123 Main Street
White Plains, New York 10601
914-681-6840
914-287-3309 (FAX)

NewYorkPower Authority

William J. Cahill, Jr.
Chief Nuclear Officer

May 3, 1995
JPN-95-026

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, D. C. 20555

SUBJECT: James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
Response to NRC Request for Additional Information Regarding Proposed Emergency Action Levels (TAC M89913)

REFERENCES:

1. NRC letter, C. E. Carpenter, Jr. to W. J. Cahill, Jr. dated February 9, 1995 regarding the same subject.

2. NYPA letter, W. A. Josiger to USNRC (IPN-94-030/JPN-94-087) dated July 12, 1994 regarding upgraded Emergency Action Levels.

Dear Sir:

The Authority's response to the NRC staff's recent RAI (Request for Additional Information, Reference 1) regarding upgraded Emergency Action Levels (EALs) for the James A. FitzPatrick Nuclear Power Plant is Attachment I.

Also attached are four associated documents which have been revised to reflect the Authority's response to the NRC staff's questions. Attachment II is Revision 1 of the EALs. Attachment III is the EAL Technicai Bases Report. Attachment IV is the Fission Product Barrier Evaluation, and Attachment V is the FitzPatrick specific EAL guideline (PEG). These documents supersede and replace those included with Reference 2.

The Authority plans to implement these upgraded EALs July 10, 1995. Additional formats of the EALs and the EAL Technical Bases may be developed for use in the emergency facilities (i.e. wall chart, procedure format, etc.).

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No commitments are being made by the Authority in this submittal. If you have any questions, please contact Ms. Charlene D. Faison.

Very truly yours,

Robert J. Deasy for

William J. Cahill, Jr.
Chief Nuclear Officer
Nuclear Generation

List of Attachments:

I. James A. FitzPatrick Emergency Action Levels, Response to Request for Additional Information.

II. James A. FitzPatrick Emergency Action Levels, Revision 1, Based on Proposed Response to NRC RAIs, dated April 25, 1995.

III. New York EAL Upgrade Project, James A. FitzPatrick Emergency Action Levels, Technical Bases, Revision 1, dated April 25, 1995, OSSI-92-402A-4-JAF.

IV. Fission Product Barrier Evaluation, Revision 1, New York Power Authority, James A. FitzPatrick, dated February 25, 1995, OSSI 92-402A-2-JAF.

V. EAL Upgrade Project, Plant Specific EAL Guideline, PEG, James A. FitzPatrick, Revision 1, February 25, 1995.

cc: Next page

cc: Without attachments.

Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Resident Inspector's Office
U. S. Nuclear Regulatory Commission
P. O. Box 41
Lycoming, NY 13093

cc: With attachments.

Mr. C. E. Carpenter, Project Manager
Project Directorate I-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Stop 14B2
Washington, DC 20555

Attachment I to JPN-95-026

James A. FitzPatrick Nuclear Power Plant
Emergency Action Levels
Response to NRC Request for Additional Information

New York Power Authority
Docket No. 50-333

James A. FitzPatrick Nuclear Power Plant
Emergency Action Levels

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Docket 50-333

SPECIFIC RAIs

Response to Specific RAI #1 (page 1)

EAL # 5.1.1 has been revised to reference performance of an assessment of the release. The EAL has also been revised to include criteria requiring declaration if the assessment is not accomplished within 60 minutes. The term "unplanned" has been included.

Response to Specific RAI #2 (page 2)

Inclusion of the site-specific Technical Specification gaseous and liquid release limit values serves no purpose to the EAL user. These limit values are well defined within the procedures utilized to evaluate releases. Reference to the limit, as opposed to the limit values, is sufficient and appropriate information for the EAL user since the actual values are only useful to those individuals performing the evaluation. The results of that evaluation is reported to the EAL user as a fraction or multiple of the limit.

Response to Specific RAI #3 (page 2)

As stated in the RAI and JAF PEG, JAF does not have telemetered perimeter monitoring or real time dose assessment capability. No other sources of information exists to evaluate this criteria. However, the criteria referenced in the RAI, AU1-3 and AU1-4, are indirectly addressed in EALs 5.1.1 and 5.2.1. EAL 5.2.1 requires declaration based upon measured releases for > 60 min. which correspond to two times the Technical Specification release limits. The AU1-3 dose rate threshold, 0.1 mR/hr, corresponds to that which results from the EAL 5.2.1 threshold. EAL 5.1.1 also requires declaration based upon exceeding effluent monitor values representing the AU1-4 threshold value.

Response to Specific RAI #4 (page 2)

The words "with all irradiated assemblies remaining covered" is unnecessary since irradiated fuel uncovery would require declaration of an Alert based on EAL 1.5.2.

The term "cannot be restored and maintained above" is defined in the Technical Bases Document as "The value of the identified parameter(s) is/is not able to be returned and kept above/below specified limits after having passed those limits. This determination includes making an evaluation that considers both current and future systems performances in relation to the current value and trend of the parameter(s). Does not imply any specific time interval but does not permit prolonged operation beyond a limit without taking the specified action." This definition provides the intent that allows for restoration efforts to take effect prior to declaration. Once irradiated fuel is uncovered, the Alert declaration would be required by EAL 1.5.2. This terminology also provides the intent regarding an "uncontrolled decrease" in that the "inability to restore and maintain" defines the lack of control.

The transfer canal (cattle chute) level in a BWR IV is only of concern during refueling operations, in which case the canal is open to and in direct contact with the spent fuel pool. Therefore the current wording of EAL 1.5 1 adequately addresses this concern.

Response to Specific RAI #5 (page 3)

EAL # 5.1.2 has been revised to reference performance of an assessment of the release. The EAL has also been revised to include criteria requiring declaration if the assessment is not accomplished within 15 minutes. The term "unplanned" has been included.

Response to Specific RAI #6 (page 4)

Inclusion of the site-specific Technical Specification gaseous and liquid release limit values serves no purpose to the EAL user. These limit values are well defined within the procedures utilized to evaluate releases. Reference to the limit, as opposed to the limit values, is sufficient and appropriate information for the EAL user since the actual values are only useful to those individuals performing the evaluation. The results of that evaluation is reported to the EAL user as a fraction or multiple of the limit.

Response to Specific RAI #7 (page 4)

As stated in the RAI and JAF PEG, JAF does not have telemetered perimeter monitoring or real time dose assessment capability. No other sources of information exists to evaluate this criteria. However, the criteria referenced in the RAI, AA2-3 [AA1-3] and AA2-4 [AA1-4], are indirectly addressed in EALs 5.1.2 and 5.2.3. EAL 5.2.3 requires declaration based upon offsite measured or projected dose rates associated with the AA1-3 threshold of > 10.0 mRem/hr for > 15 min. EAL 5.1.2 requires declaration based upon exceeding effluent monitor values representing the AU1-4 threshold value.

Response to Specific RAI #8 (page 5)

A.

EAL # 5.1.3 has been revised to reference performance of an assessment of the release. The EAL has also been revised to include criteria requiring declaration if the assessment is not accomplished within 15 minutes. The term "unplanned" has been included as well.

EAL 5.1.3 and the EAL 5.1.3 Table 5.1 values are based on performance of a dose assessment (actual or projected). Therefore the intent of "expected" is inherent in the meaning of the EAL.

Table 5.2 has been revised to quantify doses in rem. The term "TEDE Rate" has been changed to "External Exposure Rate". The term "CDE Thyroid Rate" has been changed to Thyroid Exposure Rate (for 1 hr. of inhalation)".

B.

As stated in the RAI and JAF PEG, JAF does not have telemetered perimeter monitoring or real time dose assessment capability. No other sources of information exists to evaluate this criteria. However, the criteria of AS1-2 is indirectly addressed in EAL 5.2.4. EAL 5.2.4 requires declaration based upon offsite measured or projected doses/dose rates associated with the AS1-2 threshold.

