Auxiliary transformer is available to supply power should it be necessary. This is not the case for Unit 2. Unit 2's Unit Auxiliary transformer is not normally connected to the electrical distribution system, but is available during some outage evolutions. In order for the Unit 2 Unit Auxiliary transformer to be used, hard connections from the main generator to the electrical distribution system must be manually disconnected.

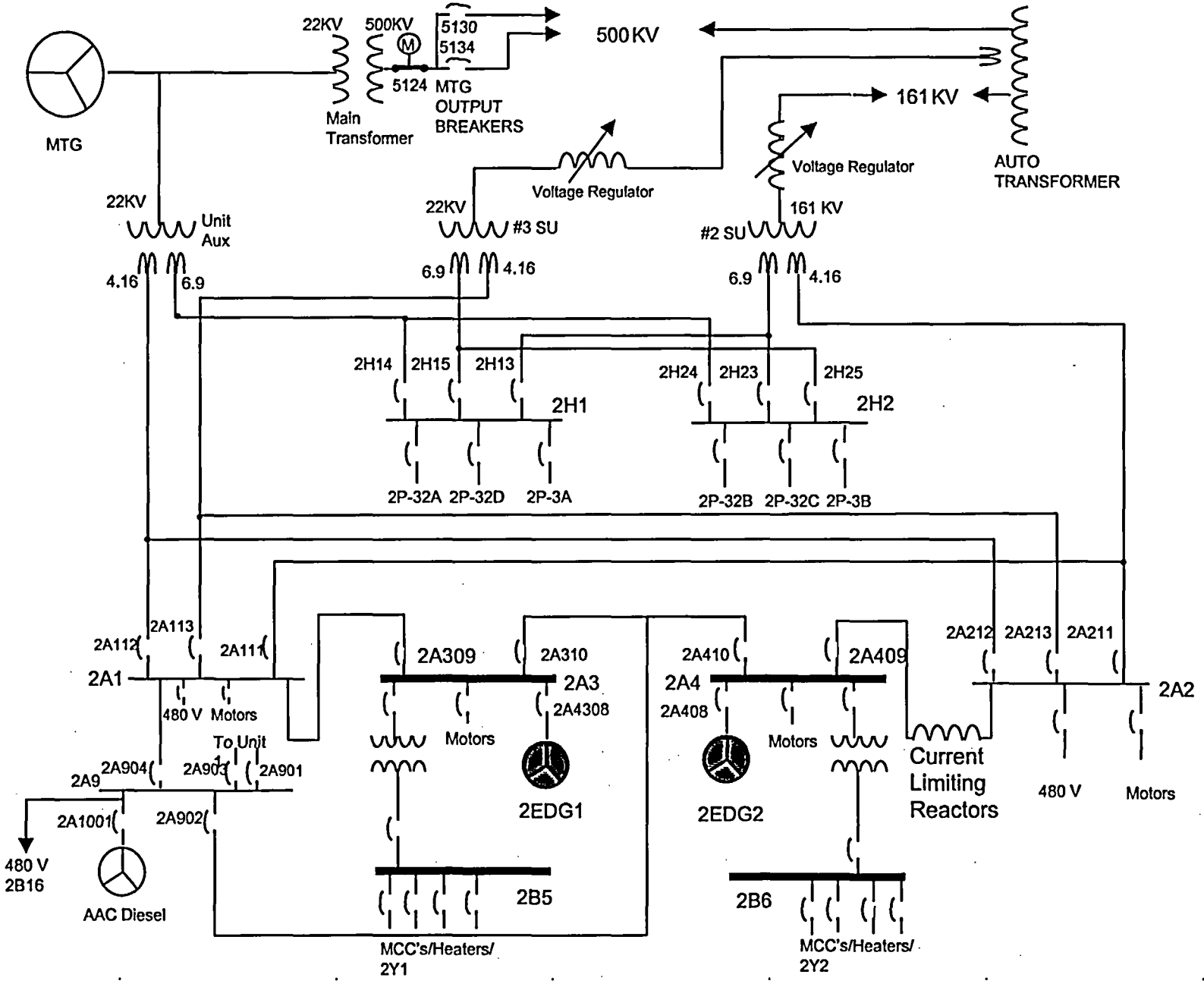
Diagrams from the System Training Manuals for each unit's electrical distribution system are shown below.

Unit 1



ELECTRICAL DISTRIBUTION ONE LINE DIAGRAM

Unit 2


MTG
22KV
500KV
5130
5134
5124
MTG OUTPUT BREAKERS
Main Transformer
500 KV
161 KV
AUTO TRANSFORMER
Voltage Regulator
Voltage Regulator
22KV
Unit Aux
4.16
6.9
22KV
#3 SU
6.9
4.16
#2 SU
161 KV
6.9
4.16
2H14
2H15
2H13
2H1
2H24
2H23
2H25
2H2
2P-32A
2P-32D
2P-3A
2P-32B
2P-32C
2P-3B
2A112
2A113
2A111
2A1
480 V Motors
To Unit
2A309
2A310
2A3
2A4308
Motors
2A410
2A409
2A4
2A408
Motors
2A212
2A213
2A211
2A2
2A9
2A904
2A903
2A901
2A1001
2A902
480 V
2B16
AAC Diesel
2EDG1
2EDG2
Current Limiting Reactors
480 V
Motors
2B5
2B6
MCC's/Heaters/
2Y1
MCC's/Heaters/
2Y2

5. Describe whether temporary RCS water level instrumentation is installed in Modes 5 and 6, and if installed, whether ANO-1 and ANO-2 instrumentation capabilities in Modes 5 and 6 would monitor water level at or below the bottom ID of the RCS loop and at the top of active fuel (TOAF) for either unit.

   ANO Response:

   In Mode 5, temporary RCS water level instrumentation is not installed until just prior to entering Mode 6. In Mode 5, the normal means of RCS water level indication is available. In Mode 5, the normal means of RCS water level indication can monitor RCS level at the bottom ID of the RCS loop (for both Units 1 and 2) and at the TOAF for Unit 2 only.

   In Mode 6, a temporary means of RCS water level indication is installed. In Mode 6, neither unit at ANO has the capability to monitor level below the bottom ID of the RCS loop.

6. Provide a copy or include a detailed description in licensee Bases of calculations used to determine effluent monitor thresholds under AG1, AS1, AA1 and AU1, and specify any deviations in Attachment 4 from guidance contained in Appendix A to NEI 99-01 (Basis for Radiological Effluent Initiating Conditions).

   ANO Response:

   For IC AU1, the following was added to the basis discussion concerning EAL 2:

   The monitor readings in EAL #2 were calculated based on the default source term as described in the ODCM and annual average meteorological conditions for the most limiting downwind sector. The monitor readings in EAL #2 are set to indicate two times the ODCM limit.

   For IC AA1, the following was added to the basis discussion concerning EAL 2:

   The monitor readings in EAL #2 were calculated based on the default source term as described in the ODCM and annual average meteorological conditions for the most limiting downwind sector. The monitor readings in EAL #2 are set to indicate 200 times the ODCM limit.

   For IC AS1, the basis discussion concerning EAL 1 was revised to read as follows:

   *The monitor readings in EAL #1 were determined by using the same meteorology and source term as those used for determining the monitor reading EALs in **AU1** and **AA1**. This protocol maintains intervals between the ICs for the four classifications. Since doses are not monitored in real-time, a release duration of one hour was assumed and the monitor readings are based on a site boundary (or beyond) dose rate of 100 mR/hour TEDE.*

For IC AG1, the basis discussion concerning EAL 1 was revised to read as follows:

*The monitor readings in EAL #1 were determined by using the same meteorology and source term as those used for determining the monitor reading EALs in **AU1** and **AA1.** This protocol maintains intervals between the ICs for the four classifications. Since doses are not monitored in real-time, a release duration of one hour was assumed and the monitor readings are based on a site boundary (or beyond) dose rate of 1000 mR/hour TEDE.*

----------End of responses to NRC General Comments----------

NRC Specific Comments:

1. **AU1 / EAL 2** (corresponds to NEI 99-01, AU1 / EAL 2)

   Licensee inserted the statement "...during a discharge", which is not addressed under NEI 99-01, AU1 / EAL 2. Provide discussion regarding the reason for adding this qualifier, since criterion already requires that monitor reading be valid. In addition, address insertion of statement as either deviation or difference under Attachment 4, including justification, or provide change to reflect NEI 99-01, AU1 / EAL 2 criterion.

   ANO Response:

   The statement was deleted.

2. **AU1 / EAL 4** (corresponds to NEI 99-01, AU1 / EAL 5)
   AA1 / EAL 4 (corresponds to NEI 99-01, AA1-EAL 5)

   Licensee modified NEI 99-01 criteria under AU1 (and AA1) / EAL 4 to reflect "RDACS data indicating NUE (Alert)." While justification provided is adequate, describe modification of EAL as a deviation vs. difference in Attachment 4.

   ANO Response:

   Attachment 4 was changed to describe the modification of the EALs as a deviation.

3. **AU1 Basis** (corresponds to NEI 99-01, AU1 / Basis)

   Licensee under AU1 Basis does not address NEI 99-01 Basis guidance, which states "...if an ongoing release is detected and the starting time for that release is unknown, the Emergency Director should, in the absence of data to the contrary, assume the release has exceeded 60 minutes." Statement is included under licensee AA1 Basis. Address deletion of Basis statement and justification in Attachment 4, or provide change to comply with NEI 99-01 guidance in Basis.

   ANO Response:

   The statement was, in fact, in the AU1 basis. It was, however, in a different paragraph from the NEI document. The AU1 basis was re-arranged to more closely match that of the NEI document.

4. **AU2 / EAL 1** (corresponds to NEI 99-01, AU2 / EAL 1)
   AA2 / EAL 2 (corresponds to NEI 99-01, AA2 / EAL 2)

   Licensee does not address the "fuel transfer canal", which is identified under NEI 99-01, AU2 / EAL 1 and AA2 / EAL 2. Identify deletion and provide justification for

change in Attachment 4, or provide proposed changes to comply with NEI 99-01 guidance.

ANO Response:

At ANO, the refueling canal performs the functions of the reactor refueling cavity and fuel transfer canal. Thus, the term "refueling canal" was substituted for "reactor refueling cavity" and "fuel transfer canal."

This statement was added to the Introduction to Attachment 4.

5. AA2 (corresponds to NEI 99-01, AA2)

Initiating Condition (IC) statement under Index of EALs, contained in Attachment 1 to EAL classification procedure, does not contain statement "outside the reactor vessel", as reflected in NEI 99-01, AA2 and Attachments 2 and 3 of the proposed EAL classification procedure. Provide change to address inconsistency.

ANO Response:

The statement was added.

6. AA3 / EAL 1 (corresponds to NEI 99-01, AA3 / EAL 1)

a. Under Differences in Attachment 4, the licensee states that "[f]or EAL #1...of the ANO's EALs, a site-specific list is not provided since the possible plant conditions and configurations are very diverse." However, the licensee does provide a listing of site-specific areas under AA3 / EAL 1, contrary to the statement made in Attachment 4. Provide change to Attachment 4 to resolve inconsistency, and provide logic used for selection of the technical support center (TSC) and Controlled Area Access entry control point as areas requiring continuous occupancy.

ANO Response:

Attachment 4 has been changed to describe the deviations from NEI guidance.

The TSC and Controlled Access Area entry point were removed from EAL #1 in Attachments 2 and 3. Continuous occupancy is not required in these areas because, under normal conditions, there are no functions performed related to safe operation or safe shutdown of the plant.

In addition, the Central Alarm Station (CAS) was also removed from the list of areas because the CAS is located in the ANO Administration Building. Due to the location of the CAS, other EALs would be met that are indicative of at least an Alert emergency class if a radiation level of 15 mR/hr is reached in the CAS. There is no area radiation monitor in the CAS.

ANO does not have a Radwaste Control Room.

The AA3 basis was also changed to reflect the changes in the EALs.

6. AA3 / EAL 1 (corresponds to NEI 99-01, AA3 / EAL 1)

b. The site-specific listing under AA3 / EAL 1 in Attachment 2 (EAL Matrix) states "Control Room, TSC...", while Attachment 3 (EAL Basis) states "Control Room/TSC...". Provide change to address inconsistency.

ANO Response:

See the response to Question 6.a.

7. AA3 / EAL 2 (corresponds to NEI 99-01, AA3 / EAL 2)

a. Licensee states in Attachment 4 that "[f]or EAL...#2 of the ANO's EALs, a site-specific list is not provided since the possible plant conditions and configurations are very diverse." However, the licensee Basis (last paragraph) states that "[a]pplicable areas requiring infrequent access are identified in the site's Abnormal Operating Procedures, Emergency Operating Procedures, the 10 CFR 50 Appendix R analysis, and/or analyses performed in response to Section 2.1.6b of NUREG-0578..." Based on this statement, describe why the referenced documents cannot be used to identify areas containing safe shutdown equipment, or provide proposed changes to comply with NEI 99-01 guidance. If specific areas are not to be listed, describe technical justification for modification of NEI 99-01 criteria as a deviation vs. difference under Attachment 4, and revise licensee Basis accordingly.

ANO Response:

EAL 2 was revised to include a site-specific list as specified in NEI 99-01.

7. AA3 / EAL 2 (corresponds to NEI 99-01, AA3 / EAL 2)

b. Licensee specifies a threshold of 5000 mR/hr. Describe whether the station's normal occupational exposure guidelines and limits would impede (delay) access to areas, i.e., the need for administrative approvals and briefings prior to entry, as discussed in NEI 99-01, AA3 Basis. If so, provide further justification or proposed change to dose rate threshold that would ensure unimpeded access during an emergency. In addition, clarify whether if standard Radiation Protection procedures are used, is the proposed threshold consistent with other Entergy stations currently using NESP-007 scheme or proposing adoption of NEI 99-01.

ANO Response:

The site specific value was changed to 10 R/hr for all Entergy Nuclear South sites. The Basis Document discussion was also revised. A standard set of radiological practices and procedures does exist for Entergy Nuclear South plants contained in corporate Radiation Protection (RP) procedures. These procedures are standard for the Entergy South Region plants (submitting plants to change from NUREG-0654 to NEI 99-01 Revision 4) but are not common for the entire Entergy system. These procedures do require specific actions prior to an expected dose of 5 Rem. With regard to application to this EAL, these procedures are generally based on expected *dose* for an activity, not exposure *rates*. For instance, RP-105, *Radiation Work Permits* step 5.3.1.2 states "Stay times are required for activities that will result in an exposure of > 500 mrem/entry..." NEI 99-01 states "As used here, *impede*, includes hindering or interfering provided that the interference or delay is sufficient to significantly threaten the safe operation of the plant." This guidance implies that some actions required by exposure rates encountered may not be severe enough to warrant consideration as applicable to this IC because they may not represent a *significant* (emphasis added) threat to the safe operation of the plant. Exposure rates and required time in the area that together cause the requirement to use stay times do not appear in themselves enough to meet the NEI criterion stated above. Neither does any requirement for briefings as these would be expected to occur regardless in order to conduct the activities required with the Radiation Protection briefing included as a part of the task briefing. Therefore, Entergy establishes a value for this EAL that considers stay times that may be so restrictive that they may require multiple entries with multiple personnel to accomplish a task to prevent exceeding Entergy administrative limits or require extension of the administrative limits.

7. **AA3 / EAL 2** (corresponds to NEI 99-01, AA3 / EAL 2)

c. Licensee has expanded EAL 2 criteria to add qualifier: "and access is required for safe plant operation, but is impeded due to radiation dose rates." Per the NEI 99-01 guidance, access to the affected area is not a requirement, but rather that the threshold value in these infrequently accessed areas is exceeded. In addition, per the NEI 99-01 guidance, exceeding the threshold value is intended to reflect that access would be impeded, thus rendering statement "but is impeded due to radiation dose rates" redundant. Provide site-specific technical justification for deviations from NEI 99-01 guidance in Attachment 4, or provide change to reflect NEI 99-01 AA3 / EAL 2 guidance.

ANO Response:

The qualifier added to EAL 2 has been removed.

8. CU2 (corresponds to NEI 99-01, CU2)

Licensee IC statement in Attachment 4 is inconsistent with that listed in Attachment 1 (Index of EALs), Attachment 2 (EAL Matrix) and under NEI 99-01 CU2. Correct inconsistency between IC statements.

ANO Response:

The format of Attachment 4 is to provide the NEI 99-01 IC and EALs followed by an explanation of any deviations or differences between the site-specific ICs and EALs.

In this case, the NEI 99-01 CU2 IC was erroneously written to be the same as the CU1 IC.

The IC statement in Attachment 4 was corrected to read consistent with the NEI IC for CU2.

9. CU2 / EAL 1 (corresponds to NEI 99-01, CU2 / EAL 2)

Licensee states "UNPLANNED RCS level drop below the reactor vessel flange greater than 15 minutes," rather than NEI 99-01, CU2 / EAL 1 criterion of "*[greater than **or equal to**]* ≥ 15 minutes." Provide justification for deviation, or proposed changes to comply with NEI 99-01 guidance.

ANO Response:

The EAL statement was changed to "greater than or equal to" 15 minutes.

10. CU3-EAL 1 (corresponds to NEI 99-01, CU3-EAL 1) /
SU1-EAL 1 (corresponds to NEI 99-01, CU3-EAL 1)

NEI 99-01 IC statements and Example EALs for both CU3 and SU1, with the exception of mode applicability, are identical. However, listing of offsite power sources and criteria used for threshold 1.b, "At least (site-specific) emergency generators are supplying power to emergency busses," are inconsistent between licensee CU3 / EAL 1 and SU1 / EAL 1. Describe rationale for inconsistencies between criteria in CU3 and SU1 based on common NEI 99-01 guidance, or provide proposed changes to eliminate inconsistency.

ANO Response:

The EALs for CU3 and SU1 were revised and re-formatted for consistency with each other and NEI guidance.

11. CU3 (corresponds to NEI 99-01, CU3)

Licensee has chosen to make IC applicable for modes 5 (Cold Shutdown), 6 (Refueling) and D (Defueled). NEI 99-01, CU3 guidance limits applicability to Cold Shutdown and Refueling only. Basis merely states that licensee chose to add Defueling to mode applicability. Provide technical justification for deviation in Attachment 4 regarding applicability to Defueled mode, or provide proposed change to comply with NEI 99-01 guidance.

ANO Response:

"Defueled" was removed from the list of applicable modes.

12. CU5 (corresponds to NEI 99-01, CU5 / EAL 1)
SU4 (corresponds to NEI 99-01, SU4 / EAL 1)

Licensee states that "ANO uses the letdown radiation monitor (if available) as a qualitative measure of potential fuel clad degradation", but does not provide monitor per NEI 99-01, CU5 / EAL 1. Provide the alarm setpoint(s) for the letdown radiation monitor in ANO-1 and ANO-2, and describe how the setpoint(s) correlate to Technical Specification allowable limits. If alarm setpoint does correspond to Technical Specification allowable limits, provide further technical justification for deviation from NEI 99-01 guidance, or provide change to comply with NEI 99-01 guidance.

ANO Response:

NEI 99-01 EAL #1 was added to ICs CU5 and SU4 (for Unit 1 only) to comply with NEI guidance.

EAL #1 only applies to Unit 1 since the Unit 2 Letdown Radiation Monitor alarm setpoint is not based on exceeding the technical specification limit. Instead, the Unit 2 setpoint is set at 67% of the selected scale. The alarm is provided only to provide the operators with an indication of rising radioactivity in the reactor coolant.

13. CU6 (corresponds to NEI 99-01, CU6)
SU6 (corresponds to NEI 99-01, SU6)

a. Licensee lists the Station Radio System under offsite communications equipment in Tables C2 and M2, but NEI 99-01 CU6 / SU6 Basis describes radio transmissions as an extraordinary means of offsite communications. Clarify in Attachment 4 whether implementing procedures address the use of the Station Radio System as a back-up means of offsite communications, as technical justification for consideration under these EALs.

ANO Response:

The Station Radio System is listed in Emergency Plan Implementing Procedures as a backup method for offsite communications. ANO does not intend to include a statement in Attachment 4 related to the inclusion of the Station Radio System. NEI 99-01 provides for a site-specific list of communications systems for consideration in these EALs.

The CU6 and SU6 bases were revised to remove the statement regarding radio transmission as an extraordinary means of communications.

13. CU6 (corresponds to NEI 99-01, CU6)
SU6 (corresponds to NEI 99-01, SU6)

b. Licensee includes cellular telephones under onsite and offsite communications capability in Tables C1/C2 and M1/M2. Clarify in Attachment 4 whether implementing procedures address the use of cellular phones as a means of offsite communications as technical justification for consideration under these EALs. In addition, confirm that cellular phones will function effectively within or in close proximity to plant structures to be considered a means of onsite and/or offsite communications.

ANO Response:

Cellular phones were removed from the EALs since Emergency Plan Implementing Procedures do not address the use of cellular phones as a means of offsite communications.

14. CA1 (corresponds to NEI 99-01, CA1 / EAL 1)
CA2 (corresponds to NEI 99-01, CA2 / EAL 1)
CS1 (corresponds to NEI 99-01, CS1 / EAL 1)
CS2 (corresponds to NEI 99-01, CS2 / EAL 1)

Licensee states that NEI 99-01 criterion: "Loss of RCS inventory as indicated by RPV level less than the bottom ID of the RCS loop," was not considered since RVLMS will not monitor level below the bottom ID of the RCS loop. However, CA1 and CA2 Basis discussions state that RCS level indication ***may be lost*** below the bottom ID of the RCS loop, rather than is not available. If instrument design may allow for RPV level indication under certain conditions, then provide specific justification why criterion was not addressed, or provide proposed changes to comply with NEI 99-01 guidance.

ANO Response:

The EALs for CA1, CA2, and CS1 were changed to comply with NEI guidance considering the capabilities for reactor vessel level monitoring. The EALs for CS2 were combined and modified based on the inability to monitor reactor vessel level at either of the levels specified in NEI 99-01.

For IC CA2, the basis statement was changed to, "Below this level, RCS level indication will be lost and loss of suction to decay heat removal systems will occur."

The bases for CS1 and CS2 were also changed to reflect the capabilities for reactor vessel level monitoring.

The EALs for CS2 were revised to read as follows:

1. *Reactor vessel level cannot be monitored with core uncovery indicated by:*
   - *Containment High Range Radiation Monitor reading greater than 10 R/hr:*
   - *Erratic source range monitor indication*
   - *Core Exit Thermocouples indicate superheat*

EALs 1.b and 2.b of CS2 were combined. These EALs are identical in NEI 99-01 with the exception of the reactor vessel water levels required to meet their criteria dependent upon whether containment closure was established.

EALs 1.a and 2.a were deleted because, in Mode 6, neither unit at ANO has the capability to monitor reactor vessel water level below the bottom ID of the RCS loop. Combining the two EALs is appropriate and provides a distinction from CA2 in which the required NEI 99-01 RCS levels can be monitored.

15. <u>CA1 (corresponds to NEI 99-01, CA1 / Basis)</u>

Licensee incorrectly included discussion regarding refueling mode from CA2 Basis in CA1 Basis (3rd paragraph), rather than discussion on cold shutdown provided in NEI 99-01, CA1 Basis. Licensee Basis also incorrectly references CA2 and CS2 due to this error, and in 1st paragraph states "a loss of heat removal" versus NEI 99-01 discussion of "a loss of ability to adequately cool the core." Provide changes to licensee Basis to address cold shutdown guidance in NEI 99-01 CA1 Basis.

ANO Response:

The first paragraph of the CA1 basis was changed to reflect NEI 99-01 language. The third paragraph of the CA1 basis was changed to include the cold shutdown basis from NEI 99-01.

16. <u>CA3 (corresponds to NEI 99-01, CA3)</u>
<u>SS1 (corresponds to NEI 99-01, SS1)</u>

a. ICs for NEI 99-01, CA3 and SS1, state that "Loss of All Offsite Power and Loss of All Onsite Power to Essential Busses." Licensee defines "essential busses" as "required 4.16 KV busses" under CA3 IC and "vital 4.16 busses" under SS1 IC. Licensee also uses term "emergency busses" in CA1 EAL criterion, which is consistent with NEI 99-01 guidance, but uses the term "vital busses" in SS1 EAL criterion. Provide technical justification for inconsistency or proposed change to address inconsistent use of terminology.

ANO Response:

IC CA3 was re-worded to state "vital 4.16 KV busses."

IC EAL criteria were reworded to state "vital 4.16 KV busses."

16. **CA3** (corresponds to NEI 99-01, CA3)
SS1 (corresponds to NEI 99-01, SS1)

b. NEI 99-01 example EAL criterion for CA3 and SS1 are identical, with the exception of mode applicability, but licensee criteria under CA3 and SS1 are not consistent. Licensee criterion under SS1 would not allow credit for the restoration of offsite power to an essential bus, but only from an emergency diesel generator. Provide technical justification in Attachment 4 for deviation in interpretation of EAL criterion between licensee CA3 and SS1, and the apparent failure to address a restoration of offsite power to an essential bus within 15 minutes under SS1.

ANO Response:

The EALs for ICs CA3 and SS1 were revised to comply with NEI guidance.

17. **CS1 / EAL 2** (corresponds to NEI 99-01, CS1 / EAL 2.a)
CS2 / EAL 2 (corresponds to NEI 99-01, CS2 / EAL 2.a)
CG1 / EAL 2 (corresponds to NEI 99-01, CG1 / EAL 2.a)

Licensee does not address NEI 99-01 criterion: "(RPV inventory as indicated by) RPV level less than TOAF *[top of active fuel]*", based on justification that RVLMS will not monitor level below the bottom of ID of the RCS loop. Provide description and justification as a deviation to NEI 99-01 guidance vs. difference in Attachment 4.

ANO Response:

Please see the response to Question 14 which addresses ICs CS1 and CS2.

The EALs for CG1 were revised to comply with NEI guidance with the exception of EAL 2.a. This EAL is only applicable in Mode 5 since neither unit at ANO can monitor level at, or below, the TOAF in Mode 6. Attachment 4 has been changed to address this deviation.

18. CS2 (corresponds to NEI 99-01, CS2)

Licensee EAL 1.a criteria is not consistent with NEI 99-01 guidance, but rather duplicates that in NEI 99-01, CS2 / EALs 2.b, with the exception of source range monitor (SRM) and core exit thermocouple (CET) indication. In addition, the criterion "Reactor vessel level cannot be monitored for greater than 30 minutes", was inserted under licensee CS2 - EAL 1.b and 2.b; however, this criterion is not provided under NEI 99-01 CS2 example EALs or basis, nor are deviations adequately justified by licensee. Provide further technical justification for deviations in Attachment 4, or provide proposed change to comply with NEI 99-01 guidance.

ANO Response:

See the response to Question 14 which addresses IC CS2.

19. CS2 / EAL 2 (corresponds to NEI 99-01, CS2 / EAL 1.a & 2.b)
CG1 / EAL 2 (corresponds to NEI 99-01, CG1 / EAL 2.a)

a. NEI 99-01 guidance establishes "Containment High Range Radiation Monitor reading > [site-specific] setpoint" as a criterion as evidence that RPV level cannot be monitored with indication of core uncovery. Licensee does not consider this criterion because ANO's monitors have not been analyzed for this setpoint. However, the intent of this "site-specific" criterion is for the licensee to perform calculation which should be performed at TOAF with both Containment Closure established and not established configurations. Address site-specific Containment High Range Radiation Monitor setpoints (readings) in CS2 / CG1 criteria, or provide further technical justification in Attachment 4 why setpoint (reading) cannot be calculated per NEI 99-01 guidance.

ANO Response:

ANO selected 10 R/hr as the setpoint for this EAL because it is sufficiently above the expected normal shutdown reading to avoid an unnecessary entry into the EAL. 10 R/hr is also well below the containment radiation monitor alarm alert setpoint of 500 R/hr that would be indicative of fuel uncovery.

19. CS2 / EAL 2 (corresponds to NEI 99-01, CS2 / EAL 1.a & 2.b)
CG1 / EAL 2 (corresponds to NEI 99-01, CG1 / EAL 2.a)

b. Criterion, "RPV level cannot be monitored with indication of core uncovery", is not reflected in licensee criteria. Address NEI 99-01 statement "RPV level cannot be monitored with indication of core uncovery" in CS2 / CG1, or provide further justification in Attachment 4 why statement was not considered.

ANO Response:

See the response to Question 14 which addresses IC CS2.

See the response to Question 17 which addresses IC CG1.

20. **E-HU1** (corresponds to NEI 99-01, E-HU1)
E-HU2 (corresponds to NEI 99-01, E-HU2)

Mode applicability is considered "not applicable" per NEI 99-01 guidance, since classification based on an ISFSI / dry storage-related event is not tied to plant operating mode. Licensee chose to list all operating modes, including Defueling. Provide justification in Attachment 4 for deviation from NEI 99-01 guidance.

ANO Response:

Mode applicability was changed to "All" for human factoring concerns during the review of the EALs. Some reviewers believed that it was more appropriate to list all modes to preclude an operator from inferring that, since mode applicability was not applicable, an emergency class would not have to be declared.

Justification has been provided in Attachment 4.

21. **E-HU1 / EALs 1 & 2** (corresponds to NEI 99-01, E-HU1 / EALs 1 & 2)

Thresholds for natural phenomena and accident conditions established by the licensee appear to provide insufficient detail. Per NEI 99-01 Basis, the licensee needs to determine the magnitude or consequence of an event for classification purposes (e.g., high winds *resulting in a loss of shielding due to missile impact*, tornado resulting in a long-term loss of heat transfer due to blockage of air inlets, case drop *greater than X ft.*, etc.). In addition, EALs do not address a tipped-over cask or a seismic event as listed in NEI 99-01 E-HU1 Basis and licensee Basis. Provide specific thresholds for identified natural phenomena and accident conditions listed, based on description in licensee Basis. In addition, provide a listing of natural phenomena and accident conditions considered in the results of the ISFSI Safety Analysis Report (SAR) per NUREG-1536 or SAR referenced in the cask's Certification of Compliance and related NRC Safety Evaluation Report.

ANO response:

EALs 1 and 2 were revised to include specific thresholds for each of the accident conditions listed in the EALs.

22. **RCB4** (corresponds to NEI 99-01, Table 5-F-4:RCS Barrier Example EAL #4)

Indications for an RCS Barrier LOSS, based on Containment Radiation Monitoring, were omitted from EAL Matrix in Attachment 2, but are provided under EAL Basis (Attachment 3). Provide change to EAL Matrix to address inconsistency.

ANO Response:

The RCB4 criterion was added to the EAL Matrix (Attachment 2).

23. **Fission Product Barrier Degradation** (corresponds to NEI 99-01, Table 5-F-4: RCS Barrier Example EAL #5)

Provide discussion in Attachment 4 of evaluation performed to identify other site-specific indications of a loss or potential loss of the Fuel Clad Barrier per NEI 99-01 guidance.

ANO Response:

A team of Unit 1 and Unit 2 Operators reviewed the potential for other site-specific indications and determined that there were none applicable to ANO. Attachment 4 was revised accordingly.

24. **CNB1 - 2nd LOSS** (corresponds to NEI 99-01, Table 5-F-4: Containment Barrier Example EAL #2)

Licensee states, "Containment pressure not consistent with event response". This is inconsistent with NEI 99-01 criterion, which states "Containment pressure or sump level not consistent with LOCA conditions". Identify as a deviation and provide technical justification under Attachment 4, or provide proposed change to comply with NEI 99-01 guidance.

ANO Response:

The statement was changed to comply with NEI guidance.

25. **CNB1 - 1st POTENTIAL LOSS** (corresponds to NEI 99-01, Table 5-F-4: Containment Barrier Example EAL #2)

EAL criteria statement in Attachment 4 is worded, "Design pressure and increasing hydrogen concentration > 4%". This is inconsistent with licensee criteria established in EAL Matrix (Attachment 2) and EAL Basis (Attachment 3), which creates two separate criteria. Provide proposed change to Attachment 4 to address inconsistency.