Response to Specific RAI #9 (page 6)

JAF EAL 5.1.4 is the equivelent licensee EAL for NUMARC EAL AG1-1. The EAL 5.1.4 theshold values are listed under the "GE" column. There is no reference in the PEG that the calculated values are beyond the normal indicating range.

EAL # 5.1.4 has been revised to reference performance of an assessment of the release. The EAL has also been revised to include criteria requiring declaration if the assessment is not accomplished within 15 minutes. The term "unplanned" has been included as well.

Response to Specific RAI #10 (page 7)

As stated in the RAI and JAF PEG, JAF does not have telemetered perimeter monitoring or real time dose assessment capability. No other sources of information exists to evaluate this criteria. However, the criteria of AG1-2 is indirectly addressed in 5.2.5. EAL 5.2.5 requires declaration based upon offsite measured or projected doses/dose rates associated with the AG1-2 threshold.

Response to Specific RAI #11 (page 7)

The referenced containment loss example is incorporated into the classification scheme. As stated in the RAI, for BWR pressure suppression type containments, the numerous variables which can affect containment pressure under accident conditions makes it impossible to evaluate containment integrity based upon containment pressure response alone. While these indicators may likely be manifested as a result of a loss of containment integrity, it would be inappropriate to assume loss of containment integrity based solely on their occurrence. NUMARC also does not specify the degree or magnitude of containment pressure decrease or initial increase intended to meet this criteria. It is for these reasons that the referenced indicator has been specifically incorporated into the judgment EALs (9.1.6 and 9.1.8). Unusual Event EAL 9.1.2 has been revised to also include the rapid unexplained decrease criteria for loss of containment.

Response to Specific RAI #12 (page 7)

NUMARC/NESP-007 "Questions and Answers" published in June 1993 Fission Product Barriers - BWR Question 4 states that this condition should be removed from the FPB chart but must still be classified under system failures due to the probable offsite dose release from the puff release. It is agreed that this condition should not be included as a fission product barrier loss indicator. However, the Q&A response does not specify how this condition should be classified. The NUMARC bases for this RCS barrier loss condition state that this indicator was intended to be consistent with the Alert classification since "design basis" accident analysis shows that even with MSIV closure, the offsite dose consequences from a "puff" release would be in excess of 10 millirem. However, unless the initiating assumptions associated with the design basis steam line break existed at the time of the actual break, declaration

of an Alert based on assumed dose results is inappropriate. The JAF FSAR accident analysis assumes a complete double-ended shear of a MSL with delayed MSIV closure and fuel clad failures. The conditions of concern are more than adequately addressed by EALs 3.4.1, 4.1.1 and 4.2.1 for failure to isolate conditions and EAL 5.1.2 for successful isolation resulting in > 10 millirem dose due to steam release. The JAF PEG and Fission Product Barrier Evaluation has been revised to reflect removal of the referenced RCS loss indicator.

Response to Specific RAI #13 (page 8)

Primary system leakage inside the drywell of 50 gpm under hot conditions would result in a high drywell pressure isolation, thereby precluding quantification of the leak rate. However, as stated in the JAF Fission Product Barrier Evaluation, this condition is addressed in EAL 3.1.1 which requires declaration of an Alert based on the inability to maintain containment pressure < 2.7 psig. The JAF PEG has been revised to clarify this bases.

Response to Specific RAI #14 (page 8)

As stated in response to RAI #13, the 50 gpm leakage value would result in a containment high pressure isolation and is therefore addressed by EAL 3.1.1 (PEG RCS loss indicator RCS2.1). The combination of high containment pressure and coolant activity > 300 μCi/gm is addressed in EAL 3.1.2. The JAF Fission Product Barrier Evaluation has been revised to reflect this bases.

Response to Specific RAI #15 (page 9)

The JAF PEG identifies each of the following conditions as containment barrier loss indicators:

PC2.1 Any steam line or RWCU isolation failure resulting in a release pathway outside primary containment:
- Main Steam Line
- HPCI Steam Line
- RCIC Steam Line

PC2.2 Primary containment venting is required due to combustible gas concentrations
OR
Primary containment venting is required due to PCPL

PC2.3 Primary system is discharging outside PC
AND EITHER
RB area temperatures are > maximum safe operating levels in two or more areas, EOP-5
OR
RB area radiation levels are > maximum safe operating levels in two or more areas, EOP-5

Each of the above conditions, either in combination with RPV water level below top of active fuel or by themselves, requires declaration of a General Emergency by the following EALs:

3.4.2 General Emergency

Any steam line or RWCU isolation failure resulting in a release pathway outside primary containment, Table 3.1
AND any:
- Coolant activity > 300 µCi/gm I-131 equivalent
- RPV water level < 0 in. (TAF)
- DW radiation > 3000 R/hr

3.3.2 General Emergency

Primary containment venting is required due to combustible gas concentrations

3.1.3 General Emergency

Primary containment venting is required due to PCPL

4.1.2 General Emergency

Primary system is discharging outside PC
AND
RB area temperatures are > maximum safe operating levels in two or more areas, EOP-5
AND any:
- Coolant activity > 300 µCi/gm I-131 equivalent
- RPV water level < 0 in. (TAF)
- DW radiation > 3000 R/hr

4.2.2 General Emergency

Primary system is discharging outside PC
AND
RB area radiation levels are > maximum safe operating levels in two or more areas, EOP-5
AND any:
- Coolant activity > 300 µCi/gm I-131 equivalent
- RPV water level < 0 in. (TAF)
- DW radiation > 3000 R/hr

Response to Specific RAI #16 (page 10)

A.

EAL 8.4.1 has been revised to state an "Earthquake felt inplant based upon a consensus of Control Room Operators on duty AND ..."

B.

NUMARC/NESP-007 quotes the following paragraph from the referenced EPRI guidance defining a "felt earthquake" as:

> "An earthquake of sufficient intensity such that: (a) the inventory ground motion is felt at the nuclear plant site and recognized as an earthquake based on a consensus of Control Room operators on duty at the time, and (b) for plants with operable seismic instrumentation, the seismic switches of the plant are activated. For most plants with seismic instrumentation , the seismic switches are set at an acceleration of about 0.01 g."

The referenced EPRI guidance clearly states that the "felt" earthquake requires both conditions by use of the Boolean "AND" statement.

Response to Specific RAI #17 (page 11)

EAL 8.4.3 has been deleted. The example EAL from which it was derived, HU1-3 and its generic bases provides no specific guidance for declaration beyond that which the IC provides. Therefore this EAL has been subsumed into the "Other" category EAL 9.1.1. The section 8.4 EALs have been renumbered appropriately. The category 8.0 table numbering has been revised to be consistent with this change.

Response to Specific RAI #18 (page 11)

EAL 8.2.1 has been revised to state "Confirmed fire in or contiguous to any plant area, Table 8.2 or 8.3, not...".

Response to Specific RAI #19 (page 11)

EAL 8.1.1 has been revised to include any security event which represents a potential degradation in the level of safety of the plant.

EAL 8.1.2 has been revised to include any security event which represents an actual substantial degradation of the level of safety of the plant.

EAL 8.1.3 has been revised to include any security event which represents actual or likely failures of plant systems needed to protect the public.

Response to Specific RAI #20 (page 12)

EAL 8.4.7 (renumbered 8.4.6) has been revised to state "Any natural event which results in a report of visible structural damage or assessment by Control Room personnel of actual damage to equipment needed for safe plant operation, Table 8.3".

Response to Specific RAI #21 (page 13)

The concern of this EAL is concentrations which are either life threatening or preclude access to areas needed for safe plant operation. No specific thresholds have been defined since specific thresholds are dependent upon the type of toxic or flammable gas involved as well as the amount and type of personal protective equipment available to those individuals requiring access. Therefore, the determination as to whether concentrations are sufficient to be life

threatening or preclude access to areas required for safe operation is left to the judgment of the user. Where specific criteria are available to the user it is expected that criteria would be considered in this evaluation.