ANO Response:

The format of Attachment 4 is to state the NEI 99-01 example EALs followed by the description of any ANO-specific differences or deviations.

The CNB1 example EAL in Attachment 4 was changed to match the NEI document.

26. **CNB1 - 2nd POTENTIAL LOSS** (corresponds to NEI 99-01, Table 5-F-4: Containment Barrier Example EAL #2)
CG1 - EAL 3 (corresponds to NEI 99-01, CG1-EAL 3)

a. NEI 99-01 guidance establishes criterion, "Explosive mixture exists", which, per the NEI 99-01 Basis, means a hydrogen and oxygen concentration of at least the lower deflagration limit curve exists. The licensee's criterion only states "Containment Hydrogen Concentration greater than 4%", and does not address oxygen component. Provide hydrogen and oxygen concentrations reflective of the lower deflagration limit for ANO1 and ANO 2 containment structures, or provide further technical justification why oxygen concentration is not applicable to ANO1 and 2.

ANO Response:

The EAL wording was revised to be consistent with NEI guidance.

26. **CNB1 - 2nd POTENTIAL LOSS** (corresponds to NEI 99-01, Table 5-F-4: Containment Barrier Example EAL #2)
CG1 - EAL 3 (corresponds to NEI 99-01, CG1-EAL 3)

b. Criteria identified for an "explosive mixture inside containment" under CG1 / EAL 3 is not consistent with threshold in CNB1. Provide proposed change to address inconsistency.

ANO Response:

The EAL criteria under CG1, EAL 3 and CNB1, 2nd potential loss were revised for consistency with NEI guidance and each other.

27. **CNB2 - POTENTIAL LOSS** (corresponds to NEI 99-01, Table 5-F-4: Containment Barrier Example EAL #3)

a. NEI 99-01 guidance defines a POTENTIAL LOSS as "core exit thermocouples in excess of 1200 degrees and restoration procedures not effective within 15 minutes." Licensee has revised NEI 99-01 statement for ANO-1 to state, "Significant ICC exists as evidenced by CETs indicating superheated conditions...", but does identify change as a deviation. Provide technical justification for deviation in Attachment 4, or provide proposed change for ANO-1 to comply with NEI 99-01 guidance.

ANO Response:

The Unit 1 setpoint was changed to match NEI guidance.

27. CNB2 - POTENTIAL LOSS (corresponds to NEI 99-01, Table 5-F-4: Containment Barrier Example EAL #3)

b. NEI 99-01 guidance also defines a POTENTIAL LOSS as "core exit thermocouples in excess of 700 degrees with reactor vessel level below top of active fuel and restoration procedures not effective within 15 minutes." Licensee states that this criterion is not considered since RVLMS is used as an indication of potential core uncovery only if core exit thermocouple (CET) indication is unavailable. Provide change to Attachment 4 to reflect a deviation from NEI 99-01 criteria, rather than a deviation.

ANO Response:

The Potential Loss EALs for CNB2 were revised for consistency with NEI guidance.

28. CNB3 - LOSS (corresponds to NEI 99-01, Table 5-F-4: Containment Barrier Example EAL #4, 1st criterion)

Licensee considers NEI 99-01 criterion, "RUPTURED S/G is also faulted outside of containment", as redundant, and therefore, does not address or provide further justification. However, NEI 99-01 Basis (3rd paragraph) acknowledges that "[u]sers should realize that the two "loss" EALs described above could be considered redundant," as a caution to licensees. Per NEI 99-01 Section 5.4, this criteria is defined as primary-to-secondary leakage of sufficient leakage to require or cause a scram and safety injection (RUPTURED) AND results in uncontrolled S/G pressure or S/G being drained completely. This differs from Containment Barrier Example EAL 4 (2nd criterion) which reflects a non-isolable (prolonged) release path to the environment from the affected S/G. Provide further technical justification for deviation in Attachment 4, or provide proposed change to comply with NEI 99-01 guidance.

ANO Response:

EAL CNB3 was revised to be consistent with NEI guidance.

29. CNB4 - LOSS (corresponds to NEI 99-01, Table 5-F-4: Containment Barrier Example EAL #5)

Licensee chose not to incorporate NEI 99-01 Basis discussion into CNB4 Basis. Describe rationale for the failure to address NEI 99-01 Basis guidance, or provide proposed change to address NEI 99-01 Basis guidance.

ANO Response:

The additional basis discussion from NEI 99-01 has been added.

30. CNB5 - POTENTIAL LOSS (corresponds to NEI 99-01, Table 5-F-4: Containment Barrier Example EAL #6)

Clarify in licensee Basis that containment high range radiation monitor reading of 4,000 R/hr corresponds to 20% fuel clad damage, or other site-specific analysis value, per the guidance in NEI 99-01 Basis.

ANO Response:

The first paragraph of the CNB5 basis was clarified to indicate that a reading of 4000 R/hr corresponds to ~20% fuel clad damage.

31. CNB6 (corresponds to NEI 99-01, Table 5-F-4: Containment Barrier Example EAL #7)

NEI 99-01 Basis states this EAL should cover other site-specific indications, including: area or ventilation monitors in containment annulus or other contiguous buildings that may unambiguously indicate a loss or potential loss of the containment barrier, or venting of containment per site emergency operating procedures. Provide rationale in Attachment 4 why these criteria are not considered applicable to ANO-1 and/or ANO-2 Containment structures, or include proposed wording to comply with NEI 99-01 Basis guidance.

ANO Response:

Elevated readings on the radiation monitors listed below were added to meet the intent of NEI guidance (Containment barrier example EAL #7).

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

These monitors will indicate a loss, or potential loss, of the containment barrier because they monitor the containment and areas contiguous to the containment.

32. CNB6 - POTENTIAL LOSS (corresponds to NEI 99-01, Table 5-F-4: Containment Barrier Example EAL #6 & 7)

Licensee chose to include "at least 20% fuel damage failure as determined from core damage assessment" as a POTENTIAL LOSS of containment, based on basis for CNB5 (Significant Radioactive Inventory in Containment). In CNB6 Basis, licensee justifies EAL by stating that "[r]egardless 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." Describe why the licensee believes that this concern is not adequately addressed under CNB5, based on containment radiation monitor readings, since this is intent as outlined in NEI 99-01 Table 5-F-4, Containment Barrier Example EAL 6 Basis.

ANO Response:

This EAL has been deleted.

33. HU1 / EAL 2 (corresponds to NEI 99-01, HU4 / EAL 2)

Licensee deleted the term "site-specific" from EAL wording and chose not to include the NEI Basis discussion, which states "Only the plant to which the specific threat is made need declare the Notification of an Unusual Event". Describe how EAL 2 would allow for the differentiation between a general (i.e., threat issues by State or region, or against company facilities / property) versus directed at station, since the "site-specific" criteria was deleted from EAL wording and basis. In addition, identify changes as deviations or differences and provide justification for further consideration, or provide proposed change to comply with NEI 99-01 guidance.

ANO Response:

The term "site-specific" has been added. The basis was also changed to include the NEI guidance, which states, "Only the plant to which the specific threat is made need declare the Notification of an Unusual Event."

34. HU5 / EAL 1 (corresponds to NEI 99-01, HU3 / EAL 1)

NEI 99-01 qualifier "...enter the site boundary area..." was replaced with "...enter normally occupied areas of the site". This interpretation is not consistent with NEI 99-01 guidance, which considers the impact of any toxic or flammable gases that have or could enter the site boundary, and not just occupied areas, on normal plant operations (as defined in Section 5.4 to NEI 99-01). The site boundary, as defined by the safety analysis report (SAR), should apply. Identify change as a deviation and provide justification in Attachment 1 for further consideration, or provide proposed change to comply with NEI 99-01 guidance.

ANO Response:

The EAL statement was changed to match the NEI 99-01 terminology.

35. HU6 / EAL 2 (corresponds to NEI 99-01, HU1 / EAL 2)

Please provide specific reference to SAR for Units 1 and 2 high winds design basis under Reference Document listing in Attachment 3 (Basis).

ANO Response:

The design wind speed for Unit 1 is 67 miles per hour as described in FSAR Section 5.1.5. The design wind speed for Unit 2 is 80 miles per hour as described in FSAR Section 3.3.1.

These references have been added to the EAL bases.

36. HU6 / EAL 6 (corresponds to NEI 99-01, HU1 / EAL 6)

Provide site-specific listing, as specified by NEI 99-01 guidance, of areas of the plant where uncontrolled flooding has the potential to affect safety-related equipment.

ANO Response:

EAL 6 of IC HU6 was revised to include a site-specific list.

37. HU6 / EALs 7 & 8 (corresponds to NEI 99-01, HU1 / EAL 7)

Describe technical basis for low and high lake water level and provide reference to basis under Reference Documents in Attachment 3 (Basis).

ANO Response:

Ground level at the ANO site is 354' mean sea level. When lake water level increases to 345', actions to protect against flooding are commenced. For EAL #7, declaring the NUE at this point will allow time for support personnel to respond.

The Circulating Water Pumps must be stopped when pump performance indicates a loss of suction. It is desirable to complete an RCS cooldown while the condenser is still available (circulating water pumps running). If lake level is forecasted to decrease to 334', an immediate plant shutdown at the maximum safe rate is performed. The required submergence for the Service Water Pumps makes it necessary to swap SW suction to the Emergency Cooling Pond at a bay level of 332'. EAL #8 is declared at 335' to allow some response time before commencing shutdown.

Actions for low or high lake level are contained in Unit 1 procedure 1203.025, "Natural Emergencies" and Unit 2 procedure 2203.008, "Natural Emergencies". These procedures are included as reference documents for IC HU6.

38. HU6 (corresponds to NEI 99-01, HU1 / EAL 7)

Describe whether the ANO site is subject to other site-specific phenomena, such as hurricanes, or subject to severe weather as defined in the NUMARC station blackout initiative (i.e., activation of severe weather mitigation procedures) per guidance in NEI 99-01 Basis. If applicable, include site-specific EALs.

ANO Response:

ANO is not subject to other site-specific natural phenomena (such as hurricanes) or subject to severe weather as defined in the NUMARC station blackout initiative. All natural phenomena are adequately covered by the EALs under HU6.

ANO included Lake Dardanelle level as the other site-specific occurrence that warrants an NUE declaration.

39. HA3 (corresponds to NEI 99-01, HA5 / EAL 1)

a. Provide justification in Attachment 4 for use of qualifier, "in progress", rather than "has been initiated" as stated in IC, or provide proposed change to comply with IC statement.

ANO Response:

HA3 has been changed to match the NEI guidance.

39. HA3 (corresponds to NEI 99-01, HA5 / EAL 1)

b. Provide site-specific procedure or equivalent objective measure in EAL criteria, which upon entering procedure, initiating specific procedural step or action, or reaching criteria, would reflect requirement for control room evacuation. Entry into this procedure, or meeting a designated procedural step or criterion, is used under licensee HS3 to determine whether control of plant was established outside the control room within 15 minutes.

ANO Response:

The EAL for HA3 has been changed to, "Entry into Alternate Shutdown procedure for Control Room evacuation" and the unit-specific procedures were listed.

40. HA4 / EAL 1 (corresponds to NEI 99-01, HA2 / EAL 1)

Licensee Basis does not include 1st paragraph from NEI 99-01 guidance providing basis for selection of site-specific areas. Describe the basis for the selection of Table H1 areas based on NEI 99-01 guidance (i.e., safe shutdown analysis, etc.).

ANO Response:

The following paragraph was added to the EAL Basis:

The areas listed are those containing functions and systems required for the safe shutdown of the plant. The list of areas was developed from the AOPs, EOPs, and the Safe Shutdown Analysis. This makes it easier to determine if the FIRE or EXPLOSION is potentially affecting one or more redundant trains of safety systems. Escalation to a higher emergency class, if appropriate, will be based on System Malfunction, Fission Product Barrier Degradation, Abnormal Rad Levels/Radiological Effluent, or SM/TSC Director/EOF Director Judgment EALs.

In addition, the list of areas from IC HU4 were added to the EAL.

41. HA5 / EAL 1 (corresponds to NEI 99-01, HA3 / EAL 1)

Licensee inserted the following qualifier in Basis: "Areas that require only temporary access that can be supported by the use of respiratory protection should not be considered as exceeding this threshold. However, this qualifier is not addressed under NEI 99-01 guidance. In addition, licensee fails to identify the addition of this qualifying Basis statement under Deviations in Attachment 4. Identify change as a deviation in Attachment 4 and provide justification for consideration, or provide proposed change to comply with NEI 99-01 guidance.

ANO Response:

The statement was removed.

42. HA6 / EAL 1 (corresponds to NEI 99-01, HA1 / EAL 1)

Provide description that supports the selection of 0.1g as indicative of an Operating Basis Earthquake (OBE) and provide reference to site-specific technical basis (i.e., SAR, etc.) in EAL Basis (Attachment 3).

ANO Response:

Unit 1 FSAR section 2.7.2 provides the value for the Operating Basis Earthquake (OBE) of 0.1g.

Unit 2 FSAR section 3.7.4.2 provides the value for the OBE of 0.1g.

References to the Unit 1 and Unit 2 FSAR are included in the EAL Basis.

43. HA6 / EAL 2 (corresponds to NEI 99-01, HA1 / EAL 2)

Licensee does not include the "Turbine Building", since it does not contain a vital area. Clarify whether damage to equipment in the turbine building due to high winds could cause, either directly or indirectly, damage to safety functions and systems required for the safe shutdown of the plant per NEI 99-01, HA1 Basis. If so, provide proposed change to comply with NEI 99-01 guidance to include the Turbine Building in Table H-2.

ANO Response:

EAL 2 was revised to include the Turbine Building.

44. HA6 / EAL 3 (corresponds to NEI 99-01, HA1 / EAL 3)

Licensee Basis contains statement, "If the crash is confirmed to affect a plant vital area, escalation to ALERT is appropriate"; however, this statement is applicable to licensee HU6 Basis rather than HA6 Basis per NEI 99-01 guidance. Provide justification for including statement in HA6 Basis, or provide proposed change.

ANO Response:

The statement was removed.

45. HA6 / EAL 4 (corresponds to NEI 99-01, HA1 / EAL 4)

Licensee references Table H-2 areas rather than developing a site-specific listing of areas containing safety functions and systems required for the safe shutdown of the plant. Provide justification in Attachment 4 for referencing Table H-2, or provide change identifying site-specific areas based on NEI 99-01 guidance to reflect areas that could realistically be impacted by turbine failure-generated missiles.

ANO Response:

EAL 4 was revised to identify the site-specific areas that could be affected by turbine failure-generated missiles.

46. HA6 / EAL 5 (corresponds to NEI 99-01, HA1 / EAL 5)

Provide justification in Attachment 4 for the failure to identify site-specific areas, per NEI 99-01 guidance, which include areas that contain systems required for safe shutdown of the plant, that are not designed to be wetted or submerged.

ANO Response:

EAL 5 was revised to include a site-specific list of areas in accordance with NEI guidance.

47. HA6 / EAL 6 (corresponds to NEI 99-01, HA1 / EAL 6)

Provide reference to technical basis (i.e., SAR, etc.) for ALERT classification based on low lake level and reference to technical basis(es) under EAL Basis (Attachment 3).

ANO Response:

See the response to Question 37 which describes the references for low lake level.

48. HS3 / EAL 1.b (corresponds to NEI 99-01, HS2 / EAL 1)

Provide justification in EAL Basis (Attachment 3), based on site-specific analysis or assessments per NEI 99-01 guidance, as to how quickly control must be re-established to ensure that core uncovery and/or core damage will not occur with the 15 minute time threshold established.

ANO Response:

According to the ANO Safe Shutdown Capability Assessment, there are no actions required to prevent core uncovery and/or core damage that must be completed in less than 15 minutes.

49. SU1 / EAL 1 (corresponds to NEI 99-01, SU1 / EAL 1)

Under the Basis, the licensee has chosen to include a discussion, which states that "...failure of the offsite power sources results in a loss of RCPs..." Intent of NEI 99-01 guidance is to reflect a prolonged loss of offsite power, and is not intended to consider the loss of specific station loads. Provide further clarification whether Basis statement, included by licensee, would preclude classification of event based on the loss of offsite power if specific station loads were not lost. If so, provide further technical justification for deviation or proposed change to comply with NEI 99-01 guidance.

ANO Response:

The basis statement was removed.

50. **SU3 / EAL 1** (corresponds to NEI 99-01, SU3-EAL 1)

a. Provide description of deviation in Attachment 4 and technical justification for further evaluation as a deviation to NEI 99-01 guidance for the use of "50% of Control Room annunciators" for Unit 1, versus the definition of "most" as 75% per NEI 99-01 SU3 Basis, or provide proposed change to comply with NEI 99-01 guidance.

ANO Response:

SU3, EAL 1 was changed to reflect NEI guidance. Also, the unit specific differences were removed.

50. **SU3 / EAL 1** (corresponds to NEI 99-01, SU3-EAL 1)

b. Provide a description of the number of Control Room annunciator panels in Unit 2 (ANO-2) and what systems / functions (in general terms) are provided on each panel. In addition, describe how the loss of 9 panels in Unit 2 (ANO-2) constitutes a loss of most (75%) of annunciators, or provide proposed change to comply with NEI 99-01 wording.

ANO Response:

SU3, EAL 1 was revised to remove the references to a specific number of annunciator panels for Unit 2.

50. **SU3 / EAL 1** (corresponds to NEI 99-01, SU3-EAL 1)

c. Licensee has chosen to insert the qualifier "Loss of AC and DC" as reason for annunciator loss. Provide justification in Attachment 4 for including qualifier. In addition, clarify whether 50% of annunciators (Unit 1) or 9 annunciator panels (Unit 2) would be lost based on a loss of AC or DC, rather than stated loss of AC and DC.

ANO Response:

The qualifier "Loss of AC and DC" was removed.

51. **SU8 / EAL 1** (corresponds to NEI 99-01, SU8 / EAL 2)
CU8 / EAL 1 (corresponds to NEI 99-01, CU8 / EAL 2)

a. Describe in Basis (Attachment 3) the rational for Unit 1 (ANO-1) and Unit 2 (ANO-2) EAL thresholds established by licensee in SU8 / EAL 1.

ANO Response:

The EALs for ICs CU8 and SU8 were revised to match NEI 99-01 guidance.

51. **SU8 / EAL 1** (corresponds to NEI 99-01, SU8 / EAL 2)
CU8 / EAL 1 (corresponds to NEI 99-01, CU8 / EAL 2)

b. Provide justification in Attachment 4 for inclusion of site-specific thresholds for inadvertent criticality in SU8 (Modes 3 / 4), but not under CU8 (Modes 5 / 6), or provide proposed change to address inconsistency.

ANO Response:

See the response to Question 51.a. which addresses ICs CU8 and SU8.

52. **SA2 / EAL 1** (corresponds to NEI 99-01, SA2 / EAL 1)

a. Licensee has revised EAL wording in EAL Basis (Attachment 3) to include qualifier "...and a successful manual trip ***or DSS trip*** occurred," which is not consistent with NEI 99-01 guidance. Define "DDS trip" and provide technical justification for deviation in Attachment 4.

ANO Response:

The phrase "or DSS trip occurred" was removed.

52. **SA2 / EAL 1** (corresponds to NEI 99-01, SA2 / EAL 1)

b. Addition of qualifier, "...and a successful manual trip ***or DSS trip*** occurred," is not consistent with the criterion contained in EAL Matrix (Attachment 2) for SA2 / EAL 1. Provide proposed change to address inconsistency between EAL Matrix and Basis.

ANO response:

The phrase "or DSS trip occurred" was removed.

53. **SA2 / EAL 1** (corresponds to NEI 99-01, SA2 / EAL 1)

Under examples of what constitutes a "manual trip", licensee inserted example: "de-energizing rod drive mechanism". Clarify that, based on NEI 99-01 guidance, the rod drive mechanism(s) can be de-energized from main control rod panels, and does not require action in other adjacent Control Room auxiliary (side or back) panels (i.e., pulling fuses) or actions outside of control room, which are not to be considered under a manual scram. Provide justification for including "de-energizing rod drive mechanism" in Attachment 4, or provide proposed changes to eliminate if action(s) cannot be performed from the main control rod panels.

ANO Response:

The phrase "de-energizing rod drive mechanisms" was removed.

The following statement was added to the basis: *"Any action taken to trip the reactor from any location other than panel C03 (Unit 1) or 2C03 (Unit 2) constitutes a failure of the manual trip function."* This statement clarifies that, to be successful for this EAL, the reactor must be tripped from either panel C03 (Unit 1) or 2C03 (Unit 2). These panels are the "reactor control console" referred to in NEI 99-01.

54. **SA4 / EAL 1** (corresponds to NEI 99-01, SA4 / EAL 1)

a. Provide proposed change to define what constitutes a loss of most or all indicators, consistent with licensee's SU3-EAL 2, or identify as a deviation and provide technical justification in Attachment 4 for further consideration.

ANO Response:

The EALs for SA4 and SU3 were revised for consistency with NEI guidance.

54. **SA4 / EAL 1** (corresponds to NEI 99-01, SA4 / EAL 1)

b. Licensee uses term "Plant Transient", which is defined differently than a "Significant Transient" per Sections 4.34 and 4.39, and NEI 99-01, Section 5.4. Intent of providing definition of a "significant transient" in NEI 99-01 was to provide consistency across Industry. Identify as deviation and provide technical justification in Attachment 4 supporting change from NEI 99-01 guidance regarding a "Significant Transient", or provide proposed change to comply with NEI 99-01 guidance.

ANO Response:

The IC and EALs for SA4 were revised to include "SIGNIFICANT TRANSIENT" in accordance with NEI guidance and Section 4.39.

55. **SS3 / EAL 1** (corresponds to NEI 99-01, SS3 / EAL 1)
CU7 / EAL 1 (corresponds to NEI 99-01, CU7 / EAL 1)

Provide justification in Attachment 4 for inclusion of unit-specific busses in SS3 (Modes 1–> 4), but not in CU7 (Modes 5 / 6), or provide proposed change to address inconsistency.

ANO Response:

The unit specific busses were removed from EAL 1 of IC SS3.

56. **SS4 / EAL 1** (corresponds to NEI 99-01, SS4 / EAL 1)

While not required per NEI 99-01 guidance, licensee has chosen to insert specific system availability to provide core cooling and heat sink. Describe basis in Attachment 4 for the selection of Criteria 1.a, 1.b and 1.c.

ANO Response:

EAL 1 was revised for consistency with NEI guidance.

57. SS6 (corresponds to NEI 99-01, SS6)

a. Licensee uses term "Transient" in IC and EAL 1.d, which is not consistent with the use of "Plant Transient" by licensee in SA4 or the use of term "Significant Transient" under NEI 99-01 guidance. Identify as deviation in Attachment 4 and provide technical justification supporting change from NEI 99-01 guidance and inconsistency with SA4, or provide proposed change to comply with NEI 99-01 guidance.

ANO Response:

The wording of the IC and EAL 1.d. were revised for consistency with NEI guidance.

57. SS6 (corresponds to NEI 99-01, SS6)

b. NEI 99-01, SS6 / EAL 1.c states that "Indications needed to monitor (site-specific) safety functions are unavailable". However, licensee SS6 / EAL 1.c has established a threshold of a "loss of 75% of indicators associated with safety systems." This is not consistent with NEI 99-01 guidance, which is intended to reflect that indication is not available to monitor a listing of site-specific safety functions, rather than a percent loss of total indicators. Identify as a deviation in Attachment 4 and provide justification supporting changes, or provide proposed changes to comply with NEI 99-01 guidance.

ANO Response:

EAL 1.c. was revised to include the functions of reactivity control, core cooling, RCS integrity, and containment integrity.

58. SG2 (corresponds to NEI 99-01, SG2)

a. NEI 99-01, SG2 Basis for EAL 1.a states that "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 the reactor vessel water level is below the top of active fuel." This definition is consistent with that contained in licensee SG2 Basis (3rd paragraph). However, licensee EAL 1.a states "Outside Region 1 of EOP Figure 4" (Unit1) or "CET average temperature greater than 700F" (Unit 2), but does not identify deviation in Attachment 4 and provide technical justification. Provide proposed changes to identify and justify deviations or to comply with NEI 99-01 guidance.

ANO Response:

The EALs for IC SG2 were revised for consistency with NEI guidance.

58. SG2 (corresponds to NEI 99-01, SG2)

b. Describe in Attachment 4 the correlation and technical basis between the thresholds indicating heat removal is extremely challenged (EAL 1.b), with the NEI 99-01 Basis guidance of "emergency feedwater flow is insufficient to remove the amount of heat required by design from at least one steam generator."

ANO Response:

EAL 1.b. was revised to include the design EFW flow rates that are sufficient to remove the heat from one steam generator.

Attachment 2

0CAN120405

Proposed Emergency Plan Pages – Changes Incorporated

The following Table D-1 is the new EAL Index that will be replacing the current Tables D-1 and D-2 in the ANO Emergency Plan during implementation of the NEI EALs. Tables D-1 and D-2 (ANO Emergency Plan, Revision 31) that will be replaced by the new EAL index is included in this document.

TABLE D-1

Index of Emergency Action Levels

Abnormal Rad Levels/Radiological Effluent	
AG1	Offsite dose resulting from an actual or imminent release of gaseous radioactivity exceeds 1000 mR TEDE or 5000 mR child thyroid CDE for the actual or projected duration of the release using actual meteorology
AS1	Offsite dose resulting from an actual or imminent release of gaseous radioactivity exceeds 100 mR TEDE or 500 mR child thyroid CDE for the actual or projected duration of the release
AA1	Any UNPLANNED release of gaseous or liquid radioactivity to the environment exceeds 200 times the radiological effluent ODCM limits for 15 minutes or longer
AA2	Damage to irradiated fuel or loss of water level that has or will result in the uncovering of irradiated fuel outside the reactor vessel
AA3	Release of radioactive material or elevated radiation levels within the facility that impede operation of systems required to maintain safe operations or to establish or maintain cold shutdown
AU1	Any UNPLANNED release of gaseous or liquid radioactivity to the environment that exceeds two times the radiological effluent ODCM limits for 60 minutes or longer
AU2	Unexpected rise in plant radiation
Cold Shutdown/Refueling System Malfunction	
CG1	Loss of reactor vessel inventory affecting fuel clad integrity with containment challenged with irradiated fuel in the reactor vessel
CS1	Loss of reactor vessel inventory affecting core decay heat removal capability
CS2	Loss of reactor vessel inventory affecting core decay heat removal capability with irradiated fuel in the reactor vessel
CA1	Loss of RCS inventory
CA2	Loss of reactor vessel inventory with irradiated fuel in the reactor vessel
CA4	Inability to maintain plant in cold shutdown with irradiated fuel in the reactor vessel
CA5	Loss of all offsite power and loss of all onsite AC power to required 4.16KV busses
CU1	RCS leakage
CU2	UNPLANNED loss of RCS inventory with irradiated fuel in the reactor vessel
CU3	UNPLANNED loss of decay heat removal capability with irradiated fuel in the reactor vessel
CU4	Fuel clad degradation
CU5	Loss of all offsite power to vital busses for greater than 15 minutes
CU6	UNPLANNED loss of required DC power for greater than 15 minutes
CU7	Inadvertent criticality
CU8	UNPLANNED loss of all onsite or offsite communications capabilities

TABLE D-1 (Continued)

Index of Emergency Action Levels

Events Related to ISFSI Malfunction	
E-HU1	Damage to a loaded cask CONFINEMENT BOUNDARY
E-HU2	Confirmed security event with potential loss of level of safety of the ISFSI
Fission Product Barrier Degradation	
FG1	Loss of ANY two barriers AND loss or potential loss of third barrier
FS1	Loss or potential loss of ANY two barriers
FA1	ANY loss or ANY potential loss of EITHER fuel clad OR RCS
FU1	ANY loss or ANY potential loss of containment
Hazards and Other Conditions Affecting Plant Safety	
HG1	Security event resulting in loss of physical control of the facility
HG2	Other conditions exist which in the judgment of the SM/TSC Director/EOF Director warrant declaration of General Emergency
HS1	Confirmed security event in a plant VITAL AREA
HS2	Other conditions exist which in the judgment of the SM/TSC Director/EOF Director warrant declaration of Site Area Emergency
HS3	Control Room evacuation has been initiated and plant control cannot be established
HA1	Confirmed security event within a plant PROTECTED AREA
HA2	Other conditions exist which in the judgment of the SM/TSC Director/EOF Director warrant declaration of an Alert
HA3	Control Room evacuation has been initiated
HA4	FIRE or EXPLOSION affecting the operability of plant safety systems required to establish or maintain safe shutdown
HA5	Release of toxic or flammable gases within or adjacent to a VITAL AREA which jeopardizes operation of systems required to establish or maintain safe shutdown
HA6	Natural and destructive phenomena affecting the plant VITAL AREA
HU1	Confirmed security event which indicates a potential degradation in the level of safety of the plant
HU2	Other conditions exist which in the judgment of the SM/TSC Director/EOF Director warrant declaration of an NUE
HU4	FIRE within PROTECTED AREA boundary not extinguished within 15 minutes of detection
HU5	Release of toxic or flammable gases deemed detrimental to normal operation of the plant
HU6	Natural and destructive phenomena affecting the PROTECTED AREA

TABLE D-1 (Continued)

Index of Emergency Action Levels

System Malfunction	
SG1	Prolonged loss of all offsite power and prolonged loss of all onsite AC power to vital 4.16KV busses
SG2	Failure of the Reactor Protection System to complete an automatic trip and manual trip was NOT successful and there is indication of an extreme challenge to the ability to cool the core
SS1	Loss of all offsite power and loss of all onsite AC power to vital 4.16KV busses
SS3	Failure of Reactor Protection System instrumentation to complete or initiate an automatic reactor trip once a Reactor Protection System setpoint has been exceeded and manual trip was NOT successful
SS4	Loss of all vital DC power
SS5	Complete loss of heat removal capability
SS6	Inability to monitor a TRANSIENT in progress
SA1	AC power capability to vital 4.16KV busses reduced to a single power source for greater than 15 minutes such that any additional single failure would result in station blackout
SA3	Failure of Reactor Protection System instrumentation to complete or initiate an automatic reactor trip once a Reactor Protection System setpoint has been exceeded and manual trip was successful
SA6	UNPLANNED loss of most or all safety system annunciation or indication in control room with either (1) a PLANT TRANSIENT in progress, or (2) SPDS and PMS dynamic alarm functions are unavailable
SU1	Loss of all offsite power to vital 4.16KV busses for greater than 15 minutes
SU6	UNPLANNED loss of most or all safety system annunciation or indication in the control room for greater than 15 minutes
SU7	RCS leakage
SU8	UNPLANNED loss of all onsite or offsite communications capabilities
SU9	Fuel clad degradation
SU10	Inadvertent criticality
SU11	Inability to reach required shutdown within Technical Specification limits

TABLE D-1

UNIT ONE EMERGENCY CLASS INITIATING CONDITIONS

NOTIFICATION OF UNUSUAL EVENT

1. PRIMARY SYSTEM EVENTS

a) RCS activity indicates >0.1% fuel cladding failure.

2. REACTOR COOLANT SYSTEM LEAKAGE

a) RCS leakage > 10 gpm unidentified or RCS Pressure Boundary leakage or > 25 gpm identified RCS leakage

3. SECONDARY SYSTEM EVENTS

a) Uncontrolled OTSG depressurization resulting in MSLI actuation.

b) OTSG Tube Leakage ≥ Tech. Spec. Limits

4. ELECTRICAL POWER FAILURES

a) Degraded power

5. RADIOLOGICAL EFFLUENTS

a) Projected or measured activity at the site boundary, averaged over one hour, is greater than or equal to .05 mrem/hr TEDE or .15 mrem/hr Child Thyroid CDE or liquid radiological effluents exceed ODCM limits.

6. SAFETY SYSTEM FUNCTION

a) Deviation from Technical Specification action statement when required to shutdown or cooldown or deviations pursuant to 10CFR50.54(x).

b) Loss of dose assessment capabilities.

c) Loss of communications.