Response to Specific RAI #22 (page 13)

EAL 7.2.2 has been revised to specify entry into AOP-43 "Shutdown from Outside the Control Room" which provides guidance for control room evacuation.

Response to Specific RAI #23 (page 14)

A.
Per letter from NRC (R. Bernero) to NYPA (J. Brons) NRC-028, JAF-86-269 dated 9/15/86, "Exemption to Appendix R to 10CFR50 Concerning Core Uncovery During Alternate Safe Shutdown" an exemption to Section III.L.1 and III.L.2.b of Appendix R was granted to JAF. This exemption states: "... safe shutdown could be affected from remote shutdown panels under an operator action time of 30 minutes using approved alternate procedures." This was based on site specific analysis that justifies 30 minutes for operator action to institute control from remote shutdown panels.

B.
EAL 7.2.4 has been revised to state "AND Plant control cannot be established per AOP-43 "Shutdown from Outside the Control Room"

Response to Specific RAI #24 (page 15)

EAL 8.1.4 has been revised to reflect an 'OR' logic.

Response to Specific RAI #25 (page 15)

EALs 7.3.1 and 7.3.3 have been revised to add the words "safety system annunciators or indications...". EAL 7.3.1, 7.3.3, and 7.3.4 has been revised to be consistent with the corresponding EALs at Nine Mile Point 1 and 2 by replacing the word "Any" with "All".

Response to Specific RAI #26 (page 16)

EAL # 7.3.2 has been revised to add the term "Unplanned".

The concern of this EAL is the loss of ability to communicate such that it affects the ability to perform routine plant operations or notify offsite agencies or personnel. Because of the existence of numerous redundant communication systems which may be available, it is inappropriate to limit the criteria to a predetermined list as this may exclude other systems which may be available at the time. Also, some of the JAF communication systems, by themselves, may not necessarily provide all of the communications functions that are required at the time of loss (i.e. routine operations may require a combination of Gaitronics and station radios). The EAL, as worded, is more inclusive by defining the condition as a loss of communication capability affecting the ability to communicate.

Response to Specific RAI #27 (page 17)

Both DC buses would not be de-energized for any planned activity unless the reactor was defueled. This EAL is not applicable under defueled conditions.

Response to Specific RAI #28 (page 18)

The concern of NUMARC IC SA1 and this EAL is the total loss of ability to provide AC power to the emergency busses and their vital loads. A condition can exist where the supply transformers and/or emergency diesel generators are available but a fault on the bus precludes powering vital loads. Therefore it is more appropriate and inclusive to define the EAL by the inability to power the safeguards buses rather than the loss of the power sources. EAL 6.1.1 defines a loss of offsite AC power sources and is therefore defined as such. EAL 6.1.3 defines losses of AC power sources to an extent that only one source is available and is therefore defined as such.

Response to Specific RAI #29 (page 19)

EAL 2.2.1 and it's associated technical bases have been revised to be consistent with the NUMARC/NESP-007 criteria as modified by the clarifications provided in "NUMARC/NRC

Questions and Answers, June 1993 System Malfunctions Question 7"

EAL 2.2.1 now reads:

> Any RPS setpoint has been exceeded
> AND
> Automatic scram fails to result in a control rod pattern which assures reactor shutdown under all conditions without boron

Response to Specific RAI #30 (page 19)

The JAF Technical Specifications do not specify required functions to maintain cold shutdown. EAL 7.2.3 is derived from IC SA3 which states: "Inability to Maintain Plant in Cold Shutdown." The anticipatory criteria is provided in the use of the term "cannot be maintained." The definition section of the Technical Bases Document defines the term as follows: "The value of the identified parameter(s) is not able to be kept above /below specified limits. This determination includes making an evaluation that considers both current and future system performance in relation to the current value and trend of the parameter(s). Neither implies that the parameter must actually exceed the limit before the action is taken nor that the action must be taken before the limit is reached." NUMARC/NESP-007 "Questions and Answers" published in June 1993 defines the term 'function' as : "The action which a system, subsystem or component is designed to perform." The evaluation of both current and future system performance (function) is inherent in this definition of "cannot be maintained."

Response to Specific RAI #31 (page 20)

The concern of NUMARC IC SS1 and this EAL is the total loss of ability to provide AC power to the emergency busses and their vital loads. A condition can exist where the supply transformers and/or emergency diesel generators are available but a fault on the bus precludes powering vital loads. Therefore it is more appropriate and inclusive to define the EAL by the inability to power the safeguards buses rather than the loss of the power sources. EAL 6.1.1 defines a loss of offsite AC power sources and is therefore defined as such. EAL 6.1.3 defines losses of AC power sources to an extent that only one source is available and is therefore defined as such.

Response to Specific RAI #32 (page 21)

A.

EAL 2.2.2 and it's associated technical bases have been revised to be consistent with the NUMARC/NESP-007 criteria as modified by the clarifications provided in "NUMARC/NRC Questions and Answers, June 1993 System Malfunctions Question 7"

B.

The clarifications provided in "NUMARC/NRC Questions and Answers, June 1993" states: "If sufficient control rods are not inserted to reduce reactor power below the APRM downscale setpoints, an immediate SAE (SS2) is declared. If the APRM downscale setpoint is achieved, but suppression pool temperature is greater than the Boron Injection Temperature, a precursor exists for a threat to containment and thus a SAE is warranted." Based on this clarification, EAL 2.2.2 has been revised to read as follows:

> Any RPS setpoint has been exceeded
> AND
> Automatic and manual scrams fail to result in a control rod pattern which assures reactor shutdown under all conditions without boron
> AND Either:
> Reactor power > 2.5%
> OR
> Torus temperature > Boron Injection Initiation Temperature

where 2.5% is the APRM downscale value and the Boron Injection Initiation Temperature is as specified on Figure 3.1 of EOP-3.

To be consistent with EAL 2.2.2 and changes made to the NMP1 and NMP2 EALs, EALs 2.2.3 and their associated technical bases have been revised and consolidated to read as follows:

<u>Any</u> RPS setpoint has been exceeded
AND
Automatic and manual scrams fail to result in a control rod pattern which assures reactor shutdown under all conditions without boron
AND Either:
RPV water level cannot be restored and maintained > -31 in.
OR
Torus temperature and RPV pressure cannot be maintained < HCTL

<u>Response to Specific RAI #33 (page 21)</u>

A.

<u>The wording "is not likely" has been added to EAL 6.1.5 regarding restoration of power.</u> The anticipatory "IMMINENT" criteria is provided in the second condition of this EAL by the use of the term "cannot be restored and maintained." The definition section of the Technical Bases Document defines the term, in part, as follows: "This determination includes making an evaluation that considers both current and future system performance in relation to the current value and trend of the parameter(s)." The evaluation of both current and future system performance is inherent in the definition of "imminent."

B.

The concern of NUMARC IC SG1 and this EAL is the prolonged total loss of ability to provide AC power to the emergency busses and their vital loads. A condition can exist where the supply transformers and/or emergency diesel generators are available but a fault on the bus precludes powering vital loads. Therefore it is more appropriate and inclusive to define the EAL by the inability to power the safeguards buses rather than the loss of the power sources.

C.

As defined by the BWR Owners Group Emergency Procedure Guidelines, core submergence (RPV water level above TAF) is the primary and only long term viable mechanism of adequate core cooling. By definition, as long as the core remains covered with water, adequate core cooling is assured and no fuel damage will occur as a result of the inability to remove heat from the core.