TABLE D-1 (Continued)

7. HAZARDS TO STATION OPERATIONS

a) Security threat onsite but outside the Protected Area Security Fence (e.g. attempted entry or sabotage which has been stopped outside the security fence).

b) Fire or explosion onsite.

c) Aircraft crash, unusual aircraft activity, train derailment, turbine failure, toxic or flammable gas release.

8. NATURAL EVENTS

a) Tornado, flood, loss of Dardanelle Reservoir, earthquake.

9. MISCELLANEOUS EVENTS

a) Other plant conditions exist that warrant increased awareness on the part of the operating staff and state and/or local offsite authorities or involve other than a normal controlled shutdown.

TABLE D-1 (Continued)

ALERT

1. PRIMARY SYSTEM EVENTS

   a) RCS activity indicates >1% fuel cladding failure.

2. REACTOR COOLANT SYSTEM LEAKAGE

   a) RCS leakage > normal makeup capacity (50gpm).

3. SECONDARY SYSTEM EVENTS

   a) OTSG tube leakage > 10 gpm concurrent with ongoing steam release or loss of offsite power.

4. ELECTRICAL POWER FAILURES

   a) Station Blackout.

   b) Loss of all vital DC power.

5. RADIOLOGICAL EFFLUENTS

   a) Projected or measured activity at the site boundary, averaged over one hour, is greater than or equal to .5 mrem/hr TEDE or 1.5 mrem/hr Child Thyroid CDE or liquid radiological effluents exceed 10 times ODCM limits.

   b) High radiation/airborne levels.

6. SAFETY SYSTEM FUNCTION

   a) RPS failure to complete an automatic trip.

   b) Loss of control room annunciators.

   c) Control Room evacuation.

   d) Loss of decay heat removal capabilities.

TABLE D-1 (Continued)

7. HAZARDS TO STATION OPERATION

a) Ongoing security threat within the Protected Area Security Fence but outside of plant buildings.

b) Fire or explosion onsite affecting one train of any ES system.

c) Aircraft crash, missiles, toxic or flammable gas affecting one train of any ES system.

8. NATURAL EVENTS

a) Tornado, high winds, flood, loss of Dardanelle Reservoir, earthquake.

9. MISCELLANEOUS EVENTS

a) Other plant conditions exist that warrant precautionary activation of the Technical Support Center and placing the near-site Emergency Operations Facility and other key emergency personnel on stand-by.

~~**TABLE D-1** (Continued)~~

~~SITE AREA EMERGENCY~~

~~1. PRIMARY SYSTEM EVENTS~~

~~a) Core damage indicated with an inadequate core cooling condition.~~

~~b) Containment radiation readings which indicate LOCA and >1% fuel cladding failure.~~

~~2. REACTOR COOLANT SYSTEM LEAKAGE~~

~~a) RCS leakage > normal makeup capacity (50gpm) with >1.0% fuel cladding failure~~

~~b) RCS leakage > HPI capacity.~~

~~3. SECONDARY SYSTEM EVENTS~~

~~a) OTSG tube rupture with primary to secondary leakage >normal makeup capacity (50gpm) with ongoing steam release or loss of offsite power.~~

~~b) OTSG tube leak > 1 gpm with > 1% fuel cladding failure with ongoing steam release.~~

~~4. ELECTRICAL POWER FAILURES~~

~~a) Blackout for more than 15 minutes.~~

~~b) Loss of all vital DC power for more than 15 minutes.~~

~~5. RADIOLOGICAL EFFLUENTS~~

~~a) Radiological effluents are greater than or equal to 50 mrem/hr TEDE or 150 mrem/hr Child Thyroid CDE at the Site Boundary.~~

~~b) Spent fuel accident.~~

TABLE D-1 (Continued)

6. SAFETY SYSTEM FUNCTION

a) RPS failure to complete a manual trip.

b) Loss of Control Room annunciators with a transient in progress.

c) Control room evacuation and control of shutdown systems not established in 15 minutes.

d) Degraded hot shutdown capability.

7. HAZARDS TO STATION OPERATION

a) Ongoing security threat within plant buildings but not within the Control Room or vital areas.

b) Fire or explosion onsite affecting both trains of any ES system.

c) Aircraft crash, missiles, toxic or flammable gas affecting both trains of any ES system.

8. NATURAL EVENTS

a) Tornado, high winds, flood, loss of Dardanelle Reservoir, earthquake

9. MISCELLANEOUS EVENTS

a. Other plant conditions exist that warrant activation of emergency response facilities and monitoring teams or a precautionary notification to the public near the site.

~~**TABLE D-1** (Continued)~~

~~GENERAL EMERGENCY~~

~~1. PRIMARY SYSTEM EVENTS~~

~~a) Containment radiation readings which indicate LOCA and >50% fuel overheat.~~
~~b) Core melt.~~
~~c) Loss of or challenge to all three fission product barriers.~~

~~2. REACTOR COOLANT SYSTEM LEAKAGE~~

~~N/A~~

~~3. SECONDARY SYSTEM EVENTS~~

~~N/A~~

~~4. ELECTRICAL POWER FAILURES~~

~~N/A~~

~~5. RADIOLOGICAL EFFLUENTS~~

~~a) Radiological effluents are greater than or equal to 250 mrem/hr TEDE or 500 mrem/hr Child Thyroid CDE at the site boundary.~~

~~6. SAFETY SYSTEM FUNCTION~~

~~N/A~~

~~7. HAZARDS TO STATION OPERATION~~

~~a) Ongoing security threat within the Control Room or vital areas.~~

TABLE D-1 (Continued)

8. NATURAL EVENTS

N/A

9. MISCELLANEOUS EVENTS

a) Plant conditions exist that make release of large amounts of radioactivity possible.

~~TABLE D-2~~

~~UNIT TWO EMERGENCY CLASS INITIATING CONDITIONS~~

~~NOTIFICATION OF UNUSUAL EVENT~~

~~1. PRIMARY SYSTEM EVENTS~~

~~a) RCS activity indicates >0.1% fuel cladding failure~~

~~2. REACTOR COOLANT SYSTEM LEAKAGE~~

~~a) RCS leakage > 10 gpm unidentified or RCS Pressure Boundary leakage or > 25 gpm identified RCS leakage~~

~~3. SECONDARY SYSTEM EVENTS~~

~~a) Uncontrolled S/G depressurization resulting in MSIS actuation.~~

~~b) S/G tube leak > Tech. Spec. Limits~~

~~4. ELECTRICAL POWER FAILURES~~

~~a) Degraded power~~

~~5. RADIOLOGICAL EFFLUENTS~~

~~a) Projected or measured activity at the site boundary, averaged over one hour, is greater than or equal to .05 mrem/hr TEDE or .15 mrem/hr Child Thyroid CDE or liquid radiological effluents exceed ODCM limits.~~

~~6. SAFETY SYSTEM FUNCTION~~

~~a) Deviation from Technical Specification action statements when required to shutdown or cooldown or deviations pursuant to 10CFR50.54(x).~~

~~b) Loss of dose assessment capabilities.~~

~~c) Loss of communications.~~

TABLE D-2 (Continued)

7. HAZARDS TO STATION OPERATION

a) Security threat onsite but outside the Protected Area Security Fence (e.g. attempted entry or sabotage which has been stopped outside the security fence).

b) Fire or explosion onsite.

c) Aircraft crash, unusual aircraft activity, train derailment, turbine failure, toxic or flammable gas.

8. NATURAL EVENTS

a) Tornado, flood, loss of Dardanelle Reservoir, earthquake.

9. MISCELLANEOUS EVENTS

a) Other plant conditions exist that warrant increased awareness on the part of the operating staff and state and/or local offsite authorities or involve other than a normal controlled shutdown.

~~**TABLE D-2** (Continued)~~

~~ALERT~~

~~1. PRIMARY SYSTEM EVENTS~~

~~a) RCS activity indicates >1% fuel cladding failure~~

~~2. REACTOR COOLANT SYSTEM LEAKAGE~~

~~a) RCS leakage > 44 gpm.~~

~~3. SECONDARY SYSTEM EVENTS~~

~~a) S/G Tube Leak > 10 gpm with an ongoing steam release~~

~~4. ELECTRICAL POWER FAILURES~~

~~a) Station Blackout.~~

~~b) Loss of all vital DC.~~

~~5. RADIOLOGICAL EFFLUENTS~~

~~a) Projected or measured activity at the site boundary, averaged over one hour, is greater than or equal to .5 mrem/hr TEDE or 1.5 mrem/hr Child Thyroid CDE or liquid radiological effluents exceed 10 times ODCM limits.~~

~~b) High radiation/airborne levels.~~

~~6. SAFETY SYSTEM FUNCTION~~

~~a) RPS failure to complete an automatic trip.~~

~~b) Control Room evacuation.~~

~~c) Loss of decay heat removal capabilities.~~

~~d) Loss of Control Room Annunciators.~~

TABLE D-2 (Continued)

7. HAZARDS TO STATION OPERATION

a) Ongoing security threat within the Protected Area Security Fence but outside of plant buildings.

b) Fire or explosion onsite affecting one train of ESF systems.

c) Aircraft crash, missiles, toxic or flammable gas affecting one train of ESF systems.

8. NATURAL EVENTS

a) Tornado, high winds, flood, loss of Dardanelle Reservoir, earthquake.

9. MISCELLANEOUS EVENTS

a) Other plant conditions exist that warrant precautionary activation of the Technical Support Center and placing the near site Emergency Operations Facility and other key emergency personnel on standby.

~~**TABLE D-2** (Continued)~~

~~SITE AREA EMERGENCY~~

~~1. PRIMARY SYSTEM EVENTS~~

~~a) Core damage indicated with an inadequate core cooling condition.~~

~~b) Containment radiation readings which indicate LOCA and >1% fuel cladding failure.~~

~~2. REACTOR COOLANT SYSTEM LEAKAGE~~

~~a) RCS leakage > 44 gpm with ICC conditions.~~

~~3. SECONDARY SYSTEM EVENTS~~

~~a) S/G tube rupture >44 gpm with an ongoing steam release and RCS Activity >1.0 μCi/gm, but < 378 μCi/gm (1% fuel cladding failure).~~

~~4. ELECTRICAL POWER FAILURES~~

~~a) Blackout > 15 minutes.~~

~~b) Loss of ALL vital DC for > 15 minutes.~~

~~5. RADIOLOGICAL EFFLUENTS~~

~~a) Radiological effluents are greater than or equal to 50 mrem/hr TEDE or 150 mrem/hr Child Thyroid CDE at the site boundary.~~

~~b) Spent fuel accident.~~

TABLE D-2 (Continued)

6. SAFETY SYSTEM FUNCTION

a) RPS failure to complete a manual trip.

b) Control room evacuation and control of shutdown systems not established in 15 minutes.

c) Loss of both S/Gs as a heat removal method.

d) Loss of Control Room annunciators with a transient in progress.

7. HAZARDS TO STATION OPERATION

a) Ongoing security threat within plant buildings but not within the Control Room or vital areas.

b) Fire or explosion onsite affecting both trains of ESF Systems.

c) Aircraft crash, missiles, toxic or flammable gas affecting both redundant ESF trains.

8. NATURAL EVENTS

a) Tornado, high winds, flood, loss of Dardanelle Reservoir, earthquake.

9. MISCELLANEOUS EVENTS

a) Other plant conditions exist that warrant activation of the emergency response facilities and monitoring teams or a precautionary notification to the public near the site.

TABLE D-2 (Continued)

GENERAL EMERGENCY

1. PRIMARY SYSTEM EVENTS

a) Containment radiation readings which indicate LOCA and >50% fuel overheat.

b) Core melt with Containment Integrity Lost or Challenged.

c) Loss of or challenge to all three fission product barriers.

2. REACTOR COOLANT SYSTEM LEAKAGE

N/A

3. SECONDARY SYSTEM EVENTS

N/A

4. ELECTRICAL POWER FAILURES

N/A

5. RADIOLOGICAL EFFLUENTS

a) Radiological effluents are greater than or equal to 250 mrem/hr TEDE or 500 mrem/hr Child Thyroid CDE at the Site Boundary.

6. SAFETY SYSTEM FUNCTION

N/A

7. HAZARDS TO STATION OPERATION

a) Ongoing security threat within the Control Room or vital areas.

TABLE D-2 (Continued)

8. NATURAL EVENTS

N/A

9. MISCELLANEOUS EVENTS

Plant conditions exist that make release of large amount of radioactivity possible.

Attachment 3

0CAN120405

Proposed EALs – To be Incorporated in Procedure

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT

ABNORMAL RADIATION LEVELS/EFFLUENT RELEASES

Radiological Effluents

AG1 Offsite dose resulting from an actual or imminent release of gaseous radioactivity exceeds 1000 mR TEDE or 5000 mR child thyroid CDE for the actual or projected duration of the release using actual meteorology

1 2 3 4 5 6 D

Emergency Action Level(s):

Note: If dose assessment results are available at the time of declaration, the classification should be based on EAL #2 instead of EAL #1. While necessary declarations should not be delayed awaiting results, the dose assessment should be initiated/completed in order to more accurately characterize the nature of the release.

1. VALID reading on Channel 9 of one or more of the following radiation monitors that exceeds or is expected to exceed the reading shown for 15 minutes or longer:

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 Bldg.	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 more than one hour; or analyses of field survey samples indicate child thyroid CDE of 5000 mR for one hour of inhalation, at or beyond site boundary.

AS1 Offsite dose resulting from an actual or imminent release of gaseous radioactivity exceeds 100 mR TEDE or 500 mR child thyroid CDE for the actual or projected duration of the release

1 2 3 4 5 6 D

Emergency Action Level(s):

Note: If dose assessment results are available at the time of declaration, the classification should be based on EAL #2 instead of EAL #1. While necessary declarations should not be delayed awaiting results, the dose assessment should be initiated/completed in order to determine if the classification should be subsequently escalated.

1. VALID reading on Channel 9 of one or more of the following radiation monitors that exceeds or is expected to exceed 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.

OR

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

AA1 Any UNPLANNED release of gaseous or liquid radioactivity to the environment exceeds 200 times the ODCM limits for ≥ 15 minutes

1 2 3 4 5 6 D

Emergency Action Level(s):

Note: If monitor reading is sustained for the time period indicated in the EAL AND the required assessments using procedure calculations cannot be completed within this period, declaration must be made based on the valid radiation monitor reading.

1. VALID reading on any effluent monitor that exceeds 200 times the alarm setpoint established by a current release permit for ≥ 15 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 Monitoring System
2RE-2330	BMS Liquid Discharge Monitor
2RE-4423	Radwaste Liquid Discharge Monitor

OR

2. VALID reading on Channel 7 of one or more of the following radiation monitors that exceeds 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

3. Confirmed grab sample analyses for gaseous or liquid releases indicates concentrations or release rates, with a release duration of ≥ 15 minutes, in excess of 200 times the applicable values of the ODCM.

OR

4. RDACS data indicating ALERT.

AU1 Any UNPLANNED release of gaseous or liquid radioactivity to the environment that exceeds two times the ODCM limits for ≥ 60 minutes

1 2 3 4 5 6 D

Emergency Action Level(s):

Note: If monitor reading is sustained for the time period indicated in the EAL AND the required assessments using procedure calculations cannot be completed within this period, declaration must be made based on the valid radiation monitor reading.

1. VALID reading on any effluent monitor that exceeds two 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 Monitoring System
2RE-2330	BMS Liquid Discharge Monitor
2RE-4423	Radwaste Liquid Discharge Monitor

OR

2. VALID reading on Channel 7 of one or more of the following radiation monitors that exceeds 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

3. Confirmed grab sample analyses for gaseous or liquid releases indicates concentrations or release rates, with a release duration of ≥ 60 minutes, in excess of two times the applicable values of the ODCM.

OR

4. RDACS data indicating NUE.

Plant Modes (white boxes indicate applicable modes) 1 Power Operation 2 Startup 3 Hot Standby 4 Hot Shutdown 5 Cold Shutdown 6 Refueling D Defueled

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
ABNORMAL RADIATION LEVELS/EFFLUENT RELEASES			

Abnormal Radiation Levels

AA2 Damage to irradiated fuel or loss of water level that has or will result in the uncovering of irradiated fuel outside the reactor vessel [1][2][3][4][5][6][D]

Emergency Action Level(s):

1. A VALID alarm on one or more of the following 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-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.

OR

2. VALID indication of uncontrolled water level drop in the refueling canal or spent fuel pool such that irradiated fuel will become uncovered.

AU2 Unexpected rise in plant radiation [1][2][3][4][5][6][D]

Emergency Action Level(s):

1. a. VALID indication of uncontrolled water level drop in the refueling canal or spent fuel pool with all irradiated fuel assemblies remaining covered by water.

AND

b. Unplanned 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 rise by a factor of 1000 over normal levels (highest reading in the past twenty-four hours excluding the current peak value).

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT

ABNORMAL RADIATION LEVELS/EFFLUENT RELEASES

Abnormal Radiation Levels

AA3 *Release of radioactive material* [1][2][3][4][5][6][D] or elevated radiation levels within the facility that impede operation of systems required to maintain safe operations or to establish or maintain cold shutdown

Emergency Action Level(s):

1. VALID radiation readings in the Control Room as indicted by the following:
   - > 15 mR/hr (RE-8001)

   OR
2. VALID radiation readings > 10 R/hr on any of the following monitors:

Unit 1	
RI-8004	317' Outside Stairway
RI-8005	354' Sample Room Vestibule
RI-8006	354' Radiochemistry Lab
RI-8007	354' Outside Stairway
RI-8011	335' Outside Stairway
RI-8010	386' CA Area
Unit 2	
2RITS-8900	317' General Area
2RITS-8901	335' Coolant Charging Pumps Area
2RITS-8902	335' 2F-3 Hallway
2RITS-8903	354' Volume Control Tank Access Area
2RITS-8910	386' Emergency Chiller Hallway
2RITS-8914	404' Spent Fuel Pool Cask Washdown Area
2RITS-8917	354' Hot Lab Sample Room

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION			

Loss of Reactor Coolant System Inventory

CG1 Loss of RCS inventory affecting fuel clad integrity with containment challenged with irradiated fuel in the reactor vessel [5][6]

Emergency Action Level(s):

1. Loss of RCS inventory as indicated by unexplained Reactor Building Sump, Reactor Drain Tank, Quench Tank, Aux. Building Equipment Drain Tank, or Aux. Building Sump level rise.

   AND

2. Reactor vessel level:

   a. (MODE 5 ONLY) less than the top of active fuel for > 30 minutes:
   Unit 1: RVLMS Levels 1 through 9 indicate DRY
   Unit 2: RVLMS Levels 1 through 7 indicate DRY

   OR

   b. Cannot be monitored with indication of core uncovery for > 30 minutes as evidenced by one or more of the following:

   - Containment High Range Radiation Monitor reading >10 R/hr
   - Erratic source range monitor indication
   - Core exit thermocouples indicate superheat

   AND

3. CONTAINMENT is challenged as indicated by one or more of the following:

   - Explosive mixture exists in containment.
   - Containment pressure with CONTAINMENT INTEGRITY established is:
     Unit 1: > 59 psig
     Unit 2: > 73.7 psia
   - CONTAINMENT CLOSURE not established

CS1 Loss of RCS inventory affecting core decay heat removal capability [5]

Emergency Action Level(s):

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

   a. RCS inventory as indicated by:

   Unit 1: RVLMS Levels 1 through 9 indicate DRY
   Unit 2: RVLMS Levels 1 through 6 indicate DRY

   OR

   b. Reactor vessel level cannot be monitored for > 30 minutes with a loss of RCS inventory as indicated by unexplained Reactor Building Sump, Reactor Drain Tank, Quench Tank, Aux. Building Equipment Drain Tank, or Aux. Building Sump level rise.

   OR

2. With CONTAINMENT CLOSURE established:

   a. RCS inventory as indicated by:

   Unit 1: RLVMS Levels 1 through 9 indicate DRY
   Unit 2: RVLMS Levels 1 through 7 indicate DRY

   OR

   b. Reactor vessel level cannot be monitored for > 30 minutes with a loss of RCS inventory as indicated by either:

   - Unexplained Reactor Building Sump, Reactor Drain Tank, Quench Tank, Aux. Building Equipment Drain Tank, or Aux. Building Sump level rise
   - Erratic source range monitor indication

CA1 Loss of RCS inventory [5]

Emergency Action Level(s):

1. Loss of RCS inventory as indicated by:

   Unit 1: RVLMS Levels 1 through 8 indicate DRY
   Unit 2: RVLMS Levels 1 through 5 indicate DRY

   OR

2. a. Loss of RCS inventory as indicated by unexplained Reactor Building Sump, Reactor Drain Tank, Aux. Building Equipment Drain Tank, Aux. Building Sump, or Quench Tank level rise.

   AND

   b. Reactor vessel level cannot be monitored for > 15 minutes.

CU1 RCS leakage [5]

Emergency Action Level(s):

1. Unidentified or pressure boundary leakage > 10 gpm.

   OR

2. *Identified leakage > 25 gpm.*

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION			
Loss of Reactor Coolant System Inventory		**CS2** Loss of RCS inventory affecting core decay heat removal capability with irradiated fuel in the reactor vessel [6] **Emergency Action Level(s):** 1. Reactor vessel level cannot be monitored with core uncovery indicated by one or more of the following: • Containment High Range Radiation Monitor reading > 10 R/hr • Erratic source range monitor indication • Core Exit Thermocouples indicate superheat	**CA2** Loss of RCS inventory with irradiated fuel in the reactor vessel [6] **Emergency Action Level(s):** 1. Loss of RCS inventory as indicated by: **Unit 1:** Reactor vessel level < 368 ft., 0 in. **Unit 2:** Reactor vessel level < 369 ft., 1.5 in. **OR** 2. a. Loss of RCS inventory as indicated by unexplained Reactor Building Sump, Reactor Drain Tank, Aux. Building Equipment Drain Tank, Aux. Building Sump, or Quench Tank level rise. **AND** b. Reactor vessel level cannot be monitored for > 15 minutes.	**CU2** UNPLANNED loss of RCS inventory with irradiated fuel in the reactor vessel [6] **Emergency Action Level(s):** 1. UNPLANNED reactor vessel level drop below the reactor vessel flange for ≥ 15 minutes. **OR** 2. a. Loss of RCS inventory as indicated by unexplained Reactor Building Sump, Reactor Drain Tank, Aux. Building Equipment Drain Tank, Aux. Building Sump, or Quench Tank level rise. **AND** b. Reactor vessel level cannot be monitored.

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION			
Loss of Decay Heat Removal		**CA3** Inability to maintain plant in cold shutdown with irradiated fuel in the reactor vessel [5][6] **Emergency Action Level(s):** 1. With CONTAINMENT CLOSURE **and** RCS integrity not established, an UNPLANNED event results in RCS temperature exceeding 200°F. **OR** 2. With CONTAINMENT CLOSURE established AND either RCS integrity not established or RCS inventory reduced, an UNPLANNED event results in RCS temperature exceeding 200°F for > 20 minutes[1]. **OR** 3. An UNPLANNED event results in RCS temperature exceeding 200°F for > 60 minutes[1] or results in an RCS pressure rise of > 10 psi. [1]*Note: **IF** decay heat removal system (Decay Heat or Shutdown Cooling) is in operation within this time frame **AND** RCS temperature is being reduced, **THEN** this EAL is not applicable.*	**CU3** UNPLANNED loss of decay heat removal capability with irradiated fuel in the reactor vessel [5][6] **Emergency Action Level(s):** 1. An UNPLANNED event results in RCS temperature exceeding 200°F. **OR** 2. Loss of all RCS temperature and reactor vessel level indication for > 15 minutes.

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION			
Fuel Clad Degradation			**CU4** Fuel clad degradation [1][.][.][.][5][6] **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. **OR** 2. RCS sample activity indicates fuel clad degradation > Technical Specification allowable limits. **Unit 1:** > 3.50 µCi/gm IDE > 72/Ē µCi/gm Gross Activity **Unit 2:** > 1.0 µCi/gm IDE > 100/Ē µCi/gm Gross Activity
Loss of AC Power		**CA5** Loss of all offsite power and loss of all onsite AC power to Vital 4.16KV busses [1][.][.][.][5][6][0] **Emergency Action Level(s):** 1. a. Loss of power to all Unit Auxiliary and Startup Transformers. **AND** b. Failure of all Diesel Generators to supply power to Vital 4.16 KV busses. **AND** c. Failure to restore power to at least one Vital 4.16 KV bus within 15 minutes from the time of loss of both offsite and onsite AC power.	**CU5** Loss of all offsite power to vital 4.16 KV busses for > 15 minutes [1][.][.][.][5][6] **Emergency Action Level(s):** 1. a. Loss of power to all Unit Auxiliary and Startup Transformers for > 15 minutes. **AND** b. At least one Vital 4.16 KV bus powered from an independent diesel generator.

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION			
Loss of DC Power			**CU6** UNPLANNED loss of required DC power for > 15 minutes [ ][ ][ ][5][6] **Emergency Action Level(s):** 1. a. UNPLANNED loss of vital DC power to required DC busses based on bus voltage < 105 volts. **AND** b. Failure to restore power to at least one required DC bus within 15 minutes from the time of loss.
Inadvertent Criticality			**CU7** Inadvertent criticality [ ][ ][ ][5][6] **Emergency Action Level(s):** 1. An UNPLANNED sustained positive startup rate observed on nuclear instrumentation.

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION			
Loss of Communications			***CU8*** *UNPLANNED loss of all onsite or offsite communications capabilities* [ ][ ][ ][5][6][ ] **Emergency Action Level(s):** 1. Loss of all onsite communications capability (Table C1) affecting the ability to perform routine operations. **Table C1** **Onsite Communications Equipment** Station radio system Plant paging system In-plant telephones Gaitronics **OR** 2. Loss of all offsite communications capability (Table C2). **Table C2** **Offsite Communications Equipment** All telephone lines (commercial and microwave) Station radio system ENS

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
ISFSI MALFUNCTION			
Cask Damage			**E-HU1** Damage to a loaded cask CONFINEMENT BOUNDARY [1][2][3][4][5][6][D] **Emergency Action Level(s):** 1. Natural phenomena events affecting a loaded cask CONFINEMENT BOUNDARY: a. *Tornado/High winds resulting in:* • Missile impact causing a loss of shielding • Blockage of air inlets for > 24 hours **OR** b. Flooding resulting in blockage of air inlets for > 24 hours. **OR** c. Seismic event resulting in cask tip-over causing a loss of shielding. **OR** 2. Accident conditions affecting a loaded cask CONFINEMENT BOUNDARY: a. Cask drop of > 11 inches **OR** b. Blockage of air inlets for > 24 hours **OR** c. Fire or explosion resulting in a loss of shielding **OR** d. Cask tip-over causing a loss of shielding 3. Any condition in the opinion of the SM/TSC Director/EOF Director that indicates loss of loaded fuel storage cask CONFINEMENT BOUNDARY.
Security Event			**E-HU2** Confirmed security event with potential loss of level of safety of the ISFSI [1][2][3][4][5][6][D] **Emergency Action Level(s):** 1. Security event as determined from the ANO Safeguards Contingency Plan and reported by ANO Security shift supervision.

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
FISSION PRODUCT BARRIER DEGRADATION			
Barriers	**FG1** Loss of ANY two barriers AND loss or potential loss of third barrier 1 2 3 4	**FS1** Loss or potential loss of ANY two barriers 1 2 3 4	**FA1** ANY loss or ANY potential loss of EITHER fuel clad or RCS 1 2 3 4	**FU1** ANY loss or ANY potential loss of containment. 1 2 3 4

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 an event or multiple events could occur which result in the conclusion that exceeding the loss or potential loss thresholds is imminent (i.e., within 2 hours). In this imminent loss situation use judgment and classify as if the thresholds 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)**	
Coolant Activity > 300 µCi/gm dose equivalent I-131 activity by Chemistry sample. **OR** Radiation levels > 1000 MR/hr **Unit 1:** at SA-229 **Unit 2:** at 2TCD-19	None	RCS leakage > 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:** RCS leakage exceeding normal makeup capacity (50 gpm) **Unit 2:** RCS leakage exceeding the capacity of one charging pump in the normal charging mode (44 gpm)	Rapid unexplained containment pressure loss following initial rise **OR** Containment pressure or sump level not consistent with LOCA conditions	**Unit 1:** 73.7 PSIA (59 PSIG) and rising **Unit 2:** 73.7 PSIA and rising **OR** An explosive mixture exists in Containment **OR** Containment Pressure > containment spray actuation setpoint with less than one full train of spray operating **Unit 1:** 44.7 PSIA (30 PSIG) **Unit 2:** 23.3 PSIA

Plant Modes (white boxes indicate applicable modes) 1 Power Operation 2 Startup 3 Hot Standby 4 Hot Shutdown 5 Cold Shutdown 6 Refueling D Defueled

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 Thermocouples (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 radiation monitor reading > 100 R/hr	None	1. RUPTURED steam generator is also FAULTED outside Containment **OR** 2. Primary-to-secondary leakrate > 10 gpm with nonisolable steam release from affected steam generator to the environment	None
4. Containment Radiation Monitoring (FCB4)		**4. SM/TSC Director/EOF Director Judgment (RCB4)**		**4. Containment Isolation Valve Status After Containment Isolation (CNB4)**	
Containment high range rad monitor reading > 1000 R/hr.	None	Any condition in the opinion of the SM/TSC Director/EOF Director that indicates Loss or Potential Loss of the RCS barrier based on: • Imminent barrier degradation (within 2 hours) due to degraded safety system performance • Degraded ability to monitor barrier		Unisolable breach of containment with a direct release path to the environment following containment isolation actuation	None
5. Core Damage Assessment (FCB5)				**5. Significant Radioactive Inventory in Containment (CNB5)**	
At least 5% fuel clad damage as determined from core damage assessment	None			None	Containment high range rad monitor reading > 4000 R/hr

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

<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"><u>6. SM/TSC Director/EOF Director Judgment (FCB6)</u></td><td colspan="2"></td><td colspan="2"><u>6. Other Indications (CNB6)</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 fuel clad barrier based on:

• Imminent barrier degradation (within 2 hours) due to degraded safety system performance
• Degraded ability to monitor 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>Aux. Building Extension</td></tr></table></td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td colspan="2"><u>7. Emergency Director Judgment (CNB7)</u></td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><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 based on:

• Imminent barrier degradation (within 2 hours) due to degraded safety system performance
• Degraded ability to monitor barrier</td></tr>
</table>

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
HAZARDS AND OTHER CONDITIONS				
Security	**HG1** Security event resulting in loss of physical control of the facility [1][2][3][4][5][6][D] **Emergency Action Level(s):** 1. A HOSTILE FORCE has taken control of plant equipment such that plant personnel are unable to operate equipment required to maintain safety functions.	**HS1** Confirmed security event in a plant VITAL AREA [1][2][3][4][5][6][D] **Emergency Action Level(s):** 1. INTRUSION into the plant VITAL AREA by a HOSTILE FORCE. **OR** Other security events as determined from the ANO Safeguards Contingency Plan and reported by ANO Security shift supervision.	**HA1** Confirmed security event within a plant PROTECTED AREA [1][2][3][4][5][6][D] **Emergency Action Level(s):** 1. INTRUSION into the plant PROTECTED AREA by a HOSTILE FORCE. **OR** Other security events as determined from the ANO Safeguards Contingency Plan and reported by ANO Security shift supervision.	**HU1** Confirmed security event which indicates a potential degradation in the level of safety of the plant [1][2][3][4][5][6][D] **Emergency Action Level(s):** 1. Security events as determined from the ANO Safeguards Contingency Plan and reported by ANO Security shift supervision. **OR** 2. A credible site-specific security threat notification.
Discretionary	**HG2** Other conditions exist which in the judgment of the SM/TSC Director/EOF Director warrant declaration of General Emergency [1][2][3][4][5][6][D] **Emergency Action Level(s):** 1. Other conditions exist which in the judgment of the SM/TSC Director/EOF Director indicate that events are in process or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.	**HS2** Other conditions exist which in the judgment of the SM/TSC Director/EOF Director warrant declaration of Site Area Emergency [1][2][3][4][5][6][D] Emergency Action Level(s) 1. Other conditions exist which in the judgment of the SM/TSC Director/EOF Director indicate that events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public. Any releases are not expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the site boundary.	**HA2** Other conditions exist which in the judgment of the SM/TSC Director/EOF Director warrant declaration of an Alert [1][2][3][4][5][6][D] **Emergency Action Level(s):** 1. Other conditions exist which in the judgment of the SM/TSC Director/EOF Director indicate that events are in process or have occurred which involve actual or likely potential substantial degradation of the level of safety of the plant. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.	**HU2** Other conditions exist which in the judgment of the SM/TSC Director/EOF Director warrant declaration of an NUE [1][2][3][4][5][6][D] **Emergency Action Level(s):** 1. Other conditions exist which in the judgment of the SM/TSC Director/EOF Director indicate that events are in process or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.
Control Room Evacuation		**HS3** Control Room evacuation has been initiated and plant control cannot be established [1][2][3][4][5][6][D] **Emergency Action Level(s):** 1. a. Control Room evacuation has been initiated. **AND** b. Control of the plant cannot be established per the following procedures within 15 minutes: **Unit 1:** 1203.002, "Alternate Shutdown" **Unit 2:** 2203.014, "Alternate Shutdown"	**HA3** Control Room evacuation has been initiated [1][2][3][4][5][6][D] **Emergency Action Level(s):** Entry into Alternate Shutdown procedure for Control Room evacuation: **Unit 1:** 1203.002, "Alternate Shutdown" **Unit 2:** 2203.014, "Alternate Shutdown"	

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
HAZARDS AND OTHER CONDITIONS			

Fire

HA4 FIRE or EXPLOSION affecting the operability of plant safety systems required to establish or maintain safe shutdown [1][2][3][4][5][6][D]

Emergency Action Level(s):

1. *FIRE or EXPLOSION in any* **Table H1** *areas.*

   AND

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

HU4 FIRE within PROTECTED AREA boundary not extinguished within 15 minutes of detection [1][2][3][4][5][6][D]

Emergency Action Level(s):

1. FIRE in **Table H1** buildings or areas contiguous to *any* **Table H1** *areas not extinguished within 15* minutes of Control Room notification or verification of a Control Room alarm.