GENERAL RAIs

Response to General RAI #34 (page 22)

As stated in the RAI, ICs are a subset of power plant conditions which represent a potential or actual radiological emergency. EALs are "a pre-determined, site-specific, observable threshold for a plant IC that places the plant in a given emergency class." When a site-specific, observable threshold (EAL) is reached, entry into its associated emergency class is required irrespective of the IC from which the EAL is derived. As stated in the RAI, ICs provide criteria that may be relevant to emergency classification based on the users "judgment." Therefore, it follows that use of judgment may be required for those conditions in which no "pre-determined, site-specific, observable threshold" can be defined.

Since ICs lack "site-specific, observable thresholds" for emergency classification, for those postulated conditions in which no site specific observable threshold exists, the users judgment must be based on the generic definition of the associated emergency classification.

EAL Category 9.0 "Other" defines EALs in each emergency class which are based upon the user's judgment. Category 9.0 is used when the plant condition does not meet any of the EAL thresholds of Category 1.0 through Category 8.0 but it is determined that the plant condition meets either the emergency class definition criteria or the NUMARC/NESP-007 fission product barrier loss or potential loss criteria. To address the concerns raised by the staff in this RAI, the bases document has been revised to include each of the NUMARC/NESP-007 ICs. Specific reference to these ICs is now incorporated in the judgment EALs providing a mechanism for the user to determine how an EAL (or several diverse EALs) is related to the plant conditions of concern.

Response to General RAI #2 (page 2)

Though not specifically stated, it is inferred that this RAI is in reference to EALs 5.2.3, 5.2.4 and 5.2.5.

For any actual or imminent release, dose projections performed in accordance with EAP-4, "Dose Assessment Calculations", use of actual meteorology is specified. Therefore, implicit in the performance of any dose projection is the use of actual meteorology.

To address the staff's concern that classification based upon these EALs be the result of an "actual or imminent" release of gaseous radioactivity, the EALs have been revised to include the "Actual or Imminent" terminology.

Non RAI Related Change

In order to maintain consistency with Nile Mile Point 1&2 EALs, the Technical Basis Document has been revised to clarify EAL 2.1.2 intent. The terminology of "cannot be restored and maintained" is intended to be consistent with the interpretation that:

> "The value of the identified parameter(s) is/in not able to return to above/below specified limits. This determination includes making an evaluation that considers both current and future system performance in relaton to the current value and trend of of the parameter(s). Neither implies that the parameter must actually exceed the limit before the classification is made nor that the classification must be made before the limit is reached. This does not imply any specific time interval but does not permit prolonged operation beyond a limit without making the specified classification"

This definition would require the emergency classification be made prior to water level dropping below TAF if, basd on the evaluation of the current trend of RPV water level and in consideration of current and future injection system performance, that RPV water level will not likely be restored and maintained above TAF. This definition, however, also provides the latitude, based on an that same evaluation, not to declare the SAE for those situations in which the RPV level transiently drops below TAF in the process of RPV water level restoration.

Attachment II to JPN-95-026

James A. FitzPatrick Nuclear Power Plant
Emergency Action Levels, Revision 1,
Based on Proposed Response to NRC RAIs,

New York Power Authority
Docket No. 50-333

JAFNPP Emergency Action Levels

Rev 1
Based on proposed responses to NRC RAIs

Category 1.0	Reactor Fuel
Category 2.0	Reactor Pressure Vessel
Category 3.0	Primary Containment
Category 4.0	Secondary Containment
Category 5.0	Radioactivity Release
Category 6.0	Electrical Failures
Category 7.0	Equipment Failures
Category 8.0	Hazards
Category 9.0	Other

4/25/95

Category 1.0

Reactor Fuel

1.0 Reactor Fuel

1.1 Coolant Activity

1.1.1 Unusual Event

Coolant activity > 31 µCi/gm I-131 equivalent

All

1.1.2 Alert

Coolant activity > 300 µCi/gm I-131 equivalent

Power Operation, Startup/Hot Standby, Hot Shutdown

1.0 Reactor Fuel

1.2 Off-gas Activity

1.2.1 Unusual Event

Offgas radiation ≥ hi-hi alarm for > 15 min.

All

1.2.2 Alert

Offgas radiation ≥ 10 x hi-hi alarm

Power Operation, Startup/Hot Standby, Hot Shutdown

1.0 Reactor Fuel

1.3 Containment Radiation

1.3.1 Alert

Drywell radiation > **300 R/hr**

Power Operation, Startup/Hot Standby, Hot Shutdown

1.3.2 Site Area Emergency

Drywell radiation > **3000 R/hr**

Power Operation, Startup/Hot Standby, Hot Shutdown

1.3.3 General Emergency

Drywell radiation > **250,000 R/hr**

Power Operation, Startup/Hot Standby, Hot Shutdown

1.0 Reactor Fuel

1.4 Other Radiation Monitors

1.4.1 Unusual Event

Any sustained ARM reading > **100 x alarm** or offscale hi resulting from an uncontrolled process

All

1.4.2 Alert

Sustained Refuel Floor Exhaust Radiation Monitors 17RM-456A or B > **hi-hi alarm**
OR
Any sustained refuel floor rad monitor > its Maximum Safe Operating Value, Table 1.1

All

1.4.3 Alert

Sustained area radiation levels > **15 mR/hr** in either:
Control Room
OR
Central Alarm Station and Security Building (SAS)

All

Category 1.0

Reactor Fuel

1.0 Reactor Fuel

1.4 Other Radiation Monitors

1.4.4 Alert

Sustained abnormal area radiation levels > 8 R/hr in any areas, Table 1.2
AND
Access is required for safe operation or shutdown

All

Table 1.1	Refuel Floor Rad Monitors
18RM-021-12 Spent Fuel Pool (EPIC Pt. A-1229)	1000 mR/hr
18RM-021-14 New Fuel Vault (EPIC Pt. A-1231)	1000 mR/hr
18RM-021-30 Refuel Floor West (EPIC Pt. A-1247)	200,000 mR/hr

Table 1.2 Plant Safety Function Areas

- Reactor Building
- Turbine Building
- Screenwell/Pumphouse
- Diesel Generator Building
- Administration Building

1.0 Reactor Fuel

1.5 Refueling Accidents

1.5.1 Unusual Event

Spent fuel pool/ reactor cavity water level cannot be restored and maintained above the spent fuel pool low water level alarm

All

1.5.2 Alert

Report of visual observation of irradiated fuel uncovered

All

2.0 Reactor Pressure Vessel

2.1 RPV Water Level

2.1.1 Unusual Event

Unidentified drywell leakage ≥ 10 gpm
OR
Reactor coolant to drywell identified leakage > 25 gpm

Power operation, startup/hot standby, hot shutdown

2.1.2 Site Area Emergency

RPV water level cannot be restored and maintained above 0 in. (TAF)

All

2.1.3 General Emergency

Primary Containment Flooding required

Power Operation, Startup/Hot Standby, Hot Shutdown

2.0 Reactor Pressure Vessel

2.2 Reactor Power / Reactivity Control

2.2.1 Alert

Any RPS setpoint has been exceeded
AND
Automatic scram fails to result in a control rod pattern which assures reactor shutdown under all conditions without boron

Power operation, startup/hot standby

2.2.2 Site Area Emergency

Any RPS setpoint has been exceeded
AND
Automatic and manual scrams fail to result in a control rod pattern which assures reactor shutdown under all conditions without boron
AND Either:
Reactor power > 2.5%
OR
Torus temperature > Boron Injection Initiation Temperature

Power Operation, Startup/Hot Standby

2.0 Reactor Pressure Vessel

2.2 Reactor Power / Reactivity Control

2.2.3 General Emergency

<u>Any</u> RPS setpoint has been exceeded
AND
Automatic and manual scrams fail to result in a control rod pattern which assures reactor shutdown under all conditions without boron
AND Either:
RPV water level cannot be restored and maintained > -31 in.
OR
Torus temperature and RPV pressure cannot be maintained < **HCTL**

Power Operation, Startup/Hot Standby

Category 3.0

Primary Containment

3.0 Primary Containment

3.1 Containment Pressure

3.1.1 Alert

Primary containment pressure cannot be maintained < 2.7 psig due to coolant leakage