Table H1

Unit 1	Unit 2
CA-1 & HP Office Area	2A-3 Room
Condensate Demineralizer Room	2A-4, 2D-02, & East Battery Room
Corridor 98	2B-53 Room
Fire Area C	2B-63 Room
LNEPR	2B9/2B10 Room
LSEER/ Air Compressor Room	2Y11/13 Equipment Room
LSEPR	Aux Bldg 317' General Access
LSPPR	Aux Bldg 335'
MSIV Room	Aux Bldg 354'
North ES Switchgear Room (A-4)	B ESF Room
South ES Switchgear Room	Corridor Behind Door 340
Turbine Building • A1, A2, H1, H2 Swgr area • 354' Bowling Alley north end west of BA comp room • 368' West Heater Deck from LSEER (orange door) along east wall of ES Swgr Rooms to Corridor 98 door.	Turbine Bldg • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north SWGR Room (2A3) and East of LNEPR
UNEPR/Hot Tool Room/Decon Room	Intake Structure 354' or 366'
USEPR	LNEPR
USPPR	LSEPR
	MG Set Room
	Steam Pipe Area
	Hot Machine Shop
	UNEPR
	UNPPR, LNPPR
	USPPR

Toxic Gas

HA5 Release of toxic or flammable gases within or contiguous to a VITAL AREA which jeopardizes operation of systems required to establish or maintain safe shutdown [1][2][3][4][5][6][D]

Emergency Action Level(s):

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

   OR

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

HU5 Release of toxic or flammable gases deemed detrimental to normal operation of the plant [1][2][3][4][5][6][D]

Emergency Action Level(s):

1. Report or detection of toxic or flammable gases that has or could enter the site area boundary in amounts that can 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.

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
HAZARDS AND OTHER CONDITIONS			

Natural Events

Table H1

Unit 1	Unit 2
CA-1 & HP Office Area	2A-3 Room
Condensate Demineralizer Room	2A-4, 2D-02, & East Battery Room
Corridor 98	2B-53 Room
Fire Area C	2B-63 Room
LNEPR	2B9/2B10 Room
LSEER/ Air Compressor Room	2Y11/13 Equipment Room
LSEPR	Aux Bldg 317' General Access
LSPPR	Aux Bldg 335'
MSIV Room	Aux Bldg 354'
North ES Switchgear Room (A-4)	B ESF Room
South ES Switchgear Room	Corridor Behind Door 340
Turbine Building • A1, A2, H1, H2 Swgr area • 354' Bowling Alley north end west of BA comp room • 368' West Heater Deck from LSEER (orange door) along east wall of ES Swgr Rooms to Corridor 98 door.	Turbine Bldg • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north SWGR Room (2A3) and East of LNEPR
UNEPR/Hot Tool Room/Decon Room	Intake Structure 354' or 366'
USEPR	LNEPR
USPPR	LSEPR
	MG Set Room
	Steam Pipe Area
	Hot Machine Shop
	UNEPR
	UNPPR, LNPPR
	USPPR

HA6 Natural and destructive phenomena affecting the plant VITAL AREA [1][2][3][4][5][6][D]

Emergency Action Level(s):

1. An earthquake is felt and the 0.1g acceleration alarm annunciates indicating an Operating Basis Earthquake has occurred.

   OR

2. Tornado or high winds > 67 mph within PROTECTED AREA boundary resulting in VISIBLE DAMAGE to any of the following plant structures/ equipment or Control Room indication of degraded performance of those systems:
   - Reactor Building
   - Intake Structure
   - Ultimate Heat Sink
   - BWST/RWT
   - Auxiliary Building
   - Turbine Building
   - QCST
   - Control Room
   - Startup Transformers
   - Diesel Fuel Vault

   OR

3. Vehicle crash within PROTECTED AREA boundary and resulting in VISIBLE DAMAGE to any of the following plant structures or equipment therein or Control Room indication of degraded performance of those systems:
   - Reactor Building
   - Intake Structure
   - Ultimate Heat Sink
   - BWST/RWT
   - Auxiliary Building
   - Turbine Building
   - QCST
   - Control Room
   - Startup Transformers
   - Diesel Fuel Vault

   OR

Continued on next page

HU6 Natural and destructive phenomena affecting the PROTECTED AREA [1][2][3][4][5][6][D]

Emergency Action Level(s):

1. An earthquake is felt and the 0.01g acceleration alarm annunciates indicating an earthquake has occurred.

   OR

2. Report by plant personnel of tornado or high winds > 67 mph striking within PROTECTED AREA boundary.

   OR

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

   OR

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

   OR

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

   OR

6. Uncontrolled flooding in Table H1 areas that has the potential to affect safety related equipment needed for the current operating mode.

   OR

7. Lake Dardanelle level > 345 feet.

   OR

8. Lake Dardanelle level < 335 feet.

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT

HAZARDS AND OTHER CONDITIONS

Natural Events

Table H1

Unit 1	Unit 2
CA-1 & HP Office Area	2A-3 Room
Condensate Demineralizer Room	2A-4, 2D-02, & East Battery Room
Corridor 98	2B-53 Room
Fire Area C	2B-63 Room
LNEPR	2B9/2B10 Room
LSEER/ Air Compressor Room	2Y11/13 Equipment Room
LSEPR	Aux Bldg 317' General Access
LSPPR	Aux Bldg 335'
MSIV Room	Aux Bldg 354'
North ES Switchgear Room (A-4)	B ESF Room
South ES Switchgear Room	Corridor Behind Door 340
Turbine Building • A1, A2, H1, H2 Swgr area • 354' Bowling Alley north end west of BA comp room • 368' West Heater Deck from LSEER (orange door) along east wall of ES Swgr Rooms to Corridor 98 door.	Turbine Bldg • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north SWGR Room (2A3) and East of LNEPR
UNEPR/Hot Tool Room/Decon Room	Intake Structure 354' or 366'
USEPR	LNEPR
USPPR	LSEPR
	MG Set Room
	Steam Pipe Area
	Hot Machine Shop
	UNEPR
	UNPPR, LNPPR
	USPPR

HA6 Natural and destructive phenomena affecting the plant VITAL AREA (cont'd) [1] [2] [3] [4] [5] [6] [D]

Emergency Action Level(s):

4. Turbine failure-generated missiles resulting in VISIBLE DAMAGE to or penetration of any of the following plant areas:
   - Turbine Building
   - Auxiliary Building
   - Reactor Building
   - Diesel Fuel Vault
   - Startup Transformers

   OR

5. Uncontrolled flooding in Table H1 areas that results in degraded safety system performance as indicated in the Control Room or that creates industrial safety hazards (e.g., electric shock) that precludes access necessary to operate or monitor safety equipment:

   OR

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

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SYSTEM MALFUNCTION			
Loss of AC Power	**SG1** Prolonged loss of all offsite power and prolonged loss of all onsite AC power to Vital 4.16 KV busses [1][2][3][4] **Emergency Action Level(s):** 1. Loss of power to all Unit Auxiliary and Startup transformers on a unit. **AND** Failure of all Diesel Generators to supply power to Vital 4.16 KV busses. **AND** Either of the following: (a **OR** b) a. Restoration of at least one Vital 4.16 KV bus within four (4) hours is not likely **OR** b. **FA1** entry conditions met	**SS1** Loss of all offsite power and loss of all onsite AC power to Vital 4.16 KV busses [1][2][3][4] **Emergency Action Level(s):** 1. Loss of power to all Unit Auxiliary and Startup transformers. **AND** Failure of all diesel generators to supply power to Vital 4.16 KV busses. **AND** Failure to restore power to at least one Vital 4.16 KV bus within 15 minutes from the loss of both offsite and onsite AC power	**SA1** AC power capability to Vital 4.16 KV busses reduced to a single power source for > 15 minutes such that any additional single failure would result in station blackout [1][2][3][4] **Emergency Action Level(s):** 1. AC power capability to Vital 4.16 KV busses reduced to a single power source for > 15 minutes. **AND** Any additional single failure will result in station blackout.	**SU1** Loss of all offsite power to Vital 4.16 KV busses for > 15 minutes [1][2][3][4] **Emergency Action Level(s):** 1. Loss of power to all Unit Auxiliary and Startup Transformers for > 15 minutes. **AND** At least one Vital 4.16 KV bus powered from an independent diesel generator.

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SYSTEM MALFUNCTION			
Failure of Reactor Protection System **SG3** *Failure of the Reactor Protection System to complete an automatic trip and manual trip was NOT successful and there is indication of an extreme challenge to the ability to cool the core* [1][2] **Emergency Action Level(s):** 1. Indications exist that automatic and manual trips were NOT successful. **AND** Either of the following: (a or b) a. Indication(s) exists that core cooling is extremely challenged: • CETs indicate ≥ 1200°F **OR** • RVLMS indicates: **Unit 1:** Levels 1 through 9 DRY **Unit 2:** Levels 1 through 7 DRY **OR** b. Indication(s) exist that heat removal is extremely challenged based on feedwater flow rate being less than: **Unit 1:** 430 gpm **Unit 2:** 485 gpm	**SS3** *Failure of Reactor Protection System Instrumentation to complete or initiate an automatic reactor trip once a Reactor Protection System setpoint has been exceeded and manual trip was NOT successful* [1][2] **Emergency Action Level(s):** 1. Indication(s) exist that automatic and manual trips were not successful.	**SA3** *Failure of Reactor Protection System Instrumentation to complete or initiate an automatic reactor trip once a Reactor Protection System setpoint has been exceeded and manual trip was successful* [1][2][3] **Emergency Action Level(s):** 1. Indication(s) exist that indicate that reactor protection system setpoint was exceeded and automatic trip did not occur, and a successful manual trip occurred	
Loss of DC Power	**SS4** Loss of all vital DC power [1][2][3][4] **Emergency Action Level(s):** 1. Loss of ALL Vital DC power based on bus voltage < 105 volts for > 15 minutes.		

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SYSTEM MALFUNCTION			
Loss of Heat Removal	**SS5** Complete loss of heat removal capability [1][2][3][4] **Emergency Action Level(s):** 1. Loss of core cooling and heat sink.		
Loss of Annunciators	**SS6** Inability to monitor a SIGNIFICANT TRANSIENT in progress [1][2][3][4] **Emergency Action Level(s):** 1. a. Loss of ≥ 75% of annunciators associated with safety systems. **AND** b. Compensatory non-alarming indications are unavailable. **AND** c. Indications needed to monitor safety functions (reactivity control, core cooling, RCS integrity, or containment integrity) are unavailable. **AND** d. A SIGNIFICANT TRANSIENT in progress.	**SA6** UNPLANNED loss of most or all safety system annunciation or indication in Control Room with either (1) a SIGNIFICANT TRANSIENT in progress, or (2) SPDS and PMS dynamic alarm functions are unavailable [1][2][3][4] **Emergency Action Level(s):** 1. UNPLANNED loss of most or all annunciators or indicators associated with safety systems for > 15 minutes. **AND** Either of the following: a. A SIGNIFICANT TRANSIENT is in progress. **OR** b. Compensatory non-alarming indications are unavailable.	**SU6** UNPLANNED loss of most or all safety system annunciation or indication in the Control Room for > 15 minutes [1][2][3][4] **Emergency Action Level(s):** 1. UNPLANNED loss of most or all annunciators or indicators associated with safety systems for > 15 minutes.
RCS Leakage			**SU7** RCS leakage [1][2][3][4] **Emergency Action Level(s):** 1. Unidentified or pressure boundary leakage > 10 gpm. **OR** 2. Identified leakage > 25 gpm.

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SYSTEM MALFUNCTION			
Loss of Communications			**SU8** UNPLANNED loss of all onsite or offsite communications capabilities [1][2][3][4]

Emergency Action Level(s):

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

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

OR

2. Loss of all offsite communications capability (Table M2).

Table M2 Offsite Communications Equipment
All telephone lines (commercial and microwave)
Station radio system
ENS

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SYSTEM MALFUNCTION			
Fuel Clad Degradation			[1][2][3][4] **SU9** 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 counts per minute. 2. RCS sample activity value indicating fuel clad degradation > Technical Specification allowable limits. **Unit 1:** RCS Sample Analysis: > 3.50 µCi/gm IDE RCS Sample Analysis: > 72/Ē µCi/gm Gross Activity **Unit 2:** RCS Sample Analysis: > 1.0 µCi/gm IDE RCS Sample Analysis: > 100/Ē µCi/gm Gross Activity
Inadvertent Criticality			[3][4] **SU10** Inadvertent criticality **Emergency Action Level(s):** 1. An UNPLANNED sustained positive startup rate observed on nuclear instrumentation
Failure to Shut Down			[1][2][3][4] **SU11** Inability to reach required shutdown within Technical Specification limits **Emergency Action Level(s):** 1. Plant is not brought to required operating mode within Technical Specifications LCO action statement time.

Plant Modes (white boxes indicate applicable modes) [1] Power Operation [2] Startup [3] Hot Standby [4] Hot Shutdown [5] Cold Shutdown [6] Refueling [D] Defueled

Attachment 4

0CAN120405

Proposed EAL Bases – To be Incorporated in Procedure

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AU1

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

Any UNPLANNED release of gaseous or liquid radioactivity to the environment that exceeds two times the ODCM limits for ≥ 60 minutes

Operating Mode Applicability:

All

Emergency Action Level(s): (1 OR 2 OR 3 OR 4)

Note: If monitor reading is sustained for the time period indicated in the EAL AND the required assessments using procedure calculations cannot be completed within this period, declaration must be made based on the valid radiation monitor reading.

1. VALID reading on any effluent monitor that exceeds two 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 Monitoring System
2RE-2330	BMS Liquid Discharge Monitor
2RE-4423	Radwaste Liquid Discharge Monitor

OR

2. VALID reading on Channel 7 of one or more of the following radiation monitors that exceeds 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

(Continued on next page)

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT (AU1)

3. Confirmed grab sample analyses for gaseous or liquid releases indicates concentrations or release rates, with a release duration of ≥ 60 minutes, in excess of two times the applicable values of the ODCM.

   OR

4. RDACS data indicating NUE.

Basis:

This IC addresses a potential or actual 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. These controls are located in the Offsite Dose Calculation Manual (ODCM). The occurrence of extended, uncontrolled radioactive releases to the environment is indicative of 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.

The ODCM contains the site specific release limits and appropriate surveillance requirements which normally monitor these limits. The 60 minute time period allows sufficient time to isolate any release after exceeding ODCM limits. Releases continuing for more than 60 minutes represent inability to isolate or control the release.

"UNPLANNED", as used in this context, includes any release for which a liquid waste release or a gaseous waste release discharge permit was not prepared, or a release that exceeds the conditions (e.g., minimum dilution flow, maximum discharge flow, alarm set points, etc.) on the applicable release permit. Unplanned releases in excess of two times of the ODCM limit that continue for 60 minutes or longer represent an uncontrolled situation and a potential degradation in the level of safety of the plant. The SM/TSC Director/EOF Director should not wait until 60 minutes has elapsed, but should declare the event as soon as it is determined that the release duration has or will likely exceed 60 minutes. Also, if an ongoing release is detected and the starting time for that release is unknown, the SM/TSC Director/EOF Director should, in the absence of data to the contrary, assume that the release has exceeded 60 minutes.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT (AU1)

EAL #1 addresses radioactivity releases, that for whatever reason, cause effluent radiation monitor readings to exceed two times the alarm setpoint and such releases are not terminated within 60 minutes. This alarm setpoint may be associated with a planned batch release, or a continuous release path. In either case, the setpoint is established by the discharge permit to warn of a release that is not in compliance.

EAL #2 is similar to EAL #1, but is intended to address effluent or accident radiation monitors on release pathways for which a discharge permit would not be prepared for a non-routine release. The ODCM establishes a methodology for determining effluent radiation monitor setpoints. The monitor readings in EAL #2 were calculated based on the default source term as described in the ODCM and annual average meteorological conditions for the most limiting downwind sector. The monitor readings in EAL #2 are set to indicate two times the ODCM limit.

EAL #3 addresses uncontrolled releases that are detected by sample analyses, particularly on unmonitored pathways, (e.g., spills of radioactive liquids into storm drains, leakage into the river water systems or lake, etc.).

EAL #4 addresses RDACS calculation for NUE. RDACS is a 60 minute rolling calculation and once alarmed no additional 60 minutes are required.

Escalation is via **AA1**, **AS1**, or **AG1**.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AU2

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

Unexpected rise in plant radiation

Operating Mode Applicability:

All

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

1. a. VALID indication of uncontrolled water level drop in the refueling canal or spent fuel pool with all irradiated fuel assemblies remaining covered by water.

   AND

   b. Unplanned 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 rise by a factor of 1000 over normal levels (highest reading in the past twenty-four hours excluding the current peak value)

Basis:

All of the above events tend to have long lead times relative to a potential for radiological release outside the site boundary; thus impact to public health and safety is very low.

This IC addresses elevated radiation levels as a result of lowered water level above the reactor vessel flange or events that have resulted, or may result, in unexpected rises in radiation dose rates within plant buildings. These radiation rises represent a loss of control over radioactive material and may represent a potential degradation in the level of safety of the plant.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT (AU2)

In light of reactor cavity seal failure incidents, explicit coverage of these types of events via EAL #1 is appropriate given their potential for higher doses to plant staff. Specific indications may include local area radiation monitors and personnel (e.g., refueling crew) reports.

Classification as a Notification of Unusual Event is warranted as a precursor to a more serious event.

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, the reading on an area radiation monitor located on the refueling bridge may rise due to planned evolutions such as head lift, or even a fuel assembly being raised in the manipulator mast. Generally, higher 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 reactor vessel 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 addresses UNPLANNED rises in in-plant radiation levels that represent degradation in the control of radioactive material, and represent a potential degradation in the level of safety of the plant. Normal levels can be considered as the highest reading in the past twenty-four hours excluding the current peak value.

This event escalates to an Alert per **AA3** if the rise in dose rates impedes personnel access necessary for safe operation.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AA1

ALERT

Initiating Condition:

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

Operating Mode Applicability:

All

Emergency Action Level(s): (1 OR 2 OR 3 OR 4)

Note: If monitor reading is sustained for the time period indicated in the EAL AND the required assessments using procedure calculations cannot be completed within this period, declaration must be made based on the valid radiation monitor reading.

1. VALID reading on any effluent monitor that exceeds 200 times the alarm setpoint established by a current release permit for ≥ 15 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 Monitoring System
2RE-2330	BMS Liquid Discharge Monitor
2RE-4423	Radwaste Liquid Discharge Monitor

OR

2. VALID reading on Channel 7 of one or more of the following radiation monitors that exceeds the reading shown for ≥ 15 minutes:

MONITORS - Unit 1		LIMIT
RX-9820	Containment Purge	5.90E0 (µCi/cc)
RX-9830	Fuel Handling Area	4.54E0 (µCi/cc)
RX-9825	Radwaste Area	5.36E0 (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

(Continued on next page)

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT (AA1)

3. Confirmed grab sample analyses for gaseous or liquid releases indicates concentrations or release rates, with a release duration of ≥ 15 minutes, in excess of 200 times the applicable values of the ODCM.

   OR

4. RDACS data indicating ALERT.

Basis:

This event escalates from the Notification of Unusual Event by escalating the magnitude of the release.

These EALs address a potential or actual drop 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. These controls are located in the ODCM. The occurrence of extended, uncontrolled radioactive releases to the environment is indicative of degradation in these features and/or controls.

The ODCM multiples are specified in **AA1** and **AU1** 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. For example, a release exceeding 400 times ODCM limits for 7.5 minutes does not meet the threshold for this event classification.

"UNPLANNED", as used in this context, includes any release for which a liquid waste release or a gaseous waste release discharge permit was not prepared, or a release that exceeds the conditions (e.g., minimum dilution flow, maximum discharge flow, alarm set points, etc.) on the applicable package permit. The SM/TSC Director/EOF Director should not wait until 15 minutes has elapsed, but should declare the event as soon as it is determined that the release duration has or will likely exceed 15 minutes. Also, if an ongoing release is detected and the starting time for that release is unknown, the SM/TSC Director/EOF Director should, in the absence of data to the contrary, assume that the release has exceeded 15 minutes.

EAL #1 addresses radioactivity releases that, for whatever reason, cause effluent radiation monitor readings to exceed 200 times the alarm setpoint and are not terminated within 15 minutes. This alarm setpoint may be associated with a planned batch release, or a continuous release path. In either case, the setpoint is established by the discharge permit to warn of a release that is not in compliance.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT (AA1)

EAL #2 is similar to EAL #1, but is intended to address effluent or accident radiation monitors on release pathways for which a discharge permit would not be prepared for a non-routine release. The ODCM establishes a methodology for determining effluent radiation monitor setpoints. The monitor readings in EAL #2 were calculated based on the default source term as described in the ODCM and annual average meteorological conditions for the most limiting downwind sector. The monitor readings in EAL #2 are set to indicate 200 times the ODCM limit.

EAL #3 addresses uncontrolled releases that are detected by sample analyses, particularly on unmonitored pathways, e.g., spills of radioactive liquids into storm drains, leakage into Lake Dardanelle, etc.

EALs #1 and #2 directly correlate with the ODCM since annual average meteorology is required to be used in showing compliance with the ODCM and is used in calculating the alarm setpoints. The fundamental basis of these ICs is not a dose or dose rate, but rather the degradation in the level of safety of the plant implied by the uncontrolled release that was not isolated within 15 minutes.

Due to the uncertainty associated with meteorology, emergency implementing procedures should call for the timely performance of dose assessments using actual (real-time and sector) meteorology in the event of a gaseous radioactivity release of this magnitude. The results of these assessments should be compared to **AS1** and **AG1** to determine if the event classification should be escalated. Classification should not be delayed pending the results of these dose assessments.

EAL #4 addresses RDACS calculations for ALERT. Once RDACS data indicates ALERT, no additional time is required.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AA2

ALERT

Initiating Condition:

Damage to irradiated fuel or loss of water level that has 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 VALID alarm on one or more of the following 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-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.

OR

2. VALID indication of uncontrolled water level drop in the refueling canal or spent fuel pool such that irradiated fuel will become uncovered.

Basis:

This IC and associated EALs address specific events that have resulted, or may result in unexpected 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 a 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.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT (AA2)

These EALs apply to spent fuel requiring water coverage. There is time available to take corrective actions, and there is little potential for substantial fuel damage. Uncontrolled lowering of water level may be detected by visual observation, elevated radiation levels, or various other symptoms that consider valid indicators of the event. Fuel uncovery may be expected based on abnormal radiation level, visual observation, or best judgment of the SM/TSC Director/EOF Director based on present and past trends.

EAL #1 addresses radiation monitor indications of fuel uncovery and/or fuel damage. Elevated readings on ventilation monitors may be indicative of a radioactivity release from the fuel, confirming that damage has occurred. Elevated background at the monitor due to water level drop may mask elevated ventilation exhaust airborne activity and should 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, the 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. Application of these ICs requires understanding of the actual radiological conditions present in the vicinity of the monitor.

EAL #2 indicators 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 threshold may need to be based on indications of water makeup rate or lowering in BWST (Unit 1) or RWT (Unit 2) level.

Escalation, if appropriate, would occur via **AS1** or **AG1** or SM/TSC Director/EOF Director judgment.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AA3

ALERT

Initiating Condition:

Release of radioactive material or elevated radiation levels within the facility that impede operation of systems required to maintain safe operations or to establish or maintain cold shutdown

Operating Mode Applicability:

All

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

1. VALID radiation readings in the Control Room as indicated by the following:

   - > 15 mR/hr (RE-8001)

   OR

2. VALID radiation readings > 10 R/hr on any of the following monitors:

Unit 1	
RI-8004	317' Outside Stairway
RI-8005	354' Sample Room Vestibule
RI-8006	354' Radiochemistry Lab
RI-8007	354' Outside Stairway
RI-8011	335' Outside Stairway
RI-8010	386' CA Area
Unit 2	
2RITS-8900	317' General Area
2RITS-8901	335' Coolant Charging Pumps Area
2RITS-8902	335' 2F-3 Hallway
2RITS-8903	354' Volume Control Tank Access Area
2RITS-8910	386' Emergency Chiller Hallway
2RITS-8914	404' Spent Fuel Pool Cask Washdown Area
2RITS-8917	354' Hot Lab Sample Room

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT (AA3)

Basis:

This IC addresses elevated radiation levels that impede necessary access to operating stations, or other areas containing equipment that must be operated manually or that requires local monitoring, in order to maintain safe operation or perform a safe shutdown. It is this impaired ability to operate the plant that results in the actual or potential substantial degradation of the level of safety of the plant. The cause and/or magnitude of the rise in radiation levels is not a concern of these EALs. The SM/TSC Director/EOF Director must consider the source or cause of the elevated radiation levels and determine if any other EAL may be involved. For example, a 15 mR/hr dose rate in the control room or a high radiation monitor reading may be a problem in itself. However, the elevated radiation readings levels may also be indicative of high dose rates in the containment due to a LOCA. In this latter case, an SAE or GE may be indicated by the fission product barrier matrix EALs.

This IC is not meant to apply to elevated radiation levels in the containment as these are events which are addressed in the fission product barrier matrix EALs. This IC is not intended to apply to anticipated temporary rises due to planned events (e.g., incore detector movement, radwaste container movement, depleted resin transfers, etc.).

At ANO, the only areas that are required to be manned continuously in order to maintain safe operation or establish or maintain cold shutdown are the Control Rooms. The reading on the Unit 1 Control Area Radiation Monitor (RE-8001) is used as the indicator for both Control Rooms. 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.

For areas requiring infrequent access, the single value of 10 R/hr was selected because it is a value that would result in exposure control measures intended to maintain doses within normal occupational guidelines and limits (i.e., 10CFR20), and in doing so, will impede necessary access. A 10 R/hr area may require multiple entries with multiple personnel to accomplish a task to prevent exceeding Entergy administrative limits or will require the extension of those administrative limits. Entergy establishes an administrative limit of 2000 mrem/yr TEDE. The value selected for this EAL yields a dose rate of ~ 170 mR/minute, requiring a restrictive stay time of less than 12 minutes to remain within the Entergy administrative limit of 2000 mR/yr. As used here, *impede*, includes hindering or interfering provided that the interference or delay is sufficient to significantly threaten the safe operation of the plant.

Applicable areas requiring infrequent access were developed from the site's Abnormal Operating Procedures and Emergency Operating Procedures.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AS1

SITE AREA EMERGENCY

Initiating Condition:

Offsite dose resulting from an actual or imminent release of gaseous radioactivity exceeds 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: If dose assessment results are available at the time of declaration, the classification should be based on EAL #2 instead of EAL #1. While necessary declarations should not be delayed awaiting results, the dose assessment should be initiated/completed in order to determine if the classification should be subsequently escalated.

1. VALID reading on Channel 9 of one or more of the following radiation monitors that exceeds or is expected to exceed 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

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

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT (AS1)

Basis:

This IC addresses radioactivity releases that result in doses at or beyond the site boundary that exceed a small fraction 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 may be 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 (e.g., fuel handling accident in spent fuel building).

The actual or projected dose of 100 mR TEDE is set at 10% of the EPA Protective Action Guide (PAG) values given in EPA-400-R-92-001, while the 500 mR child thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE. The TEDE integrated dose value also provides a desirable gradient (one order of magnitude) between the Alert, Site Area Emergency and General Emergency Classes.

The SM/TSC Director/EOF Director should not wait until 15 minutes has elapsed, but should declare the event as soon as it is determined that the release duration has or will likely exceed 15 minutes.

The monitor list in EAL #1 includes monitors on all potential release pathways (plant stack, primary-secondary leak, fuel handling accident). 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 child thyroid "committed dose equivalent (CDE)". For the purpose of these ICs, 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 in EPA-400R-92-001 provides for the use adult thyroid dose conversion factors.

The monitor readings in EAL #1 were determined by using the same meteorology and source term as those used for determining the monitor reading EALs in **AU1** and **AA1**. This protocol maintains intervals between the ICs for the four classifications. Since doses are not monitored in real-time, a release duration of one hour was assumed and the monitor readings are based on a site boundary (or beyond) dose of 100 mR/hour TEDE.

Monitor indications in EAL #1 are calculated using SAR source terms applicable to each monitored pathway in conjunction with annual average meteorology, one hour release duration and Dose Conversion Factors (DCFs) from EPA-400R-92-001, Tables 5-1 and 5-2.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT (AS1)

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 performance of dose assessments within 15 minutes 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. However, classification should not be delayed pending the results of these dose assessments. If dose assessment team calculations cannot be completed in 15 minutes, then valid monitor readings should be used for emergency classification.

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.

Escalation is via **AG1**.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AG1

GENERAL EMERGENCY

Initiating Condition:

Offsite dose resulting from an actual or imminent release of gaseous radioactivity exceeds 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: If dose assessment results are available at the time of declaration, the classification should be based on EAL #2 instead of EAL #1. While necessary declarations should not be delayed awaiting results, the dose assessment should be initiated/completed in order to more accurately characterize the nature of the release.

1. VALID reading on Channel 9 of one or more of the following radiation monitors that exceeds or is expected to exceed the reading shown for 15 minutes or longer:

	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 more than one hour; or analyses of field survey samples indicate child thyroid CDE of 5000 mR for one hour of inhalation, at or beyond site boundary.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT (AG1)

Basis:

This IC and associated EALs address 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 EALs, this EAL 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 actual or projected dose of 1000 mR TEDE and 5000 mR child thyroid CDE integrated doses are based on the EPA Protective Action Guide (PAG) values given in EPA-400-R-92-001, which indicates that public protective actions are indicated if doses exceed these values. This is consistent with the emergency class description of a General Emergency.

The SM/TSC Director/EOF Director should not wait until 15 minutes has elapsed, but should declare the event as soon as it is determined that the release duration has or will likely exceed 15 minutes.

The monitor list in EAL #1 includes monitors on all potential release pathways (Plant stack, Primary/Secondary Leak, Fuel Handling Accident). 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 child thyroid "committed dose equivalent (CDE)". For the purpose of these ICs, 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 EPA-400R-92-001 provides for the use of adult thyroid dose conversion factors.

The monitor readings in EAL #1 were determined by using the same meteorology and source term as those used for determining the monitor reading EALs in **AU1** and **AA1**. This protocol maintains intervals between the ICs for the four classifications. Since doses are not monitored in real-time, a release duration of one hour was assumed and the monitor readings are based on a site boundary (or beyond) dose of 1000 mR/hour TEDE.

Monitor indications in EAL #1 are calculated using SAR source terms applicable to each monitored pathway in conjunction with annual average meteorology, one hour release duration and dose conversion factors (DCFs) from EPA-400R-92-001, Tables 5-1 and 5-2.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT (AG1)

Since dose assessment in EAL #2 is based on actual meteorology, whereas the monitor reading 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 performance of dose assessments within 15 minutes 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. However, classification should not be delayed pending the results of these dose assessments. If dose assessment team calculations cannot be completed in 15 minutes, then valid monitor readings should be used for emergency classification.

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 charcoal cartridge should determine the iodine value.

Cold Shutdown/Refueling System Malfunction

CU1

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

RCS leakage

Operating Mode Applicability:

Cold Shutdown (Mode 5)

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

1. Unidentified or pressure boundary leakage > 10 gpm.

   OR

2. Identified leakage > 25 gpm.

Basis:

This IC is included as an NUE because it is considered to be a potential degradation of the level of safety of the plant. The 10 gpm value for the unidentified and pressure boundary leakage was selected as it is sufficiently large to be observable via normally installed instrumentation (e.g., pressurizer level, RCS loop level instrumentation, etc.) or reduced inventory instrumentation such as level hose indication. Lesser values must generally be determined through time consuming surveillance tests (e.g., mass balances). The EAL for identified leakage is set at a higher value due to the lesser significance of identified leakage in comparison to unidentified or pressure boundary leakage. Prolonged loss of RCS inventory may result in escalation to the ALERT level via either IC **CA1** or **CA4**.

The difference between **CU1** and **CU2** deals with the RCS conditions that exist between cold shutdown and refueling mode applicability. In cold shutdown the RCS will normally be intact and RCS inventory and level monitoring means such as pressurizer level indication and makeup volume control tank levels are normally available.

Cold Shutdown/Refueling System Malfunction

CU2

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

UNPLANNED loss of RCS inventory with irradiated fuel in the reactor vessel

Operating Mode Applicability:

Refueling (Mode 6)

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

1. UNPLANNED reactor vessel level drop below the reactor vessel flange for ≥ 15 minutes.

   OR

2. a. Loss of RCS inventory as indicated by unexplained Reactor Building Sump, Reactor Drain Tank, Aux. Building Equipment Drain Tank, Aux. Building Sump, or Quench Tank level rise.

      AND

   b. Reactor vessel level cannot be monitored.

Basis:

This IC is included as an NUE because it may 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. 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 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 that a more serious condition exists. Continued loss of RCS inventory will result in escalation to the ALERT level via either IC **CA2** or **CA4**.

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 indications of RCS inventory are available.

Cold Shutdown/Refueling System Malfunction (CU2)

In the refueling mode, normal means of core temperature indication and Reactor vessel 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 RCS 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 ALERT would be via either **CA2** or **CA4**.

EAL #1 involves a drop in Reactor vessel 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 lowering levels in flooded refueling canal level (covered by **AU2**, EAL #1) until such time as the level lowering to the level of the vessel flange.

If the reactor vessel level continues to lower and reaches the bottom of the reactor coolant system hot leg penetration into the vessel, then escalation to **CA2** would be appropriate.

Cold Shutdown/Refueling System Malfunction

CU3

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

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)

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

   OR

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

Basis:

This IC is included as an NUE because it may 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. In cold shutdown, the decay heat available to raise RCS temperature during a loss of inventory or loss of heat removal event may be significantly greater than in the refueling mode. Entry into cold shutdown conditions may be attained within hours of operating at power. Entry into the refueling mode procedurally may not occur for many hours after the reactor has been shut down. 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 reactor vessel. In addition, the operators should be able to monitor RCS temperature and reactor vessel level so that escalation to the ALERT level via **CA2** or **CA4** will occur if required.

Loss of forced decay heat removal at reduced inventory may result in more rapid rises in reactor coolant temperatures depending on the time since shutdown. Escalation to the Alert level via **CA4** is provided should an UNPLANNED event result in RCS temperature exceeding the Technical Specification cold shutdown temperature limit for greater than 30 minutes with CONTAINMENT CLOSURE not established.

Cold Shutdown/Refueling System Malfunction (CU3)

Unlike the cold shutdown mode, normal means of core temperature indication and reactor vessel level indication may not be available in the refueling mode. Redundant means of reactor vessel level indication are 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 or refueling modes, EAL #2 would result in declaration of an NUE if either temperature or level indication cannot be restored within 15 minutes from the loss of both means of indication. Escalation to ALERT would be via **CA2** based on an inventory loss or **CA4** based on exceeding its temperature criterion.

The SM/TSC Director/EOF Director must remain attentive to events or conditions that lead to the conclusion that exceeding the EAL threshold 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

CU4

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

Fuel clad degradation

Operating Mode Applicability:

Cold Shutdown (Mode 5)
Refueling (Mode 6)

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.

   OR

2. RCS sample activity indicates fuel clad degradation > Technical Specification allowable limits.

   Unit 1:
   > 3.50 µCi/gm IDE
   > 72/Ē µCi/gm Gross Activity

   Unit 2:
   > 1.0 µCi/gm IDE
   > 100/Ē µCi/gm Gross Activity

Basis:

The condition noted in this EAL is considered to be a potential degradation in the level of safety of the plant and a potential precursor of more serious problems. EAL #1 addresses the Unit 1 Letdown Radiation Monitor alarm setpoint that is indicative of RCS Iodine levels that may exceed the Technical Specification limit. No monitor reading is provided for Unit 2 because the Letdown Radiation Monitor alarm setpoint does not correlate with the Technical Specification limit. EAL #2 addresses reactor coolant samples exceeding Technical Specification limits for iodine spikes that are indicative of a loss of fuel clad integrity.

Cold Shutdown/Refueling System Malfunction

CU5

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

Loss of all offsite power to vital 4.16 KV busses for > 15 minutes

Operating Mode Applicability:

Cold Shutdown (Mode 5)
Refueling (Mode 6)

Emergency Action Level(s):

1. a. Loss of power to all Unit Auxiliary and Startup Transformers for > 15 minutes.

   AND

   b. At least one vital 4.16 KV bus powered from an independent diesel generator.

Basis:

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

Escalation is via CA5.

Cold Shutdown/Refueling System Malfunction

CU6

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

UNPLANNED loss of required DC power for > 15 minutes

Operating Mode Applicability:

Cold Shutdown (Mode 5)
Refueling (Mode 6)

Emergency Action Level(s):

1. a. UNPLANNED Loss of Vital DC power to required DC busses based on bus voltage < 105 volts.

   AND

   b. Failure to restore power to at least one required DC bus within 15 minutes from the time of loss.

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 since the operating crew may not have necessary indication and control of equipment needed to respond to the loss.

UNPLANNED is included in this IC and EAL to preclude the declaration of an emergency as a result of planned maintenance activities. Routinely, plants perform maintenance on a train related basis during shutdown periods. It is intended that the loss of the operating (operable) train is to be considered.

The specified bus voltage indication, 105 volts, is based on the minimum bus voltage necessary for the operation of safety related equipment.

If the loss of DC power results in the inability to maintain cold shutdown, the escalation to an ALERT will be per **CA4**.

Cold Shutdown/Refueling System Malfunction

CU7

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

Inadvertent criticality

Operating Mode Applicability:

Cold Shutdown (Mode 5)
Refueling (Mode 6)

Emergency Action Level(s):

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

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 misloading events and inadvertent dilution events. This condition indicates a potential degradation of the level of safety of the plant warranting an NUE classification. The IC excludes inadvertent criticalities that occur during planned reactivity changes associated with reactor startups (e.g., criticality earlier than estimated) which are addressed in the companion IC **SU10**.

This condition can be identified using the startup rate monitor. 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/TSC Director/EOF Director judgment.

Cold Shutdown/Refueling System Malfunction

CU8

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

UNPLANNED loss of all onsite or offsite communications capabilities

Operating Mode Applicability:

Cold Shutdown (Mode 5)
Refueling (Mode 6)

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

1. Loss of all onsite communications capability (Table C1) affecting the ability to perform routine operations.

Table C1 Onsite Communications Equipment
Station radio system
Plant paging system
In-plant telephones
Gaitronics

OR

2. Loss of all offsite communications capability (Table C2).

Table C2 Offsite Communications Equipment
All telephone lines (commercial and microwave)
Station radio system
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's ability to perform routine tasks necessary for plant operations or the ability to communicate problems to offsite authorities. The loss of offsite communications ability is expected to be significantly more comprehensive than the condition addressed by 10 CFR 50.72. The availability of one method of ordinary offsite communications is sufficient to inform state and local authorities of plant problems. This EAL is intended to be used only when extraordinary means (e.g., individuals being sent to offsite locations, etc.) are being utilized to make communications possible.

Cold Shutdown/Refueling System Malfunction

CA1

ALERT

Initiating Condition:

Loss of RCS inventory

Operating Mode Applicability:

Cold Shutdown (Mode 5)

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

1. Loss of RCS inventory as indicated by:

   Unit 1: RVLMS Levels 1 through 8 indicate DRY
   Unit 2: RVLMS Levels 1 through 5 indicate DRY

   OR

2. a. Loss of RCS inventory as indicated by unexplained Reactor Building Sump, Reactor Drain Tank, Aux. Building Equipment Drain Tank, Aux. Building Sump, or Quench Tank level rise.

      AND

   b. Reactor vessel level cannot be monitored for > 15 minutes.

Basis:

These EALs serve as precursors to a loss of the ability to adequately cool the core. 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 drop and potential core uncovery. This condition will result in a minimum classification of ALERT. The bottom of the RCS hot leg penetration into the reactor vessel is approximately RLVMS Level 9 (Unit 1) or RVLMS Level 5 (Unit 2). Below this level, remote Reactor vessel level indication may 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, therefore, be indicative of a failure of the RCS barrier.

In cold shutdown the decay heat available to raise RCS temperature during a loss of inventory or heat removal event may be significantly greater than in the refueling mode. Entry into cold shutdown conditions may be attained within hours of operating at power or hours after refueling is completed. Entry into the refueling mode procedurally may not occur for several hours 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 reactor vessel. The above forms the basis for needing both a cold shutdown specific IC (**CA1**) and a refueling specific IC (**CA2**).

Cold Shutdown/Refueling System Malfunction (CA1)

In cold shutdown, normal RCS level and RPV level instrumentation systems will normally be available. However, if all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that RPV 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. The 15-minute duration allows CA1 to be an effective precursor to CS1. 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 CS1 basis. Therefore, this EAL meets the definition for an Alert emergency class.

The difference between **CA1** and **CA2** deals with the reactor conditions that exist between cold shutdown and refueling mode applicability. In cold shutdown the reactor vessel will normally be intact and standard reactor vessel level monitoring means are available.

If reactor vessel level continues to drop, then escalation to Site Area Emergency will be via **CS1**.

Cold Shutdown/Refueling System Malfunction

CA2

ALERT

Initiating Condition:

Loss of RCS inventory with irradiated fuel in the reactor vessel

Operating Mode Applicability:

Refueling (Mode 6)

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

1. Loss of RCS inventory as indicated by:

   Unit 1: Reactor vessel level < 368 ft., 0 in.
   Unit 2: Reactor vessel level < 369 ft., 1.5 in.

   OR

2. a. Loss of RCS inventory as indicated by unexplained Reactor Building Sump, Reactor Drain Tank, Aux. Building Equipment Drain Tank, Aux. Building Sump, or Quench Tank level rise.

      AND

   b. Reactor vessel level cannot be monitored for > 15 minutes.

Basis:

These EALs serve as precursors to a loss of heat removal. 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 drop and potential core uncovery. This condition will result in a minimum classification of ALERT. 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, therefore, be indicative of a failure of the RCS barrier.

In cold shutdown the decay heat available to raise RCS temperature during a loss of inventory or heat removal event may be significantly greater than in the refueling mode. Entry into cold shutdown conditions may be attained within hours of operating at power or hours after refueling is completed. Entry into the refueling mode procedurally may not occur for several hours 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 reactor vessel. The above forms the basis for needing both a cold shutdown specific IC (CA1) and a refueling specific IC (CA2).

Cold Shutdown/Refueling System Malfunction (CA2)

In the refueling mode, normal means of reactor vessel level indication may not be available. Redundant means of reactor vessel level indication will be normally 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 RCS 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 reactor vessel leakage. The 15-minute duration for the loss of level indication was chosen because it is half of the **CS2** Site Area Emergency EAL duration. The 15-minute duration allows **CA2** to be an effective precursor to **CS2**. 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 **CS2** basis. Therefore, this EAL meets the definition for an ALERT.

The difference between **CA1** and **CA2** deals with the reactor conditions that exist between cold shutdown and refueling mode applicability. In cold shutdown the reactor vessel will normally be intact and standard reactor vessel level monitoring means are available. In the refueling mode the reactor vessel is not intact and RCS inventory is monitored by different means.

If reactor vessel level continues to drop, then escalation to Site Area Emergency will be via **CS2**.

Cold Shutdown/Refueling System Malfunction

CA3

ALERT

Initiating Condition:

Inability to maintain plant in cold shutdown with irradiated fuel in the reactor vessel

Operating Mode Applicability:

Cold Shutdown (Mode 5)
Refueling (Mode 6)

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

1. With CONTAINMENT CLOSURE and RCS integrity not established, an UNPLANNED event results in RCS temperature exceeding 200°F.

   OR

2. With CONTAINMENT CLOSURE established AND either RCS integrity not established or RCS inventory reduced, an UNPLANNED event results in RCS temperature exceeding 200°F for > 20 minutes[1].

   OR

3. An UNPLANNED event results in RCS temperature exceeding 200°F for > 60 minutes[1] or results in an RCS pressure rise of > 10 psi.

   [1]Note: IF decay heat removal system (Decay Heat or Shutdown Cooling) is in operation within this time frame AND RCS temperature is being reduced, THEN this EAL is not applicable.

Basis:

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 sequences of events 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 200°F when the heat removal function is available.

Cold Shutdown/Refueling System Malfunction (CA3)

The SM/TSC Director/EOF Director must remain alert to events or conditions that lead to the conclusion that exceeding the EAL threshold 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.

EAL #1 addresses 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 to be pressurized (e.g., no freeze seals or nozzle dams). No delay time is allowed for EAL #1 because the evaporated reactor coolant that may be released into the containment during this heatup condition could also be directly released to the environment.

EAL #2 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 in EAL #1, RCS integrity should be assumed to be in place when the RCS pressure boundary is in its normal condition to be pressurized (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*, and is believed to be conservative given that a low pressure containment barrier to fission product release is established. Note 1 indicates that EAL #2 is not applicable if actions are successful in restoring an RCS heat removal system to operation and RCS temperature is being reduced within the 20-minute time frame.

EAL #3 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. As in EAL #1 and #2, RCS integrity should be considered to be in place when the RCS pressure boundary is in its normal condition to be pressurized (e.g., no freeze seals or nozzle dams). The status of CONTAINMENT CLOSURE in this EAL 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 a substantial degradation in plant safety. The 10 psi pressure rise covers 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 is 10 psi, which can be read on installed control board instrumentation. Note 1 indicates that EAL 3 is not applicable if actions are successful in restoring a shutdown cooling system to operation and RCS temperature is being reduced within the 60-minute time frame assuming that the RCS pressure rise has remained less than 10 psi.

Escalation to Site Area Emergency would be via **CS1** or **CS2** should boiling result in significant reactor vessel level loss leading to core uncovery.

Cold Shutdown/Refueling System Malfunction

CA5

ALERT

Initiating Condition:

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

Operating Mode Applicability:

Cold Shutdown (Mode 5)
Refueling (Mode 6)
Defueled

Emergency Action Level(s):

1. a. Loss of power to all Unit Auxiliary and Startup transformers.

   AND

   b. Failure of all Diesel Generators to supply power to Vital 4.16 KV busses.

   AND

   c. Failure to restore power to at least one Vital 4.16 KV bus within 15 minutes from the time of loss of both offsite and onsite AC power.

Basis:

Loss of all AC power compromises all plant safety systems requiring electric power including DHR/shutdown cooling, emergency core cooling, containment cooling, spent fuel pool cooling, and the ultimate heat sink. When in the cold shutdown, refueling, or defueled mode the event can be classified as an Alert 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. Fifteen minutes was selected as a threshold to exclude transient or momentary power losses. Escalating to Site Area Emergency, if appropriate, is by Abnormal Rad Levels/Radiological Effluent, or SM/TSC Director/EOF Director judgment ICs.

Consideration should be given to available loads necessary to remove decay heat or provide reactor vessel makeup capability when evaluating loss of AC power to vital busses. Even though a vital bus may be energized, if necessary loads (i.e., loads that, if lost, would inhibit decay heat removal capability or reactor vessel makeup capability) are not available on the energized bus, then the bus should not be considered available.

Cold Shutdown/Refueling System Malfunction

CS1

SITE AREA EMERGENCY

Initiating Condition:

Loss of RCS inventory affecting core decay.heat removal capability

Operating Mode Applicability:

Cold Shutdown (Mode 5)

Emergency Action Level: (1 OR 2)

1. With CONTAINMENT CLOSURE not established:

   a. RCS inventory as indicated by:

      Unit 1: RVLMS Levels 1 through 9 indicate DRY
      Unit 2: RVLMS Levels 1 through 6 indicate DRY

      OR

   b. Reactor vessel level cannot be monitored for > 30 minutes with a loss of RCS inventory as indicated by unexplained Reactor Building Sump, Reactor Drain Tank, Quench Tank, Aux. Building Equipment Drain Tank, or Aux. Building Sump level rise.

   OR

2. With CONTAINMENT CLOSURE established:

   a. RCS inventory as indicated by:

      Unit 1: RLVMS Levels 1 through 9 indicate DRY
      Unit 2: RVLMS Levels 1 through 7 indicate DRY

      OR

   b. Reactor vessel level cannot be monitored for >30 minutes with a loss of RCS inventory as indicated by either:

      - Unexplained Reactor Building Sump, Reactor Drain Tank, Quench Tank, Aux. Building Equipment Drain Tank, or Aux. Building Sump level rise
      - Erratic source range monitor indication

Cold Shutdown/Refueling System Malfunction (CS1)

Basis:

Under the conditions specified by these EALs, continued lowering in reactor vessel level is indicative of a loss of inventory control. Inventory loss may be due to a reactor vessel breach, pressure boundary leakage, or continued boiling in the reactor vessel.

If all reactor vessel level indications were to be lost during a loss of RCS inventory event, the operators would need to determine that RCS inventory loss was occurring by observing containment sump level, reactor drain tank level, or quench tank level change. Containment sump level, reactor drain tank level, or quench 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. This EAL is 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 (mid-loop, reduced level/flange level, head in place, cavity flooded, RCS venting strategy, decay heat removal system design, vortexing pre-disposition, or steam generator U-tube draining) can have a significant impact on heat removal capability challenging the fuel clad barrier. Analysis in the above references indicates that core damage may occur within an hour following continued core uncovery; therefore, 30 minutes was chosen to be conservative.

The 30-minute duration allowed when CONTAINMENT CLOSURE is established allows sufficient time for actions to be performed to recover needed cooling equipment and is considered to be conservative. As water level in the reactor vessel lowers, the dose rate above the core will rise. Additionally, studies indicate that the installed nuclear instrumentation will operate erratically when the core is uncovered and can be used as a tool for making such determinations. Since effluent release is not expected with closure established, declaration of a Site Area Emergency is warranted under the conditions specified.

Cold Shutdown/Refueling System Malfunction

CS2

SITE AREA EMERGENCY

Initiating Condition:

Loss of RCS inventory affecting core decay heat removal capability with irradiated fuel in the reactor vessel

Operating Mode Applicability:

Refueling (Mode 6)

Emergency Action Level(s):

1. Reactor vessel level cannot be monitored with core uncovery indicated by one or more of the following:
   - Containment High Range Radiation Monitor reading > 10 R/hr
   - Erratic source range monitor indication
   - Core Exit Thermocouples indicate superheat

Basis:

Under the conditions specified by these EALs, continued drop in reactor vessel level is indicative of a loss of inventory control. Inventory loss may be due to a reactor vessel breach, pressure boundary leakage, or continued boiling in the reactor vessel.

In cold shutdown the decay heat available to raise RCS temperature during a loss of inventory or heat removal event may be significantly greater than in the refueling mode. Entry into cold shutdown conditions may be attained within hours of operating at power or hours after refueling is completed. Entry into the refueling mode procedurally may not occur for several hours 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 reactor vessel (note that the heatup threat could be lower for cold shutdown conditions if the entry into cold shutdown was following a refueling). The above forms the basis for needing both a cold shutdown specific IC (CS1) and a refueling specific IC (CS2).

Cold Shutdown/Refueling System Malfunction (CS2)

If all reactor vessel level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that RCS inventory loss was occurring by observing containment sump level, reactor drain tank level, or quench tank level change. Containment sump level, reactor drain tank level, or quench 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. This EAL is 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, (mid-loop, reduced level/flange level, head in place, cavity flooded, RCS venting strategy, decay heat removal system design, vortexing pre-disposition, or steam generator U-tube draining) can have a significant impact on heat removal capability challenging the fuel clad barrier. Analysis in the above references indicates that core damage may occur within an hour following continued core uncovery; therefore, 30 minutes was chosen to be conservative.

As water level in the reactor vessel lowers, the dose rate above the core will rise. The dose rate due to core shine should result in up-scaled Containment High Range Monitor indication. 10 R/hr was selected as the setpoint for this EAL because it is sufficiently above the expected normal shutdown reading to preclude unnecessary entry into the EAL. 10 R/hr is also high enough to be indicative of potential fuel uncovery.

The 30-minute duration allowed when CONTAINMENT CLOSURE is established allows sufficient time for actions to be performed to recover needed cooling equipment and is considered to be conservative. As water level in the reactor vessel lowers, the dose rate above the core will rise. Additionally, studies indicate that the installed nuclear instrumentation will operate erratically when the core is uncovered and can be used as a tool for making such determinations. In the refueling mode, normal means of reactor vessel level indication is not available; however, a temporary means of reactor vessel level indication is normally installed to assure that the ability to monitor level will not be interrupted. This temporary means of level indication will only indicate to the bottom of the hot leg. Since effluent release is not expected with closure established, declaration of a Site Area Emergency is warranted under the conditions specified.

Declaration of an Site Area Emergency is warranted under the conditions specified by the IC. Escalation to a General Emergency is via **CG1** or **AG1**.

Cold Shutdown/Refueling System Malfunction

CG1

GENERAL EMERGENCY

Initiating Condition:

Loss of RCS inventory affecting fuel clad integrity with containment challenged with irradiated fuel in the reactor vessel

Operating Mode Applicability:

Cold Shutdown (Mode 5)
Refueling (Mode 6)

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

1. Loss of RCS inventory as indicated by unexplained Reactor Building Sump, Reactor Drain Tank, Quench Tank, Aux. Building Equipment Drain Tank, or Aux. Building Sump level rise.

   AND

2. Reactor vessel level:

   a. (MODE 5 ONLY) Less than the top of active fuel for > 30 minutes:
      Unit 1: RVLMS Levels 1 through 9 indicate DRY
      Unit 2: RVLMS Levels 1 through 7 indicate DRY

      OR

   b. Cannot be monitored with indication of core uncovery for > 30 minutes as evidenced by one or more of the following:

      - Containment High Range Radiation Monitor reading > 10 R/hr
      - Erratic source range monitor indication
      - Core exit thermocouples indicate superheat

   AND

3. CONTAINMENT is challenged as indicated by one or more of the following:

   - An explosive mixture exists in containment.
   - Containment pressure with CONTAINMENT INTEGRITY established is:
     Unit 1: > 59 psig
     Unit 2: > 73.7 psia
   - CONTAINMENT CLOSURE not established.

Cold Shutdown/Refueling System Malfunction (CG1)

Basis:

For EAL #1 the operators would need to determine that RCS 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.

EAL #2 represents the inability to restore and maintain reactor vessel level above the top of active fuel. Fuel damage is probable if reactor vessel level cannot be restored, as available decay heat will cause boiling further reducing the reactor vessel level. 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 (e.g., mid-loop, reduced level/flange level, head in place, cavity flooded, RCS venting strategy, decay heat removal system design, vortexing pre-disposition, or steam generator U-tube draining) can have a significant impact on heat removal capability challenging the fuel clad barrier. Analysis in the above references indicates that core damage may occur within an hour following continued core uncovery; therefore, 30 minutes was chosen to be conservative. As water level in the reactor vessel lowers, the dose rate above the core will rise. Additionally, 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. The GE is declared on the occurrence of the loss or imminent loss of function of all three barriers. Based on the above discussion, RCS barrier failure resulting in core uncovery for 30 minutes or more may cause fuel clad failure. With the CONTAINMENT breached or challenged, 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.

As water level in the reactor vessel lowers, the dose rate above the core will rise. The dose rate due to core shine should result in up-scaled Containment High Range Monitor indication. 10 R/hr was selected as the setpoint for this EAL because it is sufficiently above the expected normal shutdown reading to preclude unnecessary entry into the EAL. 10 R/hr is also high enough to be indicative of potential fuel uncovery.

In the context of EAL #3, containment closure is the action taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under existing plant conditions. Containment closure should not be confused with refueling containment integrity as defined in technical specifications. Site shutdown contingency plans provide for re-establishing containment closure following a loss of heat removal or RCS inventory functions. If the closure is re-established prior to exceeding the temperature or level thresholds of the RCS barrier and fuel clad barrier EALs, escalation to GE would not occur.

Cold Shutdown/Refueling System Malfunction (CG1)

The pressure at which containment is considered challenged is based on the condition of the containment. If containment integrity is established, then the containment will be challenged at the design pressure. This is consistent with the owners groups' Emergency Response Procedures. Since no significant pressurization is expected during cold shutdown/refueling operations, there is no specific pressure setpoint at which the containment is considered to be challenged. Plant procedures provide for the establishment of containment closure when required and for the monitoring of the status of containment closure.

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.

EVENTS RELATED TO ISFSI

E-HU1

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

Damage to a loaded cask CONFINEMENT BOUNDARY

Operating Mode Applicability:

Not Applicable

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

1. Natural phenomena events affecting a loaded cask CONFINEMENT BOUNDARY:

   a. Tornado/High winds resulting in:
      - Missile impact causing a loss of shielding
      - Blockage of air inlets for > 24 hours

      OR

   b. Flooding resulting in blockage of air inlets for > 24 hours.

      OR

   c. Seismic event resulting in cask tip-over causing a loss of shielding.

      OR

2. Accident conditions affecting a loaded cask CONFINEMENT BOUNDARY:

   a. Cask drop of > 11 inches.

      OR

   b. Blockage of air inlets for > 24 hours

      OR

   c. Fire or explosion resulting in a loss of shielding

      OR

   d. Cask tip-over causing a loss of shielding.

      OR

3. Any condition in the opinion of the SM/TSC Director/EOF Director that indicates loss of loaded fuel storage cask CONFINEMENT BOUNDARY.

EVENTS RELATED TO ISFSI (E-HU1)

Basis:

An NUE would be declared 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.

For EAL #1 and EAL #2, the results of the ISFSI Safety Analysis Report (SAR) referenced in the cask('s) Certificate of Compliance and the related NRC Safety Evaluation Report are used to develop a list of natural phenomena events and accident conditions. These EALs address responses to a dropped cask, a tipped-over cask, explosion, missile damage, fire damage or natural phenomena affecting a cask (e.g., seismic event, tornado, etc.).

For EAL #3, any condition not explicitly detailed as an EAL threshold value, which, in the judgment of the SM/TSC Director/EOF Director, is a potential degradation in the level of safety of the ISFSI. SM/TSC Director/EOF Director judgment is to be based on known conditions and the expected response to mitigating activities within a short time period.

Possible damage modes to the storage cask involve loss of shielding from impact damage due to tornado- or wind-generated missiles. Cask containment loss due to a tornado is not postulated except long-term loss of heat transfer due to blockage of air inlets as discussed in following paragraphs.

There is no fully immersing flood that might move or tip-over the cask postulated for the ANO site. The Maximum Probable Flood blocks the air inlets of the Holtec casks above site Elevation 354 feet.

The VSC-24 storage cask drop accident is a cask drop of 5 feet onto an essentially unyielding surface. The Holtec storage cask drop accident is a cask drop of 11 inches onto an essentially unyielding surface. 11 inches was selected in the interest of conservatism. Any similar drop or tip-over of a loaded canister while being transported in a site transfer cask can also potentially affect a confinement boundary.

The full blockage of air inlets event is a postulated blockage of the airflow inlets for greater than 24 hours for the VSC-24 casks and 72 hours (or 24 hours with the difference between the average air outlet temperature and the ISFSI ambient temperature equal to or greater than 126°F) for the Holtec casks. In the interest of conservatism, 24 hours was selected as the EAL threshold value. The cask has four air inlets and the classification is not based on a loss of confinement boundary, but the condition could lead to the degradation of the fuel during storage or posing an operational safety problem with respect to its removal from storage.

A fire inside the ISFSI fence or explosion that generates missiles that enter the ISFSI area could lead to the degradation of the fuel during storage or pose an operational safety problem with respect to its removal from storage.

EVENTS RELATED TO ISFSI

E-HU2

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

Confirmed security event with potential loss of level of safety of the ISFSI

Operating Mode Applicability:

Not applicable

Emergency Action Level(s):

1. Security event as determined from the ANO Safeguards Contingency Plan and reported by ANO Security shift supervision.

Basis:

This EAL is based on ANO Security Plans. Security events which do not represent a potential degradation in the level of safety of the ISFSI are reported under 10 CFR 73.71 or in some cases under 10 CFR 50.72.

Security shift supervision are the designated personnel 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 Security Plan.

FISSION PRODUCT BARRIER DEGRADATION

FU1

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

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)

Emergency Action Level(s):

Comparison of conditions/values with those listed in fission product barrier matrix indicates:

Loss or potential loss of containment.

Containment Barrier EALs: (CNB1 OR CNB2 OR CNB3 OR CNB4 OR CNB5 OR CNB6 OR CNB7)

Basis:

The fuel cladding and the reactor coolant system are weighted more heavily than the containment barrier.

Loss of the containment would be a potential degradation in the level of plant safety.

FISSION PRODUCT BARRIER DEGRADATION

FA1

ALERT

Initiating Condition:

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

Operating Mode Applicability:

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

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

Comparison of conditions/values with those listed in fission product barrier matrix indicates:

1. Loss or potential loss of fuel clad.

   OR

2. Loss or potential loss of RCS.

Fuel Clad Barrier EALs: (FCB1 OR FCB2 OR FCB3 OR FCB4 OR FCB5 OR FCB6)

OR

RCS Barrier EALs: (RCB1 OR RCB2 OR RCB3 OR RCB4)

Basis:

The fuel cladding and the reactor coolant system are weighted more heavily than the containment barrier.

Loss of either the fuel cladding or the reactor coolant system would be a substantial degradation in the level of plant safety.

FISSION PRODUCT BARRIER DEGRADATION

FS1

SITE AREA EMERGENCY

Initiating Condition:

Loss or potential loss of ANY two barriers

Operating Mode Applicability:

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

Emergency Action Level(s): (ANY 2 of the 3)

Comparison of conditions/values with those listed in fission product barrier Matrix indicates **ANY 2** of the following:

Loss or Potential Loss of the fuel clad.
Loss or Potential Loss of the RCS.
Loss or Potential Loss of the containment.