Power Operation, Startup/Hot Standby, Hot Shutdown

3.1.2 Site Area Emergency

Primary containment pressure cannot be maintained < 2.7 psig
AND
Coolant activity > 300 μCi/gm

Power Operation, Startup/Hot Standby, Hot Shutdown

3.1.3 General Emergency

Primary containment venting is required due to PCPL

Power Operation, Startup/Hot Standby, Hot Shutdown

3.0 Primary Containment

3.2 Torus Temperature

3.2.1 Site Area Emergency

Torus temperature and RPV pressure cannot be maintained < HCTL (non-ATWS)

Power Operation, Startup/Hot Standby, Hot Shutdown

3.0 Primary Containment

3.3 Combustible Gas Concentration

3.3.1 Site Area Emergency

≥4% H_2 exists in DW or torus

Power Operation, Startup/Hot Standby, Hot Shutdown

3.3.2 General Emergency

Primary containment venting is required due to combustible gas concentrations

All

3.0 Primary Containment

3.4 Containment Isolation Status

3.4.1 Site Area Emergency

Any steam line or RWCU isolation failure resulting in a release pathway outside primary containment, Table 3.1

Power Operation, Startup/Hot Standby, Hot Shutdown

3.4.2 General Emergency

Any steam line or RWCU isolation failure resulting in a release pathway outside primary containment, Table 3.1

AND any:

- Coolant activity > 300 µCi/gm I-131 equivalent
- RPV water level < 0 in. (TAF)
- DW radiation > 3000 R/hr

Power Operation, Startup/Hot Standby, Hot Shutdown

Table 3.1 Steam Lines
MSLs HPCI RCIC

4.0 Secondary Containment

4.1 Reactor Building Temperature

4.1.1 Site Area Emergency

Primary system is discharging outside PC
AND
RB area temperatures are > maximum safe operating levels in two or more areas, EOP-5

Power Operation, Startup/Hot Standby, Hot Shutdown

4.1.2 General Emergency

Primary system is discharging outside PC
AND
RB area temperatures are > maximum safe operating levels in two or more areas, EOP-5
AND any:

- Coolant activity > **300 µCi/gm** I-131 equivalent
- RPV water level < **0 in.** (TAF)
- DW radiation > **3000 R/hr**

Power Operation, Startup/Hot Standby, Hot Shutdown

4.0 Secondary Containment

4.2 Reactor Building Radiation Level

4.2.1 Site Area Emergency

Primary system is discharging outside PC
AND
RB area radiation levels are > maximum safe operating levels in two or more areas, EOP-5

Power Operation, Startup/Hot Standby, Hot Shutdown

4.2.2 General Emergency

Primary system is discharging outside PC
AND
RB area radiation levels are > maximum safe operating levels in two or more areas, EOP-5
AND any:

- Coolant activity > **300 µCi/gm** I-131 equivalent
- RPV water level < **0 in.** (TAF)
- DW radiation > **3000 R/hr**

Power Operation, Startup/Hot Standby, Hot Shutdown

Category 5.0

Radioactivity Release / Area Radiation

5.0 Radioactivity Release / Area Radiation

5.1 Effluent Monitors

5.1.1 Unusual Event

A valid reading from an unplanned release on any monitors Table 5.1 column "NUE" for > 60 min. unless sample analysis can confirm release rates < 2 x technical specifications within this time period.

All

5.1.2 Alert

A valid reading from an unplanned release on any monitors Table 5.1 column "Alert" for > 15 min. unless dose assessment can confirm releases are below Table 5.2 column "Alert" within this time period.

All

5.0 Radioactivity Release / Area Radiation

5.1 Effluent Monitors

5.1.3 Site Area Emergency

A valid reading from an unplanned release on any monitors Table 5.1 column "SAE" for > 15 min. unless dose assessment can confirm releases are below Table 5.2 column "SAE" within this time period.

All

5.1.4 General Emergency

A valid reading from an unplanned release on any monitors Table 5.1 column "GE" for > 15 min. unless dose assessment can confirm releases are below Table 5.2 column "GE" within this time period.

All

5.0 Radioactivity Release / Area Radiation

5.2 Dose Projections/ Environmental Measurements/ Release Rates

5.2.1 Unusual Event

Confirmed sample analyses for gaseous or liquid release rates > 2 x technical specifications limits for > 60 min.

All

5.2.2 Alert

Confirmed sample analyses for gaseous or liquid release rates > 200 x technical specifications limits for > 15 min.

All

5.2.3 Alert

Dose projections or field surveys resulting from actual or imminent release which indicate doses / dose rates > Table 5.2 column "Alert" at the site boundary or beyond.

All

5.0 Radioactivity Release / Area Radiation

5.2 Dose Projections/ Environmental Measurements/ Release Rates

5.2.4 Site Area Emergency

Dose projections or field surveys resulting from actual or imminent release which indicate doses / dose rates > Table 5.2 column "SAE" at the site boundary or beyond.

All

5.2.5 General Emergency

Dose projections or field surveys resulting from actual or imminent release which indicate doses / dose rates > Table 5.2 column "GE" at the site boundary or beyond.

All

Category 5.0

Radioactivity Release / Area Radiation

Table 5.1 Effluent Monitor Classification Thresholds				
Low Range Monitors				
Monitor	GE	SAE	Alert	UE
STACK	see Hi Range	see Hi range	see Hi Range	≥5E5 cps
RX BLDG EXH	N/A	N/A	≥2E4 cpm	≥9.9E5 cpm
REFUEL FLR EXH	N/A	N/A	≥9.9E5 cpm	≥2E4 cpm
TURB BLDG EXH	see Hi Range	see Hi Range	≥9.9E5 cpm	≥5E4 cpm
RADW BLDG EXH	see Hi Range	see Hi Range	≥9.9E5 cpm	≥2E4 cpm
SW EFF	N/A	N/A	≥40,000 cps	≥400 cps
RADW EFF	N/A	N/A	≥200 x hi-hi trip	≥2 x hi-hi trip
High Range Monitors				
Monitor	GE	SAE	Alert	UE
STACK	≥11,600 mR/hr	≥1160 mR/hr	≥116 mR/hr	N/A
TURB BLDG EXH	≥12 mR/hr*	≥1.2 mR/hr*	N/A	N/A
RADW BLDG	≥33 mR/hr*	≥3.3 mR/hr*	N/A	N/A

* with its corresponding low range monitors upscale

Table 5.2 Dose Projection / Env. Measurement Classification Thresholds			
	GE	SAE	Alert
TEDE	1000 mR	100 mR	10 mR
CDE Thyroid	5000 mR	500 mR	N/A
External exposure rate	1000 mR/hr	100 mR/hr	10 mR/hr
Thyroid exposure rate (for 1 hr. of inhalation)	5000 mR/hr	500 mR/hr	N/A

Category 6.0

Electrical Failures

6.0 Electrical Failures

6.1 Loss of AC Power Sources

6.1.1 Unusual Event

Loss of power for >15 min. to all:

- Reserve Station Transformer T-2
- Reserve Station Transformer T-3
- Station Service Transformer (if T-4 back fed from Station Main Transformer T-1A/T1B)

All

6.1.2 Alert

Loss of all vital bus AC power for >15 min.

Cold Shutdown, Refuel, Defuel

6.1.3 Alert

Available vital bus AC power reduced to only one of the following sources for >15 min.:

- Reserve Station Transformer T-2
- Reserve Station Transformer T-3
- Station Service Transformer T-4
- EDG A (10500)
- EDG B (10600)
- EDG C (10500)
- EDG D (10600)

Power Operation, Startup/Hot Standby, Hot Shutdown

6.0 Electrical Failures

6.1 Loss of AC Power Sources

6.1.4 Site Area Emergency

Loss of all vital bus AC power for >15 min.

Power Operation, Startup/Hot Standby, Hot Shutdown

6.1.5 General Emergency

Loss of all vital bus AC power
AND either:
Power restoration to any emergency bus is not likely in **≤ 4 hrs**
OR
RPV water level cannot be restored and maintained **> 0 in.** (TAF)

Power Operation, Startup/Hot Standby, Hot Shutdown

Category 6.0

Electrical Failures

6.0 Electrical Failures

6.2 Loss of DC Power Sources

6.2.1 Unusual Event

< 105 vdc on 71-BCB-2A and B for >15 min due to unplanned activities.

Cold shutdown, Refuel

6.2.2 Site Area Emergency

< 105 vdc on 71-BCB-2A and B for >15 min.

Power Operation, Startup/Hot Standby, Hot Shutdown

Category 7.0

Equipment Failures

7.0 **Equipment Failures**

7.1 **Technical Specification\Requirements**

7.1.1 **Unusual Event**

Plant is not brought to required operating mode within Technical Specifications LCO Action Statement Time.

Power Operation, Startup/Hot Standby, Hot Shutdown

7.0 **Equipment Failures**

7.2 **System Failures or Control Room Evacuation**

7.2.1 **Unusual Event**

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

Power Operation, Startup/Hot Standby, Hot Shutdown

7.2.2 **Alert**

Entry into AOP-43, "Shutdown from Outside the Control Room"

All

7.2.3 **Alert**

Reactor coolant temperature cannot be maintained < 212 °F

Cold Shutdown, Refuel

Category 7.0

Equipment Failures

7.0 **Equipment Failures**

7.2 **System Failures or Control Room Evacuation**

7.2.4 **Site Area Emergency**

Control Room evacuation
AND
Plant control cannot be established per AOP-43, "Shutdown from Outside the Control Room" in <30 min.

All

7.0 **Equipment Failures**

7.3 **Loss of Indications/Alarm/Communication Capability**

7.3.1 **Unusual Event**

Unplanned loss of safety system annunciators or indicators on all of the following panels for > 15 min.:

- 09-3
- 09-4
- 09-5
- 09-6
- 09-7
- 09-8
- 09-75

AND
Increased surveillance is required for safe plant operation

Power Operation, Startup/Hot Standby, Hot Shutdown

7.3.2 **Unusual Event**

Unplanned loss of all communications capability affecting the ability to either:

Perform routine onsite operations
OR
Notify offsite agencies or personnel

All

Category 7.0

Equipment Failures

7.0 Equipment Failures

7.3 Loss of Indications/Alarm/Communication Capability

7.3.3 Alert

Unplanned loss of safety system annunciators or indicators on all of the following panels for > 15 min.:

- 09-3
- 09-4
- 09-5
- 09-6
- 09-7
- 09-8
- 09-75

AND

Increased surveillance is required for safe plant operation

AND either:

Plant transient in progress

OR

EPIC is unavailable

Power Operation, Startup/Hot Standby, Hot Shutdown

7.0 Equipment Failures

7.3 Loss of Indications/Alarm/Communication Capability

7.3.4 Site Area Emergency

Loss of annunciators or indicators on all of the following panels:

- 09-3
- 09-4
- 09-5
- 09-6
- 09-7
- 09-8
- 09-75

AND

EPIC is unavailable

AND

Indications to monitor all RPV and primary containment EOP parameters are lost

AND

Plant transient is in progress

Power Operation, Startup/Hot Standby, Hot Shutdown

8.0 Hazards

8.1 Security Threats

8.1.1 Unusual Event

Bomb device or other indication of attempted sabotage discovered within plant Protected Area
OR
Any security event which represents a potential degradation in the level of safety of the plant.

All

8.1.2 Alert

Intrusion into plant Protected Area by an adversary
OR
Any security event which represents an actual substantial degradation of the level of safety of the plant.

All

8.0 Hazards

8.1 Security Threats

8.1.3 Site Area Emergency

Intrusion into a plant security vital area by an adversary
OR
Any security event which represents actual or likely failures of plant systems needed to protect the public.

All

8.1.4 General Emergency

Security event which results in:
Loss of plant control from the Control Room
OR
Loss of remote shutdown capability

All

8.0 Hazards

8.2 Fire or Explosion

8.2.1 Unusual Event

Confirmed fire in or contiguous to any plant area, Table 8.2 or Table 8.3, not extinguished in $\leq$ 15 min. of Control Room notification

All

8.2.2 Alert

Fire or explosion in any plant area, Table 8.2 or Table 8.3, which results in damage to plant equipment or structures needed for safe plant operation

All

8.0 Hazards

8.3 Man-Made Events

8.3.1 Unusual Event

Vehicle crash into or projectile which impacts plant structures or systems within Protected Area boundary

All

8.3.2 Unusual Event

Report by plant personnel of an explosion within Protected Area boundary resulting in visible damage to permanent structures or equipment

All

8.3.3 Unusual Event

Report or detection of toxic or flammable gases that could enter or have entered within the Protected Area boundary in amounts that could affect the health of plant personnel or safe plant operation
OR
Report by local, county or state officials for potential evacuation of site personnel based on offsite event

All

8.0 Hazards

8.3 Man-Made Events

8.3.4 Alert

Vehicle crash or projectile impact which precludes personnel access to or damages equipment in plant vital areas, Table 8.3

All

8.3.5 Alert

Report or detection of toxic or flammable gases within a plant vital area, Table 8.3, in concentrations that will be life threatening to plant personnel or preclude access to equipment needed for safe plant operation

All

8.0 Hazards

8.4 Natural Events

8.4.1 Unusual Event

Earthquake felt inplant based upon a consensus of Control Room Operators on duty
AND either:
JAFNPP seismic activity alarm (EPIC A-124) actuated
OR
Confirmation of earthquake received on NMP-1 or NMP-2 seismic instrumentation

All

8.4.2 Unusual Event

Report by plant personnel of tornado striking within plant Protected Area boundary

All

8.4.3 Unusual Event

Lake water level > 248 ft
OR
ESW intake bay water level < 237 ft

All

8.0 Hazards

8.4 Natural Events

8.4.4 Alert

Earthquake felt inplant based upon a consensus of Control Room Operators on duty
AND
JAFNPP seismic activity alarm (EPIC A-124) actuated
AND
Confirmation of seismic event > **0.08 g** by NMP-2

All

8.4.5 Alert

Sustained winds > **90 mph**
OR
Tornado strikes a plant vital area, Table 8.3

All

8.4.6 Alert

Any natural event which results in a report of visible structural damage or assessment by Control Room personnel of actual damage to equipment needed for safe plant operation, Table 8.3, vital areas

All

8.0 Hazards

8.4 Natural Events

8.4.7 Alert

Lake water level > 255 ft
OR
ESW intake bay water level < 235 ft

All

Table 8.2 Plant Areas
• RadWaste Building/Track Bay • Reactor Track Bay • Boiler House • Security Building • CAS Building • #2 Oil Storage Shack • H_2 Storage Facility • CAD N_2 Storage Building

Table 8.3 Plant Vital Areas
• Reactor Building • Control Room/ Relay Room/Cable Spreading Room • Turbine Building • Screenwell/Pumphouse • Diesel Generator Building • Battery Room/Battery Room Corridor

Category 9.0

Other

9.0 Other

9.1.1 Unusual Event

Any event, as determined by the Shift Supervisor or Emergency Director, that could lead to or has led to a potential degradation of the level of safety of the plant.

All

9.1.2 Unusual Event

Any event, as determined by the Shift Supervisor or Emergency Director, that could lead to or has led to a loss or potential loss of containment, Attachment A.

Loss of containment indicators may include a rapid unexplained decrease following initial increase in containment pressure

Power Operation, Startup/Hot Standby, Hot Shutdown

9.0 Other

9.1.3 Alert

Any event, as determined by the Shift Supervisor or Emergency Director, that could cause or has caused actual substantial degradation of the level of safety of the plant.