Fuel Clad Barrier EALs: (FCB1 OR FCB2 OR FCB3 OR FCB4 OR FCB5 OR FCB6)

RCS Barrier EALs: (RCB1 OR RCB2 OR RCB3 OR RCB4)

Containment Barrier EALs: (CNB1 OR CNB2 OR CNB3 OR CNB4 OR CNB5 OR CNB6 OR CNB7)

Basis:
Loss of 2 fission product barriers would be a major failure of plant systems needed for protection of the public.

FISSION PRODUCT BARRIER DEGRADATION

FG1

GENERAL EMERGENCY

Initiating Condition:
Loss of ANY two barriers AND loss or potential loss of third barrier

Operating Mode Applicability:

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

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

Comparison of conditions/values with those listed in fission product barrier matrix indicates:

1. Loss of 2 fission product barriers.

   AND

2. Loss or potential loss of third.

Fuel Clad Barrier EALs: (FCB1 OR FCB2 OR FCB3 OR FCB4 OR FCB5 OR FCB6)

RCS Barrier EALs: (RCB1 OR RCB2 OR RCB3 OR RCB4 OR RCB5)

Containment Barrier EALs: (CNB1 OR CNB2 OR CNB3 OR CNB4 OR CNB5 OR CNB6 OR CNB7)

Basis:

Conditions/events causing the loss of 2 Fission Product Barriers with the loss or potential loss of the third could reasonably be expected to cause a release beyond the immediate site area exceeding EPA Protective Action Guidelines.

FISSION PRODUCT BARRIER DEGRADATION

FUEL CLAD BARRIER EALs: (FCB1 OR FCB2 OR FCB3 OR FCB4 OR FCB5 OR FCB6)

The fuel clad barrier is the zircalloy tubes that contain the fuel pellets.

1. Primary Coolant Activity Level (FCB1)

Loss: Coolant activity > 300 µCi/gm dose equivalent I-131 activity by Chemistry sample.

OR

Radiation levels > 1000 mR/hr

Unit 1: at SA-229
Unit 2: at 2TCD-19

Potential Loss: None

Basis:

An RCS concentration of 300 µCi/gm dose equivalent I-131 has been determined to correspond to approximately 2.9% failed clad for Unit 1, and 2.1% clad damage for Unit 2, which is consistent with the NUMARC EAL Task Force Assessment that this level corresponds to less than 5% clad damage. This amount of radioactivity is well above that expected for iodine spikes and thus 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.

There is no equivalent potential loss EAL for this item.

Reference Documents

1. ANO Calculation 03-E-0002-01, Radiation Monitor EAL Setpoints for Fission Product Barrier Degradation

FISSION PRODUCT BARRIER DEGRADATION

FUEL CLAD BARRIER EALs: (FCB1 OR FCB2 OR FCB3 OR FCB4 OR FCB5 OR FCB6)

The fuel clad barrier is the zircalloy tubes that contain the fuel pellets.

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:

The loss EAL reading corresponds to significant superheating of the coolant. The loss EAL of greater than or equal to 1200°F for Unit 2 is consistent with the generic value and is also consistent with recommendations from CE in reference document #5. The elevated temperature corresponds to significant superheating of the coolant and is indicative of a loss of the fuel clad barrier. Figure 5-2 of reference document #5 is the bases for Figure 1-2 of reference document #4, used to estimate core damage using core exit thermocouples for either unit, and indicates that clad rupture due to high temperature is not expected for CET temperature readings of less than 1200°F.

For Unit 1, the loss EAL is consistent with the treatment of inadequate core cooling (ICC) in the EOPs, which is based on a pressure-temperature curve. The basis for Region 3 of this curve from the BWOG EOP Technical Basis Document states, "If the RCS P-T reaches Region Three, then cladding temperature in the high power regions of the core may be 1400°F or higher." This is consistent with the intent of the 1200°F CET reading recommendation, as CET temperature will be lower than fuel clad temperature.

The potential loss EAL corresponds to a loss of subcooling. For Unit 2, there is a Functional Recovery EOP (2202.009), and the core and RCS heat removal acceptance criteria for safety function status checks include determination of RCS superheated.

For Unit 1, the RCS P-T in Region 2 (CET temperatures above saturation for indicated pressure) of the EOP Figure 4 corresponds to a loss of subcooling. This is consistent with EOP 1202.005, "Inadequate Core Cooling".

FISSION PRODUCT BARRIER DEGRADATION (FCB2)

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 BARRIER DEGRADATION

FUEL CLAD BARRIER EALs: FCB1 OR FCB2 OR FCB3 OR FCB4 OR FCB5 OR FCB6

The fuel clad barrier is the zircalloy tubes that contain the fuel pellets.

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:

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. Consistent with this approach, RVLMS is used as an indication of potential core uncovery only if CET indication is unavailable.

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
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
4. Calculation 90-E-0116-01, Unit 2 EOP Setpoint Document, Setpoint R.3

FISSION PRODUCT BARRIER DEGRADATION

FUEL CLAD BARRIER EALs: FCB1 OR FCB2 OR FCB3 OR FCB4 OR FCB5 OR FCB6

The fuel clad barrier is the zircalloy tubes that contain the fuel pellets.

4. Containment Radiation Monitoring (FCB4)

Loss: Containment high range rad monitor reading > 1000 R/hr

Potential Loss: NONE

Basis:

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. The reading was calculated assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with approximately 2-5% cladding failure into the containment atmosphere. Reactor coolant concentrations of this magnitude are several times larger than that expected for iodine spikes and are therefore indicative of fuel damage. This value is higher than that specified for RCS barrier loss EAL RCB3. Therefore, this EAL condition represents a potential loss of both the fuel clad and the RCS barriers, and represents a Site Area Emergency per FS1.

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

FISSION PRODUCT BARRIER DEGRADATION

FUEL CLAD BARRIER EALs: FCB1 OR FCB2 OR FCB3 OR FCB4 OR FCB5 OR FCB6

The fuel clad barrier is the zircalloy tubes that contain the fuel pellets.

5. Core Damage Assessment (FCB5)

Loss: At least 5% fuel clad damage as determined from core damage assessment

Potential Loss: NONE

Basis:

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**.

There is no potential loss EAL associated with this item.

Reference Documents

1. ANO Procedure OP-1302.022, "Core Damage Assessment"

FISSION PRODUCT BARRIER DEGRADATION

FUEL CLAD BARRIER EALs: FCB1 OR FCB2 OR FCB3 OR FCB4 OR FCB5 OR FCB6

The Fuel Clad Barrier is the zircalloy tubes that contain the fuel pellets.

6. SM/TSC Director/EOF 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 based on:

- Imminent barrier degradation (within 2 hours) due to degraded safety system performance
- Degraded ability to monitor 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 the SM/TSC Director/EOF Director judgment that the barrier may be considered lost or potentially lost. *(See also IC SG1, "Prolonged Loss or All Offsite Power and Prolonged Loss of All Onsite AC Power", for additional information.)*

FISSION PRODUCT BARRIER DEGRADATION

RCS BARRIER EALs: RCB1 OR RCB2 OR RCB3 OR RCB4

The RCS barrier is the reactor coolant system pressure boundary and includes the reactor vessel and all reactor coolant system piping up to the isolation valves.

1. RCS Leak Rate (RCB1)

Loss: RCS leakage > 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: RCS leakage exceeding Normal Makeup Capacity (50 gpm)
Unit 2: RCS leakage exceeding the capacity of one charging pump in the normal charging mode (44 gpm)

Basis:

The loss EAL addresses conditions where leakage from the RCS is greater than available inventory control capacity such that a loss of subcooling has occurred. The loss of subcooling is the fundamental indication that the inventory control systems are inadequate in maintaining RCS pressure and inventory against the mass loss through the leak.

The potential loss EAL is based on the inability to maintain normal liquid inventory within the 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 decreasing 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 due to failure of a primary relief valve to reseat

FISSION PRODUCT BARRIER DEGRADATION (RCB1)

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 due to failure of a primary relief valve to reseat

Reference Documents

1. Unit 1 EOP 1202.013, Figure 1, Saturation and Adequate SCM
2. Unit 1 EOP Setpoint Document, Calculation 90-E-0016-07, 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

FISSION PRODUCT BARRIER DEGRADATION

RCS BARRIER EALs: RCB1 OR RCB2 OR RCB3 OR RCB4

The RCS barrier is the reactor coolant system pressure boundary and includes the reactor vessel and all reactor coolant system piping up to the isolation valves.

2. SG Tube Rupture **(RCB2)**

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

Potential Loss: NONE

Basis:

This EAL is intended to address the full spectrum of steam generator (SG) tube rupture events in conjunction with containment barrier loss EAL **CNB3** and fuel clad barrier EALs. The loss EAL addresses RUPTURED SG(s) for which the leakage is large enough to cause actuation of ECCS safety injection. This is consistent to the RCS barrier potential loss EAL **RCB1**. By itself, this EAL will result in the declaration of an Alert. However, if the SG is also FAULTED (i.e., two barriers failed), the declaration escalates to a Site Area Emergency per containment barrier loss EAL **CNB3**.

There is no potential loss EAL.

FISSION PRODUCT BARRIER DEGRADATION

RCS BARRIER EALs: RCB1 OR RCB2 OR RCB3 OR RCB4

The RCS barrier is the reactor coolant system pressure boundary and includes the reactor vessel and all reactor coolant system piping up to the isolation valves.

3. Containment Radiation Monitoring (RCB3)

Loss: Containment radiation monitor reading > 100 R/hr

Potential Loss: NONE

Basis:

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 was derived assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with an RCS concentration of 60 µCi/gm dose equivalent I-131 into the containment atmosphere. This reading is an order of magnitude lower than that specified for fuel clad barrier EAL **FCB4**. Thus, this EAL would be indicative of an RCS leak only. If the radiation monitor reading increased to that specified by fuel clad barrier EAL **FCB4**, 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.

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 BARRIER DEGRADATION

RCS BARRIER EALs: RCB1 OR RCB2 OR RCB3 OR RCB4

The RCS barrier is the reactor coolant system pressure boundary and includes the reactor vessel and all reactor coolant system piping up to the isolation valves.

4. SM/TSC Director/EOF 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 based on:

- Imminent barrier degradation (within 2 hours) due to degraded safety system performance
- Degraded ability to monitor 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. *(See also IC SG1, "Prolonged Loss of All Offsite Power and Prolonged Loss of All Onsite AC Power", for additional information.)*

FISSION PRODUCT BARRIER DEGRADATION

CONTAINMENT BARRIER EALs: CNB1 OR CNB2 OR CNB3 OR CNB4 OR CNB5 OR CNB6 OR CNB7

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

1. Containment Pressure (CNB1)

Loss:

Rapid unexplained containment pressure loss following initial rise

OR

Containment pressure or sump level not consistent with LOCA conditions

Potential Loss:

Unit 1: 73.7 PSIA (59 PSIG) and rising

Unit 2: 73.7 PSIA and rising

OR

An explosive mixture exists in Containment

OR

Containment Pressure > containment spray actuation setpoint with less than one full train of spray operating

Unit 1: 44.7 PSIA (30 PSIG)

Unit 2: 23.3 PSIA

Basis:

Rapid unexplained loss of pressure (i.e., not attributable to containment spray or condensation effects) following an initial pressure rise indicates a loss of containment integrity. Containment pressure and sump levels should rise as a result of the mass and energy release into containment from a LOCA. Thus, sump level or pressure or humidity (Unit 2) not rising indicates containment bypass and a loss of containment integrity. The containment pressure setpoint for potential loss of containment is based on the containment design pressure. 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

FISSION PRODUCT BARRIER DEGRADATION (CNB1)

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. Conditions leading to these indications result from RCS barrier and/or fuel clad barrier loss. Thus, this EAL is primarily a discriminator between Site Area Emergency and General Emergency representing a potential loss of the third barrier.

The second potential loss EAL based on containment pressure represents a potential loss of containment in that the containment heat removal/depressurization system (containment sprays, 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 BARRIER DEGRADATION

CONTAINMENT BARRIER EALs: CNB1 OR CNB2 OR CNB3 OR CNB4 OR CNB5 OR CNB6 OR CNB7

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

2. Core Exit Thermocouples **(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:

In this EAL, 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.

FISSION PRODUCT BARRIER DEGRADATION (CNB2)

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 should make the declaration as soon as it is determined that the procedures have been, or will be ineffective.

The conditions in this potential loss EAL represent an imminent core melt sequence which, if not corrected, could lead to vessel failure and a higher potential for containment failure. In conjunction with the core cooling and heat sink criteria in the fuel and RCS barrier columns, this EAL would result in the declaration of a General Emergency (loss of two barriers and the potential loss of a third). If the function restoration procedures are ineffective, there is no success path.

FISSION PRODUCT BARRIER DEGRADATION

CONTAINMENT BARRIER EALs: CNB1 OR CNB2 OR CNB3 OR CNB4 OR CNB5 OR CNB6 OR CNB7)

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

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

Loss:

1. RUPTURED steam generator is also FAULTED outside Containment

   OR

2. Primary-to-secondary leakrate > 10 gpm with nonisolable 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. Secondary side release paths to environment include atmospheric relief valves and main steam line safety valves, as well as discharges direct to the environment from an unisolable secondary or steam line break. The threshold for establishing the nonisolable secondary side release is intended to be a prolonged release of radioactivity from the RUPTURED steam generator directly to the environment. This could be expected to occur when the main condenser is unavailable to accept the contaminated steam (i.e., SGTR with concurrent loss of offsite power and the RUPTURED steam generator is required for plant cooldown or has a stuck open relief valve). 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 a nonisolable release path to the environment. These minor releases are assessed using Abnormal Rad Levels/Radiological Effluent ICs.

For smaller breaks, not exceeding the Normal Makeup Capacity for Unit 1 or the capacity of one charging pump in the normal charging lineup for Unit 2, but exceeding 10 gpm, this EAL results in an Unusual Event.

For breaks that exceed the Normal Makeup Capacity for Unit 1 or the capacity of one charging pump in the normal charging lineup for Unit 2 or result in ECCS actuation, RCS barrier EALs **RCB1** or **RCB2** would result in an Alert if the ruptured SG is isolated. If the SG remains unisolated, this EAL will be a discriminator for Site Area Emergencies. Escalation to General Emergency would be based on Loss or Potential Loss of the fuel clad barrier.

There is no equivalent potential loss EAL for this item.

FISSION PRODUCT BARRIER DEGRADATION

CONTAINMENT BARRIER EALs: CNB1 OR CNB2 OR CNB3 OR CNB4 OR CNB5 OR CNB6 OR CNB7

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

4. Containment Isolation Valve Status after Containment Isolation (CNB4)

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

Potential Loss: NONE

Basis:

This EAL is intended to address incomplete containment isolation that allows direct release to the environment. It represents a loss of the containment barrier. 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. This EAL is not intended to prohibit overriding containment isolation valves when directed by plant procedures. A manually overridden containment isolation valve is considered isolable until proven otherwise.

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 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.

There is no potential loss EAL associated with this item.

FISSION PRODUCT BARRIER DEGRADATION

CONTAINMENT BARRIER EALs: CNB1 OR CNB2 OR CNB3 OR CNB4 OR CNB5 OR CNB6 OR CNB7

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

5. Significant Radioactive Inventory in Containment (CNB5)

Loss: None

Potential Loss: Containment high range Rad Monitor reading > 4000 R/hr

Basis:

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 (~20%) well in excess of the EALs associated with both loss of fuel clad and loss of RCS barriers. A major release of radioactivity requiring offsite protective actions from core damage is not possible unless a major failure of fuel cladding allows radioactive material to be released from the core into the reactor coolant.

Regardless of whether containment is challenged, this amount of activity in containment, if released, could have such severe consequences that it is prudent to treat this as a potential loss of containment, such that a General Emergency declaration is warranted. 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%.

There is no loss EAL associated with this item.

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 BARRIER DEGRADATION

CONTAINMENT BARRIER EALs: CNB1 OR CNB2 OR CNB3 OR CNB4 OR CNB5 OR CNB6 OR CNB7

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

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.

FISSION PRODUCT BARRIER DEGRADATION

CONTAINMENT BARRIER EALs: CNB1 OR CNB2 OR CNB3 OR CNB4 OR CNB5 OR CNB6 OR CNB7

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

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 based on:

- Imminent barrier degradation (within 2 hours) due to degraded safety system performance
- Degraded ability to monitor 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. *(See also IC SG1, "Prolonged Loss of All Offsite Power and Prolonged Loss of All Onsite AC Power", for additional information.)*

Hazards and Other Conditions Affecting Plant Safety

HU1

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

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

Operating Mode Applicability:

All

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

1. Security events as determined from the ANO Safeguards Contingency Plan and reported by ANO Security shift supervision.

   OR

2. A credible site-specific security threat notification.

Basis:

Security shift supervision are the designated personnel 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.

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

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

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

The intent of EAL #2 is to ensure that appropriate notifications for the security threat are made in a timely manner. Only the plant to which the specific threat is made need declare the Notification of Unusual Event.

The determination of "credible" is made through use of information found in the Safeguards Contingency Plan.

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

Hazards and Other Conditions Affecting Plant Safety

HU2

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

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

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 process or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

Basis:

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

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

Hazards and Other Conditions Affecting Plant Safety

HU4

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

FIRE within PROTECTED AREA Boundary not extinguished within 15 minutes of detection

Operating Mode Applicability:

All

Emergency Action Level(s):

1. FIRE in Table H-1 buildings or areas contiguous to any Table H-1 areas not extinguished within 15 minutes of Control Room notification or verification of a Control Room alarm:

Table H1

Unit 1	Unit 2
CA-1 & HP Office Area	2A-3 Room
Condensate Demineralizer Room	2A-4, 2D-02, & East Battery Room
Corridor 98	2B-53 Room
Fire Area C	2B-63 Room
LNEPR	2B9/2B10 Room
LSEER/ Air Compressor Room	2Y11/13 Equipment Room
LSEPR	Aux Bldg 317' General Access
LSPPR	Aux Bldg 335'
MSIV Room	Aux Bldg 354'
North ES Switchgear Room (A-4)	B ESF Room
South ES Switchgear Room	Corridor Behind Door 340
Turbine Building • A1, A2, H1, H2 Swgr area • 354' Bowling Alley north end west of BA comp room • 368' West Heater Deck from LSEER (orange door) along east wall of ES Swgr Rooms to Corridor 98 door.	Turbine Bldg • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north SWGR Room (2A3) and East of LNEPR
UNEPR/Hot Tool Room/Decon Room	Intake Structure 354' or 366'
USEPR	LNEPR
USPPR	LSEPR
	MG Set Room
	Steam Pipe Area
	Hot Machine Shop
	UNEPR
	UNPPR, LNPPR
	USPPR

Hazards and Other Conditions Affecting Plant Safety (HU4)

Basis:

The purpose of this IC is to address the magnitude and extent of FIREs that may be potentially significant precursors to damage to safety systems. As used here, *Detection* is visual observation and report by plant personnel or sensor alarm indication. The 15 minute time period begins with a credible notification that a FIRE is occurring, or indication of a VALID fire detection system alarm. Verification of a fire detection system alarm includes actions that can be taken within the Control Room to ensure that the alarm is not spurious. A verified alarm is assumed to be an indication of a FIRE unless it is disproved within the 15 minute period by personnel dispatched to the scene. In other words, a personnel report from the scene may be used to disprove a sensor alarm if received within 15 minutes of the alarm, but shall not be required to verify the alarm.

The intent of this 15 minute duration is to size the FIRE and to discriminate against small FIREs that are readily extinguished (e.g., smoldering waste paper basket). Table H1 applies to buildings and areas adjacent (in actual contact with or immediately adjacent) to plant VITAL AREAs or other significant buildings or areas. The intent of this EAL is not to include buildings (i.e., warehouses) or areas that are not adjacent (in actual contact with or immediately adjacent) to plant VITAL AREAs. This IC excludes FIREs within administration buildings, waste-basket FIREs, and other small FIREs of no safety consequence. Escalation to a higher emergency class is by **HA4**.

Hazards and Other Conditions Affecting Plant Safety

HU5

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

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

Operating Mode Applicability:

All

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

1. Report or detection of toxic or flammable gases that has or could enter the site area boundary in amounts that can 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 existence of uncontrolled releases of toxic or flammable gas that may enter the site boundary and affect normal plant operations. It is intended that releases of toxic or flammable gases are of sufficient quantity, and the release point of such gases is such that normal plant operations would be affected. This would exclude small or incidental releases, or releases that do not impact structures needed for plant operation. The EALs are intended to not require significant assessment or quantification. The EALs assume an uncontrolled process that has the potential to affect plant operations, or personnel safety.

Escalation of this EAL is via **HA5**, which involves a quantified release of toxic or flammable gas affecting VITAL AREAs.

Hazards and Other Conditions Affecting Plant Safety

HU6

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

Natural and destructive phenomena affecting the PROTECTED AREA

Operating Mode Applicability:

All

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

1. An earthquake is felt and the 0.01g acceleration alarm annunciates indicating an earthquake has occurred.

   OR

2. Report by plant personnel of tornado or high winds > 67 mph striking within PROTECTED AREA boundary.

   OR

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

   OR

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

   OR

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

   OR

(CONTINUED ON NEXT PAGE)

Hazards and Other Conditions Affecting Plant Safety (HU6)

6. Uncontrolled flooding in Table H-1 areas that has the potential to affect safety related equipment needed for the current operating mode.

Table H1	
Unit 1	Unit 2
CA-1 & HP Office Area Condensate Demineralizer Room Corridor 98 Fire Area C LNEPR LSEER/ Air Compressor Room LSEPR LSPPR MSIV Room North ES Switchgear Room (A-4) South ES Switchgear Room Turbine Building • A1, A2, H1, H2 Swgr area • 354' Bowling Alley north end west of BA comp room • 368' West Heater Deck from LSEER (orange door) along east wall of ES Swgr Rooms to Corridor 98 door. UNEPR/Hot Tool Room/Decon Room USEPR USPPR	2A-3 Room 2A-4, 2D-02, & East Battery Room 2B-53 Room 2B-63 Room 2B9/2B10 Room 2Y11/13 Equipment Room Aux Bldg 317' General Access Aux Bldg 335' Aux Bldg 354' B ESF Room Corridor Behind Door 340 Turbine Bldg • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north SWGR Room (2A3) and East of LNEPR Intake Structure 354' or 366' LNEPR LSEPR MG Set Room Steam Pipe Area Hot Machine Shop UNEPR UNPPR, LNPPR USPPR

OR

7. Lake Dardanelle level > 345 feet.

OR

8. Lake Dardanelle level < 335 feet.

Basis:

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

Hazards and Other Conditions Affecting Plant Safety (HU6)

EAL #1 is based on damage that may be caused to some portions of the site, but should not affect ability of safety functions to operate. The method of detection is based on instrumentation, validated by a reliable source, or operator assessment. As defined in the EPRI sponsored "Guidelines for Nuclear Plant Response to an Earthquake", dated October 1989, a *"felt earthquake"* is:

An earthquake of sufficient intensity such that: (a) the vibratory ground motion is felt at the nuclear plant site and recognized as an earthquake based on a consensus of control room operators on duty at the time, and (b) for plants with operable seismic instrumentation, the seismic switches of the plant are activated.

EAL #2 is based on the assumption that a tornado striking (touching down) or high winds within the PROTECTED AREA may have potentially damaged plant structures containing functions or systems required for safe shutdown of the plant. The high wind value in EAL #2 is conservatively based on the SAR design basis for Unit 1 of 67 mph. Unit 2 Design basis is 80 mph. If damage is confirmed visually or by other plant indications, the event may be escalated to Alert.

EAL #3 is intended to address crashes of vehicle types large enough to cause significant damage to plant structures containing functions and systems required for safe shutdown of the plant. If the crash is confirmed to affect a plant VITAL AREA, the event may be escalated to Alert.

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

EAL #5 is based on main turbine rotating component failures of sufficient magnitude to cause observable damage to the turbine casing or to the seals of the turbine generator. Of major concern is the potential for leakage of combustible fluids (lubricating oils) and gases (hydrogen cooling) to the plant environs. Actual FIREs and flammable gas build up are appropriately classified via **HU4** and **HU5**. Generator seal damage observed after generator purge does not meet the intent of this EAL because it did not impact normal operation of the plant. This EAL is consistent with the definition of a NUE while maintaining the anticipatory nature desired and recognizing the risk to non-safety related equipment. Escalation of the emergency classification is based on potential damage done by missiles generated by the failure or in conjunction with a steam generator tube rupture. The latter event would be classified by the radiological EALs or fission product barrier EALs.

EAL #6 addresses the effect of flooding caused by internal events such as component failures, equipment misalignment, or outage activity mishaps. The site-specific areas include those areas that contain systems required for safe shutdown of the plant and that are not designed to be wetted or submerged. Escalation of the emergency classification is based on the damage caused or by access restrictions that prevent necessary plant operations or systems monitoring.

Hazards and Other Conditions Affecting Plant Safety (HU6)

EAL #7 and #8 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

ALERT

Initiating Condition:

Confirmed security event within a plant PROTECTED AREA

Operating Mode Applicability:

All

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

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

   OR

2. Other security events as determined from the ANO Safeguards Contingency Plan and reported by ANO Security shift supervision.

Basis:

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

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

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

Security shift supervision are the designated personnel on-site qualified and trained to confirm that a security event is occurring or has occurred. Training on security event classification confirmation is closely controlled due to the strict secrecy controls placed on the plant Security Plan.

Hazards and Other Conditions Affecting Plant Safety

HA2

ALERT

Initiating Condition:

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 process or have occurred which involve actual or likely potential substantial degradation of the level of safety of the plant. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

Basis:

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

Hazards and Other Conditions Affecting Plant Safety

HA3

ALERT

Initiating Condition:

Control Room evacuation has been initiated

Operating Mode Applicability:

All

Emergency Action Level(s):

Entry into Alternate Shutdown procedure for 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 is necessary. Inability to establish plant control from outside the Control Room within 15 minutes will escalate this event to a Site Area Emergency.

Hazards and Other Conditions Affecting Plant Safety

HA4

ALERT

Initiating Condition:

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

Operating Mode Applicability:

All

Emergency Action Level(s):

1. FIRE or EXPLOSION in any Table H1 areas.

Table H1	
Unit 1	Unit 2
CA-1 & HP Office Area Condensate Demineralizer Room Corridor 98 Fire Area C LNEPR LSEER/ Air Compressor Room LSEPR LSPPR MSIV Room North ES Switchgear Room (A-4) South ES Switchgear Room Turbine Building • A1, A2, H1, H2 Swgr area • 354' Bowling Alley north end west of BA comp room • 368' West Heater Deck from LSEER (orange door) along east wall of ES Swgr Rooms to Corridor 98 door. UNEPR/Hot Tool Room/Decon Room USEPR USPPR	2A-3 Room 2A-4, 2D-02, & East Battery Room 2B-53 Room 2B-63 Room 2B9/2B10 Room 2Y11/13 Equipment Room Aux Bldg 317' General Access Aux Bldg 335' Aux Bldg 354' B ESF Room Corridor Behind Door 340 Turbine Bldg • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north SWGR Room (2A3) and East of LNEPR Intake Structure 354' or 366' LNEPR LSEPR MG Set Room Steam Pipe Area Hot Machine Shop UNEPR UNPPR, LNPPR USPPR

AND

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

Hazards and Other Conditions Affecting Plant Safety (HA4)

Basis:

The areas listed are those containing functions and systems required for the safe shutdown of the plant. The list of areas was developed from the AOPs, EOPs, and the Safe Shutdown Analysis. This makes it easier to determine if the FIRE or EXPLOSION is potentially affecting one or more redundant trains of safety systems. Escalation to a higher emergency class, if appropriate, will be based on System Malfunction, Fission Product Barrier Degradation, Abnormal Rad Levels/Radiological Effluent, or SM/TSC Director/EOF Director Judgment EALs.

This EAL addresses a FIRE/EXPLOSION and not the degradation in performance of affected systems. System degradation is addressed in the System Malfunction EALs. The reference to damage of systems is used to identify the magnitude of the FIRE/EXPLOSION and to discriminate against minor FIREs/EXPLOSIONs. The reference to safety systems is included to discriminate against FIREs/EXPLOSIONs in areas having a low probability of affecting safe operation. The significance here is not that a safety system was degraded but the fact that the FIRE/EXPLOSION was large enough to cause damage to these systems.

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

The inclusion of a "report of VISIBLE DAMAGE" should not be interpreted as mandating a lengthy damage assessment prior to classification. No attempt is made in this EAL to assess the actual magnitude of the damage. The occurrence of the EXPLOSION with reports of evidence of damage is sufficient for declaration. The declaration of an Alert and the activation of the Technical Support Center will provide the SM/TSC Director/EOF Director with the resources needed to perform these damage assessments. The SM/TSC Director/EOF Director also needs to consider any security aspects of the EXPLOSIONs, if applicable.

Hazards and Other Conditions Affecting Plant Safety

HA5

ALERT

Initiating Condition:

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

Operating Mode Applicability:

All

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

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

   OR

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

Basis:

This IC is based on gases that affect the safe operation of the plant. This IC applies to buildings and areas adjacent to plant VITAL AREAs or other significant buildings or areas (i.e., service water intake). The intent of this IC is not to include buildings (e.g., warehouses) or other areas that are not immediately adjacent to plant VITAL AREAs. It is appropriate that increased monitoring be done to ascertain whether consequential damage has occurred.

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

EAL #2 is met when the flammable gas concentration in a VITAL AREA or any building or area adjacent to a VITAL AREA exceeds the LOWER FLAMMABILITY LIMIT. Flammable gasses, such as hydrogen and acetylene, are routinely used to maintain plant systems (hydrogen) or to repair equipment/components (acetylene - used in welding). This EAL addresses concentrations at which gases can ignite/support combustion. An uncontrolled release of flammable gasses within a facility structure has the potential to affect safe operation of the plant by limiting either operator or equipment operations due to the potential for ignition and resulting equipment damage/personnel injury. Once it has been determined that an uncontrolled release is occurring, then sampling must be done to determine if the concentration of the released gas is within this range.

Escalation to a higher emergency class, if appropriate, will be based on System Malfunction, Fission Product Barrier Degradation, Abnormal Rad Levels/ Radioactive Effluent, or SM/TSC Director/EOF Director Judgment EALs.

Hazards and Other Conditions Affecting Plant Safety

HA6

ALERT

Initiating Condition:

Natural and destructive phenomena affecting the plant VITAL AREA

Operating Mode Applicability:

All

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

1. An earthquake is felt and the 0.1g acceleration alarm annunciates indicating an Operating Basis Earthquake has occurred.

   OR

2. Tornado or high winds > 67 mph within PROTECTED AREA boundary resulting in VISIBLE DAMAGE to any of the following plant structures/equipment or Control Room indication of degraded performance of those systems:

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

   OR

3. Vehicle crash within PROTECTED AREA boundary and resulting in VISIBLE DAMAGE to any of the following plant structures or equipment therein or Control Room indication of degraded performance of those systems:

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

   OR

(CONTINUED ON NEXT PAGE)

Hazards and Other Conditions Affecting Plant Safety (HA6)

4. Turbine failure-generated missiles resulting in VISIBLE DAMAGE to or penetration of any of the following plant areas:

   - Turbine Building
   - Auxiliary Building
   - Reactor Building
   - Diesel Fuel Vault
   - Startup Transformers

   OR

5. Uncontrolled flooding in Table H1 areas that results in degraded safety system performance as indicated in the Control Room or that creates industrial safety hazards (e.g., electric shock) that precludes access necessary to operate or monitor safety equipment:

Table H1

Unit 1	Unit 2
CA-1 & HP Office Area Condensate Demineralizer Room Corridor 98 Fire Area C LNEPR LSEER/ Air Compressor Room LSEPR LSPPR MSIV Room North ES Switchgear Room (A-4) South ES Switchgear Room Turbine Building • A1, A2, H1, H2 Swgr area • 354' Bowling Alley north end west of BA comp room • 368' West Heater Deck from LSEER (orange door) along east wall of ES Swgr Rooms to Corridor 98 door. UNEPR/Hot Tool Room/Decon Room USEPR USPPR	2A-3 Room 2A-4, 2D-02, & East Battery Room 2B-53 Room 2B-63 Room 2B9/2B10 Room 2Y11/13 Equipment Room Aux Bldg 317' General Access Aux Bldg 335' Aux Bldg 354' B ESF Room Corridor Behind Door 340 Turbine Bldg • 2A1, 2A2, 2H1, 2H2 Area • 354' West wall of Demineralizer area • 368' West Heater Deck north of north SWGR Room (2A3) and East of LNEPR Intake Structure 354' or 366' LNEPR LSEPR MG Set Room Steam Pipe Area Hot Machine Shop UNEPR UNPPR, LNPPR USPPR

   OR

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

Hazards and Other Conditions Affecting Plant Safety (HA6)

Basis:

These EALs escalate from the NUE EALs in 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 indications of degraded system response or performance. The occurrence of VISIBLE DAMAGE and/or degraded system response is intended to discriminate against lesser events. The initial "report" should not be interpreted as mandating a lengthy damage assessment prior to classification. No attempt is made in this EAL to assess the actual magnitude of the damage. The significance here is not that a particular system or structure was damaged, but rather, that the event was of sufficient magnitude to cause this degradation. Escalation to higher classifications occurs on the basis of other EALs (e.g., System Malfunction).