All

9.1.4 Alert

Any event, as determined by the Shift Supervisor or Emergency Director, that could lead or has led to a loss or potential loss of either fuel clad or RCS barrier, Attachment A.

Power Operation, Startup/Hot Standby, Hot Shutdown

9.0 Other

9.1.5 Site Area Emergency

As determined by the Shift Supervisor or Emergency Director, events are in progress which indicate actual or likely failures of plant systems needed to protect the public. Any releases are not expected to result in exposures which exceed EPA PAGs.

All

9.1.6 Site Area Emergency

Any event, as determined by the Shift Supervisor or Emergency Director, that could lead or has led to either:

Loss or potential loss of both fuel clad and RCS barrier, Attachment A

OR

Loss or potential loss of either fuel clad or RCS barrier in conjunction with a loss of containment, Attachment A

Loss of containment indicators may include a rapid unexplained decrease following initial increase in containment pressure

Power Operation, Startup/Hot Standby, Hot Shutdown

9.0 Other

9.1.7 General Emergency

As determined by the Shift Supervisor or Emergency Director, events are in progress which indicate actual or imminent core damage and the potential for a large release of radioactive material in excess of EPA PAGs outside the site boundary.

All

9.1.8 General Emergency

Any event, as determined by the Shift Supervisor or Emergency Director, that could lead or has led to a loss of any two fission product barriers and loss or potential loss of the third, Attachment A.

Loss of containment indicators may include a rapid unexplained decrease following initial increase in containment pressure

Power Operation, Startup/Hot Standby, Hot Shutdown

Attachment III to JPN-95-026

New York EAL Upgrade Project, James A. FitzPatrick Nuclear Power Plant, Emergency Action Levels, Technical Bases, Revision 1

New York Power Authority
Docket No. 50-333

New York EAL Upgrade Project

JAFNPP

Emergency Action Levels

Technical Bases

Revision 1

Based on proposed responses to NRC RAIs

4/25/95

PURPOSE

The purpose of this document is to provide an explanation and rationale for each of the emergency action levels (EALs) included in the EAL Upgrade Program for the James A. FitzPatrick Nuclear Power Plant (JAFNPP). It is also intended to facilitate the review process of the JAFNPP EALs and provide historical documentation for future reference. This document is also intended to be utilized by those individuals responsible for implementation of EP-100 "Emergency Classification" as a technical reference and aid in EAL interpretation.

DISCUSSION

EALs are the plant-specific indications, conditions or instrument readings which are utilized to classify emergency conditions defined in the JAFNPP Emergency Plan.

Subsequent to the acceptance by the NRC of NUMARC/NESP-007 "Methodology for Development of Emergency Action Levels" as an acceptable alternative to the NUREG 0654 EAL guidance, the four nuclear utilities in the State of New York decided to perform a joint implementation of the new methodology. This upgrade project involved the following plants:

- Nine Mile Point Unit 1 (NMPC)
- Nine Mile Point Unit 2 (NMPC)
- James A. FitzPatrick Nuclear Power Plant (NYPA)
- Indian Point Station 2 (ConEd)
- Indian Point 3 Nuclear Power Station (NYPA)
- R. E. Ginna Nuclear Power Station (RG&E)

While the upgraded EALs are site specific, an objective of the upgrade project was to ensure conformity and consistency between the sites to the extent possible.

The revised EALs were derived from the Initiating Conditions and example EALs given in the JAFNPP Plant-Specific EAL Guideline (PEG). The PEG is the JAFNPP interpretation of the NUMARC methodology for developing EALs. The PEG identifies deletions from the NUMARC methodology by striking out words and phrases that are not applicable to JAFNPP; additions are identified by underlining new words and phrases. The source of documents for PEG changes from NUMARC methodology are listed in the references section of the PEG.

Many of the EALs derived from the NUMARC methodology are fission product barrier based. That is, the conditions which define the EALs are

based upon loss or potential loss of one or more of the three fission product barriers.

The primary fission product barriers are:

A. Reactor Fuel Cladding: The fuel cladding is comprised of the zirconium tubes which house the ceramic uranium oxide pellets along with the end plugs which are welded into each end of the fuel rods.

B. Reactor Coolant System (RCS): The RCS is comprised of the reactor vessel shell, vessel head, CRD housings, vessel nozzles and penetrations and all primary systems directly connected to the RPV up to the outermost primary containment isolation valve.

C. Primary Containment: The primary containment is comprised of the drywell, suppression chamber (torus), the interconnections between the two, and all isolation valves required to maintain primary containment integrity under accident conditions.

Although the secondary containment (reactor building) serves as an effective fission product barrier by minimizing ground level releases, it is not considered as a fission product barrier for the purpose of emergency classification.

The following criteria serves as the bases for event classification related to fission product barrier loss:

Unusual Event:

Any loss or potential loss of primary containment

Alert:

Any loss or any potential loss of either fuel clad or RCS

Site Area Emergency:

Any loss of both fuel clad and RCS
or
Any potential loss of both fuel clad and RCS
or
Any potential loss of either fuel clad or RCS with a loss of any additional barrier

General Emergency:

Loss of any two barriers with lose or potential loss of a third

Those EALs which reference one or more of the fission product barrier IC designators (FC, RCS and PC) in the PEG Reference section of the technical bases are derived from the Fission Product Barrier Analysis. The analysis entailed an evaluation of every combination of the plant specific barrier loss/potential loss indicators applied to the above criteria.

Where possible, the EALs have been made consistent with and utilize the conditions defined in the JAFNPP symptom based Emergency Operating Procedures (EOPs). While the symptoms that drive operator actions specified in the EOPs are not indicative of all possible conditions which warrant emergency classification, they do define the symptoms, independent of initiating events, for which reactor plant safety and/or fission product barrier integrity are threatened. Where these symptoms are clearly representative of one of the PEG Initiating Conditions, they have been utilized as an EAL. This allows for rapid classification of emergency situations based on plant conditions without the need for additional evaluation or event diagnosis. Although some of the EALs presented here are based on conditions defined in the EOPs, classification of emergencies using these EALs is not dependent upon EOP entry or execution. The EALs can be utilized independently or in conjunction with the EOPs.

To the extent possible, the EALs are symptom based. That is, the action level is defined by values of key plant operating parameters which identify emergency or potential emergency conditions. This approach is appropriate because it allows the full scope of variations in the types of events to be classified as emergencies. But, a purely symptom based approach is not sufficient to address all events for which emergency classification is appropriate. Particular events to which no predetermined symptoms can be ascribed have also been utilized as EALs since they may be indicative of potentially more serious conditions not yet fully realized.

The EALs are grouped into nine categories to simplify their presentation and to promote a rapid understanding by their users. These categories are:

1. Reactor Fuel
2. Reactor Pressure Vessel
3. Primary Containment
4. Secondary Containment
5. Radioactivity Release

6. Electrical Failures

7. Equipment Failures

8. Hazards

9. Other

Categories 1 through 5 are primarily symptom based. The symptoms are indicative of actual or potential degradation of either fission product barriers or personnel safety.

Categories 6, 7 and 8 are event based. Electrical Failures are those events associated with losses of either AC or vital DC electrical power. Equipment Failures are abnormal and emergency events associated with vital plant system failures, while Hazards are those non-plant system related events which have affected or may affect plant safety.

Category 9 provides the Emergency Director (Shift Supervisor) the latitude to classify and declare emergencies based on plant symptoms or events which in his judgment warrant classification. This judgment includes evaluation of loss or potential loss of one or more fission product barriers warranting emergency classification consistent with the NUMARC barrier loss criteria.