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

EAL #2 is based on the assumption that a tornado striking (touching down) or high winds within the PROTECTED AREA may have potentially damaged plant structures containing functions or systems required for safe shutdown of the plant. The high wind value in EAL #2 is conservatively based on the SAR design basis for Unit 1 of 67 mph. Unit 2 Design basis is 80 mph. If damage is confirmed visually or by other plant indications, escalation to Alert is appropriate.

EAL #3 is intended to address crashes of vehicle types large enough to cause significant damage to plant structures containing functions and systems required for safe shutdown of the plant.

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

EAL #5 addresses the effect of internal flooding that has resulted in degraded performance of systems affected by the flooding, or has created industrial safety hazards (e.g., electrical shock) that preclude necessary access to operate or monitor safety equipment. The inability to operate or monitor safety equipment represents a potential for substantial degradation of the level of safety of the plant. This flooding may have been caused by internal events such as component failures, equipment misalignment, or outage activity mishaps. The areas include those areas that contain systems required for safe shutdown of the plant that are not designed to be wetted or submerged.

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"

Hazards and Other Conditions Affecting Plant Safety

HS1

SITE AREA EMERGENCY

Initiating Condition:

Confirmed security event in a plant VITAL AREA

Operating Mode Applicability:

All

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

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

   OR

2. Other security events as determined from the ANO Safeguards Contingency Plan and reported by ANO Security shift supervision.

Basis:

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

Consideration should be given to the following types of events when evaluating an event against the criteria of the site specific Security Contingency Plan: SABOTAGE and HOSTAGE/EXTORTION. The Safeguards Contingency Plan identifies numerous events/conditions that constitute a threat/compromise the Station's security. Only those events that involve actual or likely major failures of plant functions needed for protection of the public need to be considered. The following events would **not** normally meet this requirement: failure by a member of the security force to carry out an assigned/required duty, internal disturbances, loss/compromise of safeguards materials or strike actions.

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

Security shift supervision are the designated personnel on-site qualified and trained to confirm that a security event is occurring or has occurred. Training on security event classification confirmation is closely controlled due to the strict secrecy controls placed on the plant Security Plan.

Hazards and Other Conditions Affecting Plant Safety

HS2

SITE AREA EMERGENCY

Initiating Condition:

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

Operating Mode Applicability:

All

Emergency Action Level(s):

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

Basis:

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

Hazards and Other Conditions Affecting Plant Safety

HS3

SITE AREA EMERGENCY

Initiating Condition:

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 per the following procedures within 15 minutes:

   Unit 1: 1203.002, "Alternate Shutdown"
   Unit 2: 2203.014, "Alternate Shutdown"

Basis:

Expeditious transfer of safety systems has not occurred but fission product barrier damage may not yet be indicated. The intent of this IC is to capture those events where control of the plant cannot be reestablished in a timely manner. The determination of whether or not control is established outside of the Control Room 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 control of the plant has or has not been established.

The intent of the EAL is to establish control of important plant equipment and knowledge of important plant parameters in a timely manner. Primary emphasis should be placed on those components and instruments that supply protection for and information about safety functions such as reactivity control (ability to shutdown the reactor and maintain it shutdown), RCS inventory (ability to cool the core), and secondary heat removal (ability to maintain a heat sink).

Escalation of this event, if appropriate, would be by Fission Product Barrier Degradation, Abnormal Rad Levels/Radiological Effluent, or SM/TSC Director/EOF Director Judgment EALs.

Hazards and Other Conditions Affecting Plant Safety

HG1

GENERAL EMERGENCY

Initiating Condition:

Security event resulting in loss of physical control of the facility

Operating Mode Applicability:

All

Emergency Action Level(s):

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

Basis:

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

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

Loss of physical control of the Control Room or remote shutdown/alternate shutdown capability alone may not prevent the ability to maintain safety functions. Design of the remote shutdown/alternate capability and the location of the transfer switches should be taken into account.

Hazards and Other Conditions Affecting Plant Safety

HG2

GENERAL EMERGENCY

Initiating Condition:

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

Operating Mode Applicability:

All

Emergency Action Level(s):

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

Basis:

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

SYSTEM MALFUNCTION

SU1

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

Loss of all offsite power to Vital 4.16 KV busses for > 15 minutes

Operating Mode Applicability:

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

Emergency Action Level(s):

1. Loss of power to all Unit Auxiliary and Startup Transformers for > 15 minutes.

   AND

   At least one vital 4.16 KV bus powered from an independent diesel generator.

Basis:

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

The EAL allows credit for operation of installed design feature (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

SU6

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

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

Operating Mode Applicability:

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

Emergency Action Level(s):

1. UNPLANNED loss of most or all annunciators or indicators associated with safety systems for > 15 minutes.

Basis:

This IC and its associated EALs 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.).

Quantification of "Most" is arbitrary, however, it is estimated that if approximately 75% of the safety system annunciators or indicators are lost, there is a higher 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)

It is further recognized that each plant design provides 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**.

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.). The loss of control room annunciators increases the difficulty to recognize changing plant conditions. It is estimated that if approximately 75% of the safety system annunciators or indications are lost, there is an increased risk that a degraded plant condition could go undetected. For ANO2 the selection of 9 annunciator panels was chosen since if greater than 9 annunciator panels were lost this would mean that all AC and DC was lost to either the Red or Green safety system. Any less than 9 annunciator panels would mean that a localized problem exists that does not affect the annunciators for an entire train.

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

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

This NUE will be escalated to an Alert if a transient is in progress during the loss of annunciation or indication (**SA6**).

Basis Documents:

1. 1203.043, "Loss Control Room Annunciator"
2. 2203.042, "Loss of Annunciators"

SYSTEM MALFUNCTION

SU7

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

RCS leakage

Operating Mode Applicability:

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

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

1. Unidentified or pressure boundary leakage > 10 gpm.

   OR

2. Identified leakage > 25 gpm.

Basis:

This IC is included as an NUE because the condition may be a precursor of more serious conditions and, as result, is considered to be a potential degradation of the level of safety of the plant. The 10 gpm value for the unidentified and pressure boundary leakage was selected as it is observable with normal Control Room indications. Lesser values must generally be determined through time-consuming surveillance tests (e.g., mass balances). The EAL for identified leakage is set at a higher value due to the lesser significance of identified leakage in comparison to unidentified or pressure boundary leakage. In either case, escalation of this IC to the Alert level is via **FA1**.

SYSTEM MALFUNCTION

SU8

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

UNPLANNED loss of all onsite or offsite communications capabilities

Operating Mode Applicability:

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

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

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

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

OR

2. Loss of all offsite communications capability (Table M2)

Table M2 Offsite Communications Equipment
All telephone lines (commercial and microwave)
Station radio system
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's ability to perform routine tasks necessary for plant operations or the ability to communicate problems with offsite authorities. The loss of offsite communications ability is expected to be significantly more comprehensive than the condition addressed by 10 CFR 50.72.

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

Basis Documents:
1. 1903.062, "Communications System Operating Procedure"

SYSTEM MALFUNCTION

SU9

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

Fuel clad degradation

Operating Mode Applicability:

Power Operation (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 x 10^5 counts per minute.

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

   Unit 1:
   RCS Sample Analysis: > 3.50 µCi/gm IDE
   RCS Sample Analysis: > 72/Ē µCi/gm Gross Activity

   Unit 2:
   RCS Sample Analysis: > 1.0 µCi/gm IDE
   RCS Sample Analysis: > 100/Ē µCi/gm Gross Activity

Basis:

This IC and its associated EALs are included as an NUE because it is considered to be a potential degradation in the level of safety of the plant and a potential precursor of more serious problems. EAL #1 addresses the Unit 1 Letdown Radiation Monitor alarm setpoint that is indicative of RCS Iodine levels that may exceed the Technical Specification limit. No monitor reading is provided for Unit 2 because the Letdown Radiation Monitor alarm setpoint does not correlate with the Technical Specification limit. EAL #2 addresses reactor coolant samples exceeding Technical Specification limits for iodine spikes that are indicative of a loss of fuel clad integrity. Escalation of this EAL to the Alert level is via the Fission Product Barrier Degradation Monitoring EALs. The companion EAL to **SU4** for the Cold Shutdown/Refueling modes is **CU4**.

SYSTEM MALFUNCTION

SU10

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

Inadvertent criticality

OPERATING MODE APPLICABILITY:

Hot Standby (Mode 3)
Hot Shutdown (Mode 4)

Emergency Action Level(s):

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

Basis:

This IC addresses inadvertent criticality events. While the primary concern is criticality events that occur in cold shutdown or refueling modes (NUREG 1449, Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States), this IC is applicable in other modes in which inadvertent criticalities are possible. This IC indicates a potential degradation of the level of safety of the plant, warranting a NUE classification. This IC excludes inadvertent criticalities that occur during planned reactivity changes associated with reactor startups (e.g., criticality earlier than estimated). The Cold Shutdown/Refueling IC is **CU8**.

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

Escalation would be by the fission product barrier EALs, as appropriate to the operating mode at the time of the event, or by SM/TSC Director/EOF Director Judgment.

Reference Documents:
1. 1203.012G, "Annunciator K08 Corrective Action"
2. 2203.012D, "Annunciator 2K04 Corrective Action"

SYSTEM MALFUNCTION

SU11

NOTIFICATION OF UNUSUAL EVENT

Initiating Condition:

Inability to reach required shutdown within Technical Specification limits

Operating Mode Applicability:

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

Emergency Action Level(s):

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

Basis:

Limiting Conditions for Operation (LCOs) require the plant to be brought to a required shutdown mode when the Technical Specification required configuration cannot be restored. Depending on the circumstances, this may or may not be an emergency or precursor to a more severe condition. In any case, the initiation of plant shutdown required by the site Technical Specifications requires a 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 a 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. 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

SA1

ALERT

Initiating Condition:

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

Operating Mode Applicability:

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

Emergency Action Level(s):

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

   AND

   Any additional single failure will result in station blackout.

Basis:

This IC and its associated EAL is intended to provide an escalation from SU1. The condition indicated is the degradation of the offsite and onsite power systems such that any additional single failure would result in a station blackout. This condition could occur due to a loss of offsite power with a concurrent failure of 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 diesels with only one train of emergency busses being backfed from the unit main generator, or the loss of onsite emergency diesels with only one train of emergency busses being backfed from offsite power. The subsequent loss of this single power source would escalate the event to a Site Area Emergency in accordance with **SS1**.

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

SYSTEM MALFUNCTION (SA1)

Even though a vital 4.16 KV bus may be energized, if necessary loads (i.e., loads that if lost would inhibit decay heat removal capability or reactor vessel makeup capability) are not operable on the energized bus then the bus should not be considered operable. If this bus was the only energized bus then a Site Area Emergency per **SS1** should be declared.

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

ALERT

Initiating Condition:

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

Operating Mode Applicability:

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

Emergency Action Level(s):

1. Indication(s) exist that indicate that reactor protection system setpoint was exceeded and automatic trip did not occur, and a successful manual trip occurred.

Basis:

This condition indicates failure of the reactor protection system to trip the reactor. This condition is more than a potential degradation of a safety system in that a front line automatic protection system did not function in response to a plant transient and thus the plant safety has been compromised, and design limits of the fuel may have been exceeded. An Alert is indicated because conditions exist that lead to potential loss of fuel clad or RCS barriers. Reactor protection system setpoint being exceeded, rather than limiting safety system setpoint being exceeded, is specified here because failure of the reactor protection system is the issue. A manual trip is any set of actions by the reactor operator(s) at the reactor control console which causes control rods to be rapidly inserted into the core and brings the reactor subcritical (e.g., manual reactor trip, diverse trip initiation). Any action taken to trip the reactor from any location other than panel C03 (Unit 1) or 2C03 (Unit 2) constitutes a failure of the manual trip function. Failure of manual trip would escalate the event to a Site Area Emergency (SS3).

The operator may not detect the RPS failure prior to performing the manual trip. The failure would be detected by reviewing the post trip sequence of events printout from the plant computer and the emergency class would be declared, at that time.

SYSTEM MALFUNCTION

SA6

ALERT

Initiating Condition:

UNPLANNED loss of most or all safety system annunciation or indication in Control Room with either (1) a SIGNIFICANT TRANSIENT in progress, or (2) SPDS and PMS dynamic alarm functions are unavailable

Operating Mode Applicability:

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

Emergency Action Level(s):

1. UNPLANNED loss of most or all annunciators or indicators associated with safety systems for > 15 minutes.

   AND

   Either of the following:

   a. A SIGNIFICANT TRANSIENT is in progress.

      OR

   b. Compensatory non-alarming indications are unavailable.

SYSTEM MALFUNCTION (SA6)

Basis:

This EAL 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 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.

Quantification of "Most" is arbitrary, however, it is estimated that if approximately 75% of the safety system annunciators or indicators are lost, there is higher 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 more 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**.

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

This Alert will be escalated to a Site Area Emergency (**SS6**) if the operating crew cannot monitor the transient in progress.

Reference Documents:

1. 1015.037, "Post Transient Review"
2. 1203.043, "Loss Control Room Annunciator"
3. 2203.042, "Loss of Annunciators"

SYSTEM MALFUNCTION

SS1

SITE AREA EMERGENCY

Initiating Condition:

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

Operating Mode Applicability:

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

Emergency Action Level(s):

1. Loss of power to all Unit Auxiliary and Startup transformers.

   AND

   Failure of all diesel generators to supply power to Vital 4.16 KV busses.

   AND

   Failure to restore power to at least one Vital 4.16 KV bus within 15 minutes from the loss of both offsite and onsite AC power.

Basis:

Loss of all AC power compromises all plant safety systems requiring electric power including DHR or SDC, ECCS, containment heat removal and the ultimate heat sink. Prolonged loss of all AC power will cause core uncovering and loss of containment integrity, thus this event can escalate to a General Emergency. The 15 minute duration is selected to exclude transient or momentary power losses.

Escalation to General Emergency is via fission product barrier degradation **FG1** or **SG1**.

SYSTEM MALFUNCTION (SS1)

Loss of the 6.9 KV busses and non-vital 4.16 KV busses puts the plant in a natural circulation mode with Decay Heat being removed by the EFW System. Maintaining the required components for Natural Circulation Cooling is of vital importance. Consideration should be given to operable loads necessary to remove decay heat or provide Reactor Vessel makeup capability when evaluating loss of AC power to vital 4.16 KV busses. Even though a vital bus may be energized, if necessary loads (i.e., loads that if lost would inhibit decay heat removal capability or Reactor Vessel makeup capability) are not operable on the energized bus, then the bus should not be considered operable for this IC. If this bus was the only energized bus, than a Site Area Emergency per SS1 should be declared.

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

SITE AREA EMERGENCY

Initiating Condition:

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

Operating Mode Applicability:

Power Operation (Mode 1)
Startup (Mode 2)

Emergency Action Level(s):

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

Basis:

Automatic and manual trip are not considered successful if action away from the reactor control console was required to trip the reactor.

Under these conditions, the reactor is producing more heat than the maximum decay heat load for which the safety systems are designed. A Site Area Emergency is indicated because conditions exist that lead to imminent loss or potential loss of both fuel clad and RCS barriers. 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 via **FG1** or **HG2**.

SYSTEM MALFUNCTION

SS4

SITE AREA EMERGENCY

Initiating Condition:

Loss of all vital DC power

Operating Mode Applicability:

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

Emergency Action Level(s):

1. Loss of ALL Vital DC power based on bus voltage of < 105 volts for > 15 minutes.

Basis:

Battery bus voltage indicating less than 105 volts constitutes loss of DC associated busses. 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. Escalation to a General Emergency would occur via **AG1** or **FG1**. Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

SYSTEM MALFUNCTION

SS5

SITE AREA EMERGENCY

Initiating Condition:

Complete loss of heat removal capability

Operating Mode Applicability:

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

Emergency Action Level(s):

1. Loss of core cooling and heat sink.

Basis:

This EAL addresses complete loss of functions, including ultimate heat sink, required for hot shutdown with the reactor at pressure and temperature. Reactivity control is addressed in other EALs.

Under these conditions, there is an actual major failure of a system intended for protection of the public. Thus, declaration of a Site Area Emergency is warranted. Escalation to General Emergency would be via **AG1** or **FG1**.

SYSTEM MALFUNCTION

SS6

SITE AREA EMERGENCY

Initiating Condition:

Inability to monitor a SIGNIFICANT TRANSIENT in progress

Operating Mode Applicability:

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

Emergency Action Level(s):

1. a. Loss of ≥ 75% of annunciators associated with safety systems.

   AND

   b. Compensatory non-alarming indications are unavailable.

   AND

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

   AND

   d. A SIGNIFICANT TRANSIENT is in progress.

Basis:

This IC and it associated EAL is intended to recognize the inability of the Control Room staff to monitor the plant response to a transient. A Site Area Emergency is considered to exist if the control room staff cannot monitor safety functions needed for protection of the public.

SYSTEM MALFUNCTION (SS6)

Indications needed to monitor safety functions necessary for protection of the public must include Control Room indications, computer generated indications and dedicated annunciation capability. 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, and to maintain containment intact (**FS1, FG1**).

"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 of "Most" is arbitrary, however, it is estimated that if approximately 75% of the safety system annunciators or indicators are lost, there is a higher 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 more monitoring of system operation.

Reference Documents:

1. 1015.037, "Post Transient Review"
2. 1203.043, "Loss Control Room Annunciator"
3. 2203.042, "Loss of Annunciators"

SYSTEM MALFUNCTION

SG1

GENERAL EMERGENCY

Initiating Condition:

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

Operating Mode Applicability:

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

Emergency Action Level(s):

1. Loss of power to all Unit Auxiliary and Startup transformers on a unit.

   AND

   Failure of all Diesel Generators to supply power to Vital 4.16 KV busses.

   AND

   Either of the following: (a OR b)

   a. Restoration of at least one Vital 4.16 KV bus within four (4) hours is not likely

      OR

   b. **FA1** entry conditions met.

SYSTEM MALFUNCTION (SG1)

Basis:

Loss of all AC power compromises all plant safety systems requiring electric power including DHR, SDC, ECCS, containment heat removal and the ultimate heat sink. Prolonged loss of all AC power will lead to loss of fuel clad, RCS, and containment barriers. The 4 hours to restore AC power is based on the results of the calculations referenced below. Appropriate allowance for offsite emergency response including evacuation of surrounding areas should be considered. Although this IC may be viewed as redundant to the Fission Product Barrier Degradation ICs, 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.

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 a reasonable idea of how quickly the need to declare a General Emergency may be 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

GENERAL EMERGENCY

Initiating Condition:

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

Operating Mode Applicability:

Power Operation (Mode 1)
Startup (Mode 2)

Emergency Action Level(s):

1. Indications exist that automatic and manual trips were NOT successful.

   AND

   Either of the following: (a or b)

   a. Indication(s) exists that core cooling is extremely challenged:

      - CETs indicate ≥ 1200°F

        OR

      - RVLMS indicates:
        Unit 1: Levels 1 through 9 DRY
        Unit 2: Levels 1 through 7 DRY

      OR

   b. Indication(s) exist that heat removal is extremely challenged based on feedwater flow rate being less than:

      Unit 1: 430 gpm
      Unit 2: 485 gpm

Basis:

Automatic and manual trips are not considered successful if action away from the reactor control console is required to trip the reactor.

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

SYSTEM MALFUNCTION (SG3)

The extreme challenge to the ability to cool the core is intended to mean that the core exit temperatures are at or approaching 1200°F or that the reactor vessel water level is below the top of active fuel.

Another consideration is the inability to initially remove heat during the early stages of this sequence. 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.

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 (typically 3 to 5% power) a core melt sequence exists. In this situation, core degradation can occur rapidly. For this reason, the General Emergency declaration is intended to be anticipatory of the fission product barrier matrix declaration (**FG1**) to permit maximum offsite intervention time.

Attachment 5

0CAN120405

Arkansas Nuclear One Deviations and Differences from NEI 99-01, Rev 4 Emergency Action Levels

Introduction

This document presents the ANO site-specific deviations and differences from the NEI 99-01, Revision 4 Emergency Action Levels (EALs).

Arkansas Nuclear One used the following definitions when determining the categorization of differences between the NEI 99-01, Revision 4 ICs and Example EALs and the proposed ANO ICs and EALs:

Deviation: An EAL change where the basis scheme guidance (NUREG, NUMARC, 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.)

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

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

1. ANO uses formatting such as ALL CAPS, **bold** and <u>underline</u> 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"). 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 will not be 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 Initiating Conditions or EALs.

2. At ANO, the emergency classification of Notification of Unusual Event is indicated by "Notification of Unusual Event" or the abbreviation "NUE".

3. At ANO, all Radiological Effluent Technical Specifications are included in the ODCM, thus "ODCM" is used in place of References to Radiological Effluent Technical Specifications.

4. "SM/TSC Director/EOF Director" is used instead of "Emergency Director".

5. "Reactor trip" is used in place of "reactor scram".

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". Thus, the term "refueling canal" was substituted for "reactor refueling cavity" and "fuel transfer canal".

8. Synonyms were substituted for "increase" or "decrease" such as "rise", "rising", "elevated", "lowering", "dropping", etc. These substitutions were used in ICs and EALs.

9. The term "reactor vessel" was used in place of "RPV".

10. In the NEI example EALs that refer to "emergency generators" the phrase "emergency diesel generators" was used at ANO instead.

11. In the NEI example EALs that refer to "essential" or "emergency" AC busses, ANO used "Vital 4.16 KV busses" instead.

12. "Release permit" was used in place of "radioactivity discharge permit".

13. In the NEI ICs and example EALs that refer to "inventory" or "level" as it relates to the reactor coolant, the phrases "reactor vessel level" and "RCS inventory" were used.

14. In the Fission Product Barrier EALs, the EAL numbers are preceded by "FCB" for the Fuel Clad Barrier EALs, "RCB" for the RCS Barrier EALs, and "CNB" for the Containment Barrier EALs.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AU1

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Any UNPLANNED Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds Two Times the Radiological Effluent Technical Specifications for 60 Minutes or Longer.

Operating Mode Applicability: All

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

1. VALID reading on any effluent monitor that exceeds two times the alarm setpoint established by a current radioactivity discharge permit for 60 minutes or longer.

2. VALID reading on one or more of the following radiation monitors that exceeds the reading shown for 60 minutes or longer:

   (site-specific list)

3. Confirmed sample analyses for gaseous or liquid releases indicates concentrations or release rates, with a release duration of 60 minutes or longer, in excess of two times (site-specific technical specifications).

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

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

Differences:

EAL 5: Re-numbered as EAL 4.

Deviations:

EAL 4: ANO does not have a perimeter radiation monitoring system, thus this EAL is not used.

EAL 5: The Radiological Dose Assessment Computer System (RDACS) is ANO's real-time dose assessment system. This system uses a 60-minute rolling calculation when performing dose calculations. This system also performs an Emergency Class determination based on the magnitude of the radiological release. Therefore, the NEI EAL was revised to read "RDACS data indicating NUE".

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AU2

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Unexpected Increase in Plant Radiation.

Operating Mode Applicability: **All**

Example Emergency Action Levels: (1 or 2)

1. a. VALID (site-specific) indication of uncontrolled water level decrease in the reactor refueling cavity, spent fuel pool, or fuel transfer canal with all irradiated fuel assemblies remaining covered by water.

AND

b. Unplanned VALID (site-specific) Direct Area Radiation Monitor reading increases

2. Unplanned VALID Direct Area Radiation Monitor readings increases by a factor of 1000 over normal* levels.

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

Differences:

EAL 1b: The word "direct" was not used.

EAL 2: The word "direct was not used.

The note regarding "normal levels" was incorporated into EAL 2.

Deviations:

None

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AA1

Initiating Condition -- ALERT

Any UNPLANNED Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds 200 Times the Radiological Effluent Technical Specifications for 15 Minutes or Longer.

Operating Mode Applicability: **All**

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

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

2. VALID reading on one or more of the following radiation monitors that exceeds the reading shown for 15 minutes or longer:

   (site-specific list)

3. Confirmed sample analyses for gaseous or liquid releases indicates concentrations or release rates, with a release duration of 15 minutes or longer, in excess of 200 times (site-specific technical specifications).

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

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

Differences:

EAL 5: Re-numbered as EAL 4

Deviations:

EAL 4: ANO does not have a perimeter radiation monitoring system. This EAL was, therefore, not used.

EAL 5: The Radiological Dose Assessment Computer System (RDACS) is ANO's real-time dose assessment system. This system uses a 60-minute rolling calculation when performing dose calculations. This system also performs an Emergency Class determination based on the magnitude of the radiological release. Therefore, the NEI EAL was revised to read "RDACS data indicating ALERT".

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AA2

Initiating Condition -- ALERT

Damage to Irradiated Fuel or Loss of Water Level that Has 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 VALID (site-specific) alarm or reading on one or more of the following radiation monitors: (site-specific monitors)

   Refuel Floor Area Radiation Monitor
   Fuel Handling Building Ventilation Monitor
   Refueling Bridge Area Radiation Monitor

2. Water level less than (site-specific) feet for the reactor refueling cavity, spent fuel pool and fuel transfer canal that will result in irradiated fuel uncovering.

Differences:

None

Deviations:

EAL 2: ANO does not have indication of water level for the spent fuel pool or refueling canal. Therefore, "VALID indication of uncontrolled water level drop in the refueling canal or spent fuel pool" was used in lieu of the specific water level described in NEI 99-01.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AA3

Initiating Condition -- ALERT

Release of Radioactive Material or Increases in Radiation Levels Within the Facility That Impedes Operation of Systems Required to Maintain Safe Operations or to Establish or Maintain Cold Shutdown

Operating Mode Applicability: **All**

Example Emergency Action Levels: (1 or 2)

1. VALID (site-specific) radiation monitor readings GREATER THAN 15 mR/hr in areas requiring continuous occupancy to maintain plant safety functions:

   (Site-specific) list

2. VALID (site-specific) radiation monitor readings GREATER THAN <site specific> values in areas requiring infrequent access to maintain plant safety functions.

   (Site-specific) list

Differences:

EAL 1: At ANO, the site-specific list of areas called for in the NEI example EAL does not include the "Radwaste Control Room" since ANO does not have one.

The ANO EAL also does not include the "Central Alarm Station" since ANO's CAS is located in the Administration building. The CAS does not have an area radiation monitor. Additionally, because of the location of the CAS, a dose rate of 15 mR/hr in the CAS would be adequately covered by other EALs.

Deviations:

None

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AS1

Initiating Condition -- SITE AREA EMERGENCY

Offsite Dose Resulting from an Actual or Imminent Release of Gaseous Radioactivity Exceeds 100 mR TEDE or 500 mR Thyroid 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: *If dose assessment results are available at the time of declaration, the classification should be based on EAL #2 instead of EAL #1.While necessary declarations should not be delayed awaiting results, the dose assessment should be initiated / completed in order to determine if the classification should be subsequently escalated.*

1. VALID reading on one or more of the following radiation monitors that exceeds or is expected to exceed the reading shown for 15 minutes or longer:

   (site-specific list)

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

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

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

Differences:

EAL 4: Re-numbered as EAL 3.

Deviations:

EAL 2: ANO used the term "child thyroid" in place of "thyroid CDE" because "child thyroid" is more conservative than "thyroid CDE" and the State of Arkansas uses "child thyroid" in their dose assessment methods.

EAL 3: ANO does not have a perimeter radiation monitoring system. Therefore, this EAL was not used.

EAL 4: ANO used the term "child thyroid" in place of "thyroid CDE" because "child thyroid" is more conservative than "thyroid CDE" and the State of Arkansas uses "child thyroid" in their dose assessment methods.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AG1

Initiating Condition -- GENERAL EMERGENCY

Offsite Dose Resulting from an Actual or Imminent Release of Gaseous Radioactivity Exceeds 1000 mR TEDE or 5000 mR 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: *If dose assessment results are available at the time of declaration, the classification should be based on EAL #2 instead of EAL #1.While necessary declarations should not be delayed awaiting results, the dose assessment should be initiated / completed in order to determine if the classification should be subsequently escalated.*

1. VALID reading on one or more of the following radiation monitors that exceeds or expected to exceed the reading shown for 15 minutes or longer:

   (site-specific list)

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

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

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

Differences:

Note: The last sentence of the note before the EALs was changed to "... in order to more accurately characterize the nature of the release." This modification is appropriate since it is not possible to escalate the classification any higher than General Emergency.

EAL 2: ANO used the term "child thyroid" in place of "thyroid CDE" because "child thyroid" is more conservative than "thyroid CDE" and the State of Arkansas uses "child thyroid" in their dose assessment methods.

EAL 4: Re-numbered as EAL 3.

Deviations:

EAL 2: ANO used the term "child thyroid" in place of "thyroid CDE" because "child thyroid" is more conservative than "thyroid CDE" and the State of Arkansas uses "child thyroid" in their dose assessment methods.

EAL 3: ANO does not have a perimeter radiation monitoring system. Therefore, this EAL is not used.

EAL 4: ANO used the term "child thyroid" in place of "thyroid CDE" because "child thyroid" is more conservative than "thyroid CDE" and the State of Arkansas uses "child thyroid" in their dose assessment methods.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU1

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Reactor Coolant System Leakage

Operating Mode Applicability: Cold Shutdown

Emergency Action Levels: (1 or 2)

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

2. Identified leakage greater than 25 gpm.

Differences:

None

Deviations:

None

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU2

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

UNPLANNED loss of RCS inventory with irradiated fuel in the reactor vessel

Operating Mode Applicability: Refueling

Emergency Action Levels: (1 or 2)

1. UNPLANNED RCS level decrease below the RPV flange for > 15 minutes

2. a. Loss of RPV inventory as indicated by unexplained {site-specific} sump and tank level increase

AND

b. RPV level cannot be monitored

Differences:

None

Deviations:

None

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU3

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Loss of all offsite power to Essential busses for greater than 15 minutes.

Operating Mode Applicability: Cold Shutdown
Refueling

Emergency Action Levels:

1. a. Loss of power to (site-specific) transformers for greater than 15 minutes.

AND

b. At least (site-specific) emergency generators are supplying power to emergency busses.

Differences:

The IC was re-numbered CU5.

Deviations:

None

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU4

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
Refueling

Emergency Action Levels: (1 or 2)

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

2. Loss of all RCS temperature and RPV level indication for > 15 minutes.

Differences:

The IC was re-numbered CU3.

Deviations:

None

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU5

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Fuel clad degradation

Operating Mode Applicability: Cold Shutdown
Refueling

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.

Differences:

The IC was re-numbered CU4.

Deviations:

EAL 1: A site-specific radiation monitor reading was not provided for Unit 2 because there is no alarm setpoint that correlates with the Technical Specification limit.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU6

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

UNPLANNED Loss of All Onsite or Offsite Communications Capabilities.

Operating Mode Applicability: Cold Shutdown
Refueling

Example Emergency Action Levels: (1 or 2)

1. Loss of all (site-specific list) onsite communications capability affecting the ability to perform routine operations.

2. Loss of all (site-specific list) offsite communications capability.

Differences:

The IC was re-numbered CU8.

Deviations:

None

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU7

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

UNPLANNED Loss of Required DC Power for Greater than 15 Minutes.

Operating Mode Applicability: Cold Shutdown
Refueling

Example Emergency Action Level:

1. a. UNPLANNED Loss of Vital DC power to required DC busses based on (site-specific) bus voltage indications.

AND

b. Failure to restore power to at least one required DC bus within 15 minutes from the time of loss.

Differences:

The IC was re-numbered CU6.

Deviations:

None

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU8

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Inadvertent Criticality.

Operating Mode Applicability: Cold Shutdown
Refueling

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

1. An UNPLANNED extended positive period observed on nuclear instrumentation.

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

Differences:

The IC was re-numbered CU7.

EAL 2: Re-numbered as EAL 1.

Deviations:

EAL 1: ANO does not have a period meter. Thus, this EAL was not used.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA1

Initiating Condition -- ALERT

Loss of RCS Inventory.

Operating Mode Applicability: Cold Shutdown

Example Emergency Action Levels: (1 or 2)

1. Loss of RCS inventory as indicated by RPV level less than {site-specific level}.
   (low-low ECCS actuation setpoint) (BWR)
   (bottom ID of the RCS loop) (PWR)

2. a. Loss of RCS inventory as indicated by unexplained {site-specific} sump and tank level increase

   AND

   b. RCS level cannot be monitored for > 15 minutes

Differences:

None

Deviations:

None

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA2

Initiating Condition -- ALERT

Loss of RPV Inventory with Irradiated Fuel in the RPV.

Operating Mode Applicability: Refueling

Example Emergency Action Levels: (1 or 2)

1. Loss of RPV inventory as indicated by RPV level less than {site-specific level}.
   (low-low ECCS actuation setpoint) (BWR)
   (bottom ID of the RCS loop) (PWR)

2. a. Loss of RPV inventory as indicated by unexplained {site-specific} sump and tank level increase

AND

   b. RPV level cannot be monitored for > 15 minutes

Differences:

None

Deviations:

None

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA3

Initiating Condition -- ALERT

Loss of All Offsite Power and Loss of All Onsite AC Power to Essential Busses.

Operating Mode Applicability: Cold Shutdown
Refueling
Defueled

Example Emergency Action Level:

1. a. Loss of power to (site-specific) transformers.

AND

b. Failure of (site-specific) emergency generators to supply power to emergency busses.

AND

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

Differences:

The IC was re-numbered CA5.

Deviations:

None

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA4

Initiating Condition -- ALERT

Inability to Maintain Plant in Cold Shutdown with Irradiated Fuel in the RPV.

Operating Mode Applicability: Cold Shutdown
Refueling

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

1. With CONTAINMENT CLOSURE and RCS integrity not established an UNPLANNED event results in RCS temperature exceeding the Technical Specification cold shutdown temperature limit.

2. With CONTAINMENT CLOSURE established and RCS integrity not established or RCS inventory reduced an UNPLANNED event results in RCS temperature exceeding the Technical Specification cold shutdown temperature limit for greater than 20 minutes.

3. An UNPLANNED event results in RCS temperature exceeding the Technical Specification cold shutdown temperature limit for greater than 60 minutes or results in an RCS pressure increase of greater than {site specific} psig.

Differences:

The IC was re-numbered CA3.

EAL 1: 200°F was inserted as the "Technical Specification cold shutdown temperature limit".

Deviations:

None

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CS1

Initiating Condition -- SITE AREA EMERGENCY

Loss of RPV Inventory Affecting Core Decay Heat Removal Capability.

Operating Mode Applicability: Cold Shutdown

Example Emergency Action Levels: (1 or 2)

1. With CONTAINMENT CLOSURE not established:
   a. RPV inventory as indicated by RPV level less than {site-specific level}
      (6" below the low-low ECCS actuation setpoint) (BWR)
      (6" below the bottom ID of the RCS loop) (PWR)

   OR

   b. RPV level cannot be monitored for > 30 minutes with a loss of RPV inventory as indicated by unexplained {site-specific} sump and tank level increase

2. With CONTAINMENT CLOSURE established
   a. RPV inventory as indicated by RPV level less than TOAF

   OR

   b. RPV level cannot be monitored for > 30 minutes with a loss of RPV inventory as indicated by either:
      - Unexplained {site-specific} sump and tank level increase
      - Erratic Source Range Monitor Indication

Differences:

None

Deviations:

None

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CS2

Initiating Condition -- SITE AREA EMERGENCY

Loss of RPV Inventory Affecting Core Decay Heat Removal Capability with Irradiated Fuel in the RPV.

Operating Mode Applicability: Refueling

Example Emergency Action Levels: (1 or 2)

1. With CONTAINMENT CLOSURE not established:

   a. RPV inventory as indicated by RPV level less than {site-specific level}
      (6" below the low-low ECCS actuation setpoint) (BWR)
      (6" below the bottom ID of the RCS loop) (PWR)

   OR

   b. RPV level cannot be monitored with Indication of core uncovery as evidenced by one or more of the following:
      - Containment High Range Radiation Monitor reading > {site-specific} setpoint
      - Erratic Source Range Monitor Indication
      - Other {site-specific} indications

2. With CONTAINMENT CLOSURE established

   a. RPV inventory as indicated by RPV level less than TOAF

   OR

   b. RPV level cannot be monitored with Indication of core uncovery as evidenced by one or more of the following:
      - Containment High Range Radiation Monitor reading > {site-specific} setpoint
      - Erratic Source Range Monitor Indication
      - Other {site-specific} indications

Differences:

None

Deviations:

EAL 1a: This EAL was not used because, in Mode 6, neither unit has the capability to monitor reactor vessel level below the bottom ID of the RCS loop.

EAL 2a: This EAL was not used because, in Mode 6, neither unit has the capability to monitor reactor vessel level below the bottom ID of the RCS loop.

EAL 2b: This EAL was combined with EAL 1b. EALs 1b and 2b are identical with the exception of the reactor vessel water level required dependent on the status of the containment.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CG1

Initiating Condition -- GENERAL EMERGENCY

Loss of RPV Inventory Affecting Fuel Clad Integrity with Containment Challenged lwith Irradiated Fuel in the RPV.

Operating Mode Applicability: Cold Shutdown
Refueling

Example Emergency Action Level: (1 and 2 and 3)

1. Loss of RPV inventory as indicated by unexplained {site-specific} sump and tank level increase

2. RPV Level:
   a. less than TOAF for > 30 minutes

   OR

   b. cannot be monitored with Indication of core uncovery for > 30 minutes as evidenced by one or more of the following:
      - Containment High Range Radiation Monitor reading > {site-specific} setpoint
      - Erratic Source Range Monitor Indication
      - Other {site-specific} indications

3. {Site specific} indication of CONTAINMENT challenged as indicated by one or more of the following:
   - Explosive mixture inside containment
   - Pressure above {site specific} value
   - CONTAINMENT CLOSURE not established
   - Secondary Containment radiation monitors above {site specific} value (BWR only)

Differences:

None

Deviations:

EAL 2a: This EAL was annotated to indicate that it applies only in Mode 5. In Mode 6, neither unit has the capability to measure reactor vessel level at or below the top of active fuel.

EVENTS RELATED TO ISFSI

E-HU1

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Damage to a loaded cask CONFINEMENT BOUNDARY.

Operating Mode Applicability: Not applicable

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

1. Natural phenomena events affecting a loaded cask CONFINEMENT BOUNDARY.

   (site-specific list)

2. Accident conditions affecting a loaded cask CONFINEMENT BOUNDARY.

   (site-specific list)

3. Any condition in the opinion of the Emergency Director that indicates loss of loaded fuel storage cask CONFINEMENT BOUNDARY.

Differences:

None

Deviations:

Mode applicability was changed to "All" for human factoring concerns during the review of the EALs. Some reviewers believed that it was more appropriate to list all modes to preclude an operator from inferring that, since no modes were applicable, he would not have to declare an emergency class.

EVENTS RELATED TO ISFSI

E-HU2

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Confirmed Security Event with potential loss of level of safety of the ISFSI.

Operating Mode Applicability: Not applicable

Example Emergency Action Levels:

1. Security Event as determined from (site-specific) Security Plan and reported by the (site-specific) security shift supervision.

Differences:

None

Deviations:

Mode applicability was changed to "All" for human factoring concerns during the review of the EALs. Some reviewers believed that it was more appropriate to list all modes to preclude an operator from inferring that, since no modes were applicable, he would not have to declare an emergency class.

FUEL CLAD BARRIER EXAMPLE EALS (1 or 2 or 3 or 4 or 5 or 6)

1. Critical Safety Function Status
LOSS Core Cooling - Red
POTENTIAL LOSS: Core Cooling Orange OR Heat Sink – Red

Differences:

None

Deviations:

This EAL was not used since neither unit at ANO uses Critical Safety Function Status Trees.

FUEL CLAD BARRIER EXAMPLE EALS

2. Primary Coolant Activity Level

LOSS Coolant Activity GREATER THAN (site specific) Value
POTENTIAL LOSS: Not Applicable

Differences:

This EAL was numbered **FCB1.**

Deviations:

None

FUEL CLAD BARRIER EXAMPLE EALS

3. Core Exit Thermocouple Readings

LOSS Greater THAN (site specific) degree F
POTENTIAL LOSS: Greater THAN (site specific) degree F

Differences:

This EAL was numbered **FCB2** in ANO's Fuel Clad Barrier section.

Deviations:

None

FUEL CLAD BARRIER EXAMPLE EALS

4. Reactor Vessel Water Level

LOSS Not Applicable
POTENTIAL LOSS: Level LESS than (site specific) value

Differences:

This EAL was numbered **FCB3**.

Deviations:

None

FUEL CLAD BARRIER EXAMPLE EALS
5. Containment Radiation Monitoring

LOSS Containment rad monitor reading GREATER THAN (site specific) R/hr
POTENTIAL LOSS: Not Applicable

Differences:

This EAL was numbered **FCB4**.

Deviations:

None

FUEL CLAD BARRIER EXAMPLE EALS

6. Other (Site-Specific) Indications
LOSS (Site specific) as applicable
POTENTIAL LOSS: (Site specific) as applicable

Differences:

None

Deviations:

A review was done which determined that the other available EALs adequately address the fuel clad barrier. Therefore, this EAL was not used.

FUEL CLAD BARRIER EXAMPLE EALS

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

Differences:

This EAL was numbered **FCB5.**

Deviations:

None

RCS BARRIER EXAMPLE EALs: (1 or 2 or 3 or 4 or 5 or 6)

1. Critical Safety Function Status

LOSS Not Applicable
POTENTIAL LOSS: RCS Integrity – Red or Heat Sink- Red

Differences:

None

Deviations:

Neither unit at ANO uses CSFSTs. This EAL, therefore, was not used.

RCS BARRIER EXAMPLE EALs

2. RCS Leak Rate

LOSS	GREATER THAN available makeup capacity as indicated by a loss of RCS subcooling
POTENTIAL LOSS:	Unisolable leak exceeding the capacity of one charging pump in the normal charging mode

Differences:

This EAL was numbered **RCB1**.

Deviations:

None

RCS BARRIER EXAMPLE EALs

3. SG Tube Rupture

LOSS SGTR that results in an ECCS (SI) Actuation
POTENTIAL LOSS: Not Applicable

Differences:

This EAL was numbered **RCB2**.

Deviations:

None

RCS BARRIER EXAMPLE EALs

4. Containment Radiation Monitoring

LOSS Containment rad monitor reading GREATER than (site-specific) R/hr
POTENTIAL LOSS: Not Applicable

Differences:

This EAL was numbered **RCB3**.

Deviations:

None

RCS BARRIER EXAMPLE EALs

5. Other (Site-Specific) Indications

LOSS (Site-specific) as applicable
POTENTIAL LOSS: (Site-specific) as applicable

Differences:

None

Deviations:

A review was done and determined that the other available EALs adequately address the RCS Barrier. Therefore, this EAL was not used.

RCS BARRIER EXAMPLE EALs

6. Emergency Director Judgment

Any condition in the opinion of the Emergency Director that indicate Loss or Potential Loss of the RCS Barrier

Differences:

This EAL was numbered **RCB4**.

Deviations:

None

CONTAINMENT BARRIER EXAMPLE EALs: (1 or 2 or 3 or 4 or 5 or 6 or 7 or 8)

1. Critical Safety Function Status

LOSS Not Applicable
POTENTIAL LOSS: Containment - Red

Differences:

None

Deviations:

Neither unit at ANO uses CSFSTs. Therefore, this EAL was not used.

CONTAINMENT BARRIER EXAMPLE EALs

2. Containment Pressure

LOSS	Rapid unexplained decrease following initial increase OR Containment pressure or sump level not consistent with LOCA conditions
POTENTIAL LOSS:	(Site-specific) PSIG and increasing OR Explosive mixture exists OR Pressure greater than containment depressurization actuation setpoint with less than one full train of depressurization equipment operating

Differences:

This EAL was numbered **CNB1**.

Deviations:

None

CONTAINMENT BARRIER EXAMPLE EALs

3. Core Exit Thermocouples

LOSS	Not Applicable
POTENTIAL LOSS:	Core exit thermocouples in excess of 1200 degrees and restoration procedures not effective within 15 minutes; or core exit thermocouples in excess of 700 degrees with reactor vessel level below top of active fuel and restoration procedures not effective within 15 minutes

Differences:

This EAL was numbered **CNB2**.

Deviations:
None

CONTAINMENT BARRIER EXAMPLE EALs

4. SG Secondary Side Release With Primary To Secondary Leakage

LOSS	RUPTURED S/G is also FAULTED outside of containment OR Primary-to-secondary Leakrate greater than 10 gpm with non-isolable steam release from affected S/G to the environment
POTENTIAL LOSS:	Not Applicable

Differences:

This EAL was numbered **CNB3**.

Deviations:

None

CONTAINMENT BARRIER EXAMPLE EALs

5. Containment Isolation Valve Status After Containment Isolation

LOSS Valve(s) not closed AND downstream pathway to the environment exists
POTENTIAL LOSS: Not Applicable

Differences:

1. This EAL was numbered **CNB4** in ANO's Containment Barrier section.

2. This EAL was re-worded to more clearly indicate the intent of the EAL.

Deviations:

None

CONTAINMENT BARRIER EXAMPLE EALs

6. Significant Radioactive Inventory in Containment

LOSS Not Applicable
POTENTIAL LOSS: Containment rad monitor reading GREATER THAN (site-specific) R/hr

Differences:

This EAL was numbered **CNB5**.

Deviations:

None

CONTAINMENT BARRIER EXAMPLE EALs

7. Other (Site-Specific) Indications

LOSS (Site specific) as applicable
POTENTIAL LOSS: (Site-specific) as applicable

Differences:

This EAL was numbered **CNB6**.

Deviations:

None

CONTAINMENT BARRIER EXAMPLE EALs

8. Emergency Director Judgment
Any condition in the opinion of the Emergency Director that indicates Loss or Potential Loss of the Containment barrier.

Differences:

This EAL was numbered **CNB7.**

Deviations:

None

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU1

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Natural and 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 or 7)

1. (Site-Specific) method indicates felt earthquake.

2. Report by plant personnel of tornado or high winds greater than (site-specific) mph striking within PROTECTED AREA boundary.

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

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

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

6. Uncontrolled flooding in (site-specific) areas of the plant that has the potential to affect safety related equipment needed for the current operating mode.

7. (Site-Specific) occurrences affecting the PROTECTED AREA.

Differences:

The IC was re-numbered HU6.

Deviations:

EAL 7: 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 7 and 8.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU2

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

FIRE Within PROTECTED AREA Boundary Not Extinguished Within 15 Minutes of Detection.

Operating Mode Applicability: **All**

Example Emergency Action Level:

1. FIRE in buildings or areas contiguous to any of the following (site-specific) areas not extinguished within 15 minutes of control room notification or verification of a control room alarm:

(Site-specific) list

Differences:

The IC was re-numbered HU4.

Deviations:

None

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU3

Initiating Condition – NOTIFICATION OF UNUSUAL EVENT

Release of Toxic or Flammable Gases Deemed Detrimental to Normal Operation of the Plant.

Operating Mode Applicability: **All**

Example Emergency Action Levels: (1 or 2)

1. Report or detection of toxic or flammable gases that has or could enter the site area boundary in amounts that can affect NORMAL PLANT OPERATIONS.

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

Differences:

The IC was re-numbered HU5.

Deviations:

None

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU4

Initiating Condition – NOTIFICATION OF UNUSUAL EVENT

Confirmed Security Event Which Indicates a Potential Degradation in the Level of Safety of the Plant.

Operating Mode Applicability: **All**

Example Emergency Action Levels:

1. Security events as determined from (site-specific) Safeguards Contingency Plan and reported by the (site-specific) security shift supervision

2. A credible site specific security threat notification.

Differences:

The IC was re-numbered HU1.

Deviations:

None

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU5

Initiating Condition – NOTIFICATION OF UNUSUAL EVENT

Other Conditions Existing 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 process or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

Differences:

The IC was re-numbered HU2.

Deviations:

None

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA1

Initiating Condition -- ALERT

Natural and Destructive Phenomena Affecting the Plant VITAL AREA.

Operating Mode Applicability: **All**

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

1. (Site-Specific) method indicates Seismic Event greater than Operating Basis Earthquake (OBE).

2. Tornado or high winds greater than (site-specific) mph within PROTECTED AREA boundary and resulting in VISIBLE DAMAGE to any of the following plant structures / equipment or Control Room indication of degraded performance of those systems.
   - Reactor Building
   - Intake Building
   - Ultimate Heat Sink
   - Refueling Water Storage Tank
   - Diesel Generator Building
   - Turbine Building
   - Condensate Storage Tank
   - Control Room
   - Other (Site-Specific) Structures.

3. Vehicle crash within PROTECTED AREA boundary and resulting in VISIBLE DAMAGE to any of the following plant structures or equipment therein or control indication of degraded performance of those systems:

   - Reactor Building
   - Intake Building
   - Ultimate Heat Sink
   - Refueling Water Storage Tank
   - Diesel Generator Building
   - Turbine Building
   - Condensate Storage Tank
   - Control Room
   - Other (Site-Specific) Structures.

4. Turbine failure-generated missiles result in any VISIBLE DAMAGE to or penetration of any of the following plant areas: (site-specific) list.

5. Uncontrolled flooding in (site-specific) areas of the plant that results in degraded safety system performance as indicated in the control room or that creates industrial safety hazards (e.g., electric shock) that precludes access necessary to operate or monitor safety equipment.

6. (Site-Specific) occurrences within PROTECTED AREA boundary and resulting in VISIBLE DAMAGE to plant structures containing equipment necessary for safe shutdown, or has caused damage as evidenced by control room indication of degraded performance of those systems.

Differences:

The IC was re-numbered HA6.

Deviations:

None

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA2

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:

1. FIRE or EXPLOSION in any of the following (site-specific) areas:

   (Site-specific) list

   AND

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

Differences:

The IC was re-numbered HA4.

Deviations:

None

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA3

Initiating Condition -- ALERT

Release of Toxic or Flammable Gases Within or Contiguous to a VITAL AREA Which Jeopardizes Operation of Systems Required to Maintain Safe Operations or Establish or Maintain Safe Shutdown.

Operating Mode Applicability: **All**

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

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

2. Report or detection of gases in concentration greater than the LOWER FLAMMABILITY LIMIT within or contiguous to a VITAL AREA.

Differences:

The IC was re-numbered HA5.

Deviations:

None

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA4

Initiating Condition -- ALERT

Confirmed Security Event in a Plant PROTECTED AREA.

Operating Mode Applicability: **All**

Example Emergency Action Levels: (1 or 2)

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

2. Other security events as determined from (site-specific) Safeguards Contingency Plan and reported by the (site-specific) security shift supervision

Differences:

The IC was re-numbered HA1.

Deviations:

None

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA5

Initiating Condition -- ALERT

Control Room Evacuation Has Been Initiated.

Operating Mode Applicability: **All**

Example Emergency Action Level:

1. Entry into (site-specific) procedure for control room evacuation.

Differences:

The IC was re-numbered HA3.

Deviations:

None

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA6

Initiating Condition -- ALERT

Other Conditions Existing 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 process or have occurred which involve actual or likely potential substantial degradation of the level of safety of the plant. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

Differences:

The IC was re-numbered HA2.

Deviations:

None

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS1

Initiating Condition – SITE AREA EMERGENCY

Confirmed Security Event in a Plant VITAL AREA.

Operating Mode Applicability: **All**

Example Emergency Action Levels: (1 or 2)

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

2. Other security events as determined from (site-specific) Safeguards Contingency Plan and reported by the (site-specific) security shift supervision

Differences:

None

Deviations:

None

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS2

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:

1. Control room evacuation has been initiated.

AND

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

Differences:

The IC was re-numbered HS3.

Deviations:

None

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS3

Initiating Condition – SITE AREA EMERGENCY

Other Conditions Existing Which in the Judgment of the Emergency Director Warrant Declaration of 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 process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public. Any releases are not expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the site boundary.

Differences:

The IC was re-numbered to HS2.

Deviations:

None

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HG1

Initiating Condition – GENERAL EMERGENCY

Security Event Resulting in Loss Of Physical Control of the Facility.

Operating Mode Applicability: **All**

Example Emergency Action Level:

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

Differences:

None

Deviations:

None

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HG2

Initiating Condition – GENERAL EMERGENCY

Other Conditions Existing Which in the Judgment of the Emergency Director Warrant Declaration of 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 process or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.

Differences:

None

Deviations:

None

SYSTEM MALFUNCTION

SU1

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Loss of All Offsite Power to essential Busses for Greater Than 15 Minutes.

Operating Mode Applicability:

Power Operation (1)
Startup (2)
Hot Standby (3)
Hot Shutdown (4)

Example Emergency Action Level:

1. Loss of power to (site-specific) transformers for greater than 15 minutes.

AND

At least (site-specific) emergency generators are supplying power to emergency busses.

Differences:

None

Deviations:

None

SYSTEM MALFUNCTION

SU2

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Inability to Reach Required Shutdown Within Technical Specification Limits.

Operating Mode Applicability:

Power Operation (1)
Startup (2)
Hot Standby (3)
Hot Shutdown (4)

Example Emergency Action Level:

1. Plant is not brought to required operating mode within (site-specific) Technical Specifications LCO Action Statement Time.

Differences:

The IC was re-numbered SU11.

Deviations:

None

SYSTEM MALFUNCTION

SU3

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

UNPLANNED Loss of Most or All Safety System Annunciation or Indication in the Control Room for Greater Than 15 Minutes

Operating Mode Applicability:

Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Level:

1. UNPLANNED loss of most or all (site-specific) annunciators or indicators associated with safety systems for greater than 15 minutes.

Differences:

The IC was re-numbered SU6.

Deviations:

None

SYSTEM MALFUNCTION

SU4

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

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.

Differences:

The IC was re-numbered SU9.

Deviations:

EAL 1: A site-specific radiation monitor reading was not provided for Unit 2 because there is no alarm setpoint that correlates with the Technical Specification limit.

SYSTEM MALFUNCTION

SU5

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

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.

Differences:

The IC was re-numbered SU7.

Deviations:

None

SYSTEM MALFUNCTION

SU6

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

UNPLANNED Loss of All Onsite or Offsite Communications Capabilities.

Operating Mode Applicability: Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Levels: (1 or 2)

1. Loss of all (site-specific list) onsite communications capability affecting the ability to perform routine operations.

2. Loss of all (site-specific list) offsite communications capability.

Differences:

The IC was re-numbered SU8.

Deviations:

None

SYSTEM MALFUNCTION

SU8

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Inadvertent Criticality.

OPERATING MODE APPLICABILITY Hot Standby
Hot Shutdown

Example Emergency Action Level: (1 or 2)

1. An UNPLANNED extended positive period observed on nuclear instrumentation.

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

Differences:

The IC was re-numbered SU10.

EAL 2: Re-numbered to EAL 1.

Deviations:

EAL 1: Neither unit at ANO has a period meter. Therefore, this EAL was not used.

SYSTEM MALFUNCTION

SA2

Initiating Condition -- ALERT

Failure of Reactor Protection System Instrumentation to Complete or Initiate an Automatic Reactor Scram Once a Reactor Protection System Setpoint Has Been Exceeded and Manual Scram Was Successful.

Operating Mode Applicability: Power Operation
Startup
Hot Standby

Example Emergency Action Level:

1. Indication(s) exist that indicate that reactor protection system setpoint was exceeded and automatic scram did not occur, and a successful manual scram occurred.

Differences:

The IC was re-numbered SA3.

Deviations:

None

SYSTEM MALFUNCTION

SA4

Initiating Condition -- ALERT

UNPLANNED Loss of Most or All Safety System Annunciation or Indication in Control Room With Either (1) a SIGNIFICANT TRANSIENT in Progress, or (2) Compensatory Non-Alarming Indicators are Unavailable.

Operating Mode Applicability:

Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Level:

1. UNPLANNED loss of most or all (site-specific) annunciators or indicators associated with safety systems for greater than 15 minutes.

AND

Either of the following: (a or b)

a. A SIGNIFICANT TRANSIENT is in progress.

OR

b. Compensatory non-alarming indications are unavailable.

Differences:

The IC was re-numbered SA6.

Deviations:

None

SYSTEM MALFUNCTION

SA5

Initiating Condition -- ALERT

AC power capability to essential busses reduced to a single power source for greater than 15 minutes 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:

1. AC power capability to site-specific essential busses reduced to a single power source for greater than 15 minutes

AND

Any additional single failure will result in station blackout.

Differences:

The IC was re-numbered SA1.

Deviations:

None

SYSTEM MALFUNCTION

SS1

Initiating Condition -- SITE AREA EMERGENCY

Loss of All Offsite Power and Loss of All Onsite AC Power to Essential Busses.

Operating Mode Applicability:

Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Level:

1. Loss of power to (site-specific) transformers.

AND

Failure of (site-specific) emergency generators to supply power to emergency busses.

AND

Failure to restore power to at least one emergency bus within (site-specific) minutes from the time of loss of both offsite and onsite AC power.

Differences:

None

Deviations:

None

SYSTEM MALFUNCTION

SS2

Initiating Condition -- SITE AREA EMERGENCY

Failure of Reactor Protection System Instrumentation to Complete or Initiate an Automatic Reactor Scram Once a Reactor Protection System Setpoint Has Been Exceeded and Manual Scram Was NOT Successful.

Operating Mode Applicability: Power Operation
Startup

Example Emergency Action Level:

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

Differences:

The IC was re-numbered SS3.

Deviations:

None

SYSTEM MALFUNCTION

SS3

Initiating Condition -- SITE AREA EMERGENCY

Loss of All Vital DC Power.

Operating Mode Applicability:

Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Level:

1. Loss of All Vital DC Power based on (site-specific) bus voltage indications for greater than 15 minutes.

Differences:

The IC was re-numbered SS4.

Deviations:

None

SYSTEM MALFUNCTION

SS4

Initiating Condition -- SITE AREA EMERGENCY

Complete Loss of Heat Removal Capability.

Operating Mode Applicability:

Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Level:

1. Loss of core cooling and heat sink (PWR).

1. Heat Capacity Temperature Limit Curve exceeded (BWR).

Differences:

The IC was re-numbered SS5.

Deviations:

None

SYSTEM MALFUNCTION

SS6

Initiating Condition -- SITE AREA EMERGENCY

Inability to Monitor a SIGNIFICANT TRANSIENT in Progress.

Operating Mode Applicability:

Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Level:

1. a. Loss of most or all (site-specific) annunciators associated with safety systems.

AND

b. Compensatory non-alarming indications are unavailable.

AND

c. Indications needed to monitor (site-specific) safety functions are unavailable.

AND

d. SIGNIFICANT TRANSIENT in progress.

Differences:

None

Deviations:

None

SYSTEM MALFUNCTION

SG1

Initiating Condition -- GENERAL EMERGENCY

Prolonged Loss of All Offsite Power and Prolonged Loss of All Onsite AC Power to Essential Busses.

Operating Mode Applicability:

Power Operation
Startup
Hot Standby
Hot Shutdown

Example Emergency Action Level:

1. Loss of power to (site-specific) transformers.

AND

Failure of (site-specific) emergency diesel generators to supply power to emergency busses.

AND

Either of the following: (a or b)

a. Restoration of at least one emergency bus within (site-specific) hours is not likely

OR

b. (Site-Specific) Indication of continuing degradation of core cooling based on Fission Product Barrier monitoring.

Differences:

EAL 1b: "FA1 Entry Conditions Met" was listed as the site-specific indication of continuing degradation of core cooling based on Fission Product Barrier monitoring.

Deviations:

None

SYSTEM MALFUNCTION

SG2

Initiating Condition -- GENERAL EMERGENCY

Failure of the Reactor Protection System to Complete an Automatic Scram and Manual Scram was NOT Successful and There is Indication of an Extreme Challenge to the Ability to Cool the Core.

Operating Mode Applicability: Power Operation
Startup

Example Emergency Action Level:

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

AND

Either of the following: (a or b)

a. Indication(s) exists that the core cooling is extremely challenged.

OR

b. Indication(s) exists that heat removal is extremely challenged.

Differences:

The IC was re-numbered SG3.

Deviations:

None

Attachment 6

0CAN120405

Cross Reference Matrix from NEI EAL Number to Entergy EAL Number
(i.e., NEI number, previous Entergy number, new Entergy number)

NEI 99-01 to Original ANO Submittal to Revised ANO Submittal
Initiating Condition Cross-Reference

NEI IC	Original ANO IC	Revised ANO IC
AU1	AU1	AU1
AU2	AU2	AU2
AA1	AA1	AA1
AA2	AA2	AA2
AA3	AA3	AA3
AS1	AS1	AS1
AG1	AG1	AG1
CU1	CU1	CU1
CU2	CU2	CU2
CU3	**CU3**	**CU5**
CU4	**CU4**	**CU3**
CU5	**CU5**	**CU4**
CU6	**CU6**	**CU8**
CU7	**CU7**	**CU6**
CU8	**CU8**	**CU7**
CA1	CA1	CA1
CA2	CA2	CA2
CA3	**CA3**	**CA5**
CA4	CA4	CA4
CS1	CS1	CS1
CS2	CS2	CS2
CG1	CG1	CG1
E-HU1	E-HU1	E-HU1
E-HU2	E-HU2	E-HU2
FU1	FU1	FU1
FA1	FA1	FA1
FS1	FS1	FS1
FG1	FG1	FG1
HU1	**HU6**	**HU6**
HU2	**HU4**	**HU4**
HU3	**HU5**	**HU5**
HU4	**HU1**	**HU1**
HU5	**HU2**	**HU2**
HA1	**HA6**	**HA6**
HA2	**HA4**	**HA4**
HA3	**HA5**	**HA5**
HA4	**HA1**	**HA1**
HA5	**HA3**	**HA3**
HA6	**HA2**	**HA2**
HS1	HS1	HS1
HS2	**HS3**	**HS3**

HS3	**HS2**	**HS2**
HG1	HG1	HG1
HG2	HG2	HG2
SU1	SU1	SU1
SU2	**SU2**	**SU11**
SU3	**SU3**	**SU6**
SU4	**SU4**	**SU9**
SU5	**SU5**	**SU7**
SU6	**SU6**	**SU8**
SU8	**SU8**	**SU10**
SA2	**SA2**	**SA3**
SA4	**SA4**	**SA6**
SA5	**SA5**	**SA1**
SS1	SS1	SS1
SS2	**SS2**	**SS3**
SS3	**SS3**	**SS4**
SS4	**SS4**	**SS5**
SS6	SS6	SS6
SG1	SG1	SG1
SG2	SG2	SG2

Rows highlighted in **BOLD** indicate that the revised ANO IC number is different from the NEI IC number, the original ANO IC number, or both.