Categories are further divided into one or more subcategories depending on the types and number of plant conditions that dictate emergency classifications. For example, the Reactor Fuel category has five subcategories whose values can be indicative of fuel damage: coolant activity, off-gas activity, containment radiation, other radiation monitors and refueling accidents. An EAL may or may not exist for each sub category at all four classification levels. Similarly, more than one EAL may exist for a sub category in a given emergency classification when appropriate (i. e., no EAL at the General Emergency level but three EALs at the Unusual Event level).

For each EAL, the following information is provided:

- Classification: Unusual Event, Alert, Site Area Emergency, or General Emergency

- Operating Mode Applicability: One or more of the following plant operating conditions are listed: Power Operation, Startup/Hot Standby, Hot Shutdown, Cold Shutdown, Refuel and Defuel

- EAL: Description of the condition or set of conditions which comprise the EAL

- Basis: Description of the rationale for the EAL

- PEG Reference(s): PEG IC(s) and example EAL(s) from which the EAL is derived

- Basis Reference(s): Source documentation from which the EAL is derived

The identified operating modes are defined as follows:

Power Operations

Reactor is critical and the mode switch is in RUN.

Startup/Hot Standby

The mode switch is in STARTUP/HOT STANDBY.

Hot Shutdown

Mode switch is in SHUTDOWN and reactor coolant temperature is >212 °F.

Cold Shutdown

Mode switch in SHUTDOWN and reactor coolant temperature is ≤212 °F.

Refuel

Mode switch in REFUEL.

Defueled

RPV contains no irradiated fuel.

1.0 REACTOR FUEL

The reactor fuel cladding serves as the primary fission product barrier. Over the useful life of a fuel bundle, the integrity of this barrier should remain intact as long as fuel cladding integrity limits are not exceeded.

Should fuel damage occur (breach of the fuel cladding integrity) radioactive fission products are released to the reactor coolant. The magnitude of such a release is dependent upon the extent of the damage as well as the mechanism by which the damage occurred. Once released into the reactor coolant, the highly radioactive fission products can pose significant radiological hazards in plant from reactor coolant process streams. If other fission product barriers were to fail, these radioactive fission products can pose significant offsite radiological consequences.

The following parameters/indicators are indicative of possible fuel failures:

- Coolant Activity: During normal operation, reactor coolant fission product activity is very low. Small concentrations of fission products in the coolant are primarily from either the fission of tramp uranium in the fuel cladding or minor perforations in the cladding itself. Any significant increase from these baseline levels is indicative of fuel failures.

- Off-gas Activity: As with coolant activity, any fuel failures will release fission products to the reactor coolant. Those products which are gaseous or volatile in nature will be carried over with the steam and eventually be detected by the air ejector off-gas radiation monitors.

- Containment Radiation Monitors: Although not a direct indication or measurement of fuel damage, exceeding predetermined limits on containment high range radiation monitors under LOCA conditions is indicative of possible fuel failures. In addition, this indicator is utilized as an indicator of RCS loss and potential containment loss.

- Other Radiation Monitors: Other process and area radiation monitoring systems are specifically designed to provide indication of possible fuel damage such as Area Radiation Monitoring Systems.

- Refueling Accidents: Both area and process radiation monitoring systems designed to detect fission products during refueling conditions as well as visual observation can be utilized to indicate loss or potential loss of spent fuel cladding integrity .

1.0 Reactor Fuel 1.1 Coolant Activity

1.1.1 Unusual Event

Coolant activity > 31 µCi/gm I-131 equivalent

NUMARC IC:

Fuel clad degradation

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

Elevated reactor coolant activity represents a potential degradation in the level of safety of the plant and a potential precursor of more serious problems. This EAL addresses reactor coolant samples exceeding coolant technical specifications for iodine spiking.

PEG Reference(s):

SU4.2

Basis Reference(s):

1. Technical Specification 3.6.C and Radiological Effluent Technical Specifications 3.5

1.0 Reactor Fuel 1.1 Coolant Activity

1.1.2 Alert

Coolant activity > 300 µCi/gm I-131 equivalent

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

Elevated reactor coolant activity represents a potential degradation in the level of safety of the plant and a potential precursor of more serious problems. This amount of coolant activity is well above that expected for iodine spikes and corresponds to about 2% to 5% fuel clad damage. When reactor coolant activity reaches this level, significant clad heating has occurred and thus the fuel clad barrier is considered lost. Therefore, declaration of an Alert is warranted.

PEG Reference(s):

FC1.1

Basis Reference(s):

None

1.0 Reactor Fuel 1.2 Off-gas Activity

1.2.1 Unusual Event

Offgas radiation ≥ **hi-hi alarm** for > 15 min.

NUMARC IC:

Fuel clad degradation

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

Elevated offgas radiation activity represents a potential degradation in the level of safety of the plant and a potential precursor of more serious problems. The Technical Specification allowable limit is 500,000 μCi/sec (recombiner discharge gross noble gases beta and/or gamma). The hi-hi alarm setpoint is set at 50% of the instantaneous release limit. The hi-hi alarm setpoint has been conservatively selected because it is operationally significant and is readily recognizable by Control Room operating staff. 15 minutes is allotted for operator action to reduced the offgas radiation levels and exclude transient conditions.

The hi-hi offgas radiation alarm is set at 1000 mR/hr on 17RM-150 A and B.

PEG Reference(s):

SU4.1

Basis Reference(s):

1. PSP-14 Main Steam Line and SJAE Radiation Monitor Calibration
2. AOP-3 High Activity in Reactor Coolant or Offgas
3. Technical Specifications 3.6.C

1.0 Reactor Fuel 1.2 Off-gas Activity

1.2.2 Alert

Offgas radiation ≥ 10 x hi-hi alarm

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

This EAL is to cover other indications that may indicate loss or potential loss of the fuel clad barrier. Air ejector offgas radiation levels >10 times the nominal hi-hi setpoint is indicative of significant fuel cladding failure and is consistent with the Alert EAL of 300 µCi/gm I-131 equivalent coolant activity which is approximately 10 times the Technical Specification coolant activity of 31 µCi/gm I-131 equivalent. The Technical Specification allowable limit is 500,000 µCi/sec (recombiner discharge gross noble gases beta and/or gamma). The hi-hi alarm setpoint is set at 50% of the instantaneous release limit and, therefore, a conservative representation of 10 times Technical Specification release limits. The hi-hi alarm setpoint has been conservatively selected because it is operationally significant and readily recognizable by the Control Room operating staff.

The hi-hi offgas radiation alarm is set at 275 mR/hr on 17RM-150A and B. 10 times the hi-hi alarm setpoint is therefore 2750 mR/hr.

PEG Reference(s):

FC4.1

Basis Reference(s):

1. Technical Specification 3.2.D and Radiological Effluent Technical Specifications 3.5
2. PSP-14 Main Steam Line and SJAE Radiation Monitor Calibration
3. AOP-3 High Activity in Reactor Coolant or Offgas

1.0 Reactor Fuel 1.3 Containment Radiation

1.3.1 Alert

Drywell radiation > 300 R/hr

NUMARC IC:

N/A

FPB loss/potential loss:

RCS loss

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

The drywell radiation reading is a value which indicates the release of reactor coolant to the drywell. The reading is calculated assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with normal operating concentrations (i. e., within Technical Specifications) into the drywell atmosphere. The 300 R/hr value is conservatively selected from EAP-44 Figures V-2 thru V-5 based on Case #5 (1/10th of 1% noble gas release) one hour after shutdown. The reading is less than that specified for EAL 1.3.2 because no damage to the fuel clad is assumed. Only leakage from the RCS is assumed in this EAL.

It is important to recognize that the radiation monitor may be sensitive to shine from the RPV or RCS piping. Drywell radiation monitors are 17-RE-104 A or B.

PEG Reference(s):

RCS3.1

Basis Reference(s):

1. EAP-44 Core Damage Estimation Figures V-2 thru V-5
2. Calculation SL-4370, Sargent & Lundy, May 1985 "High Range Containment Monitor Response to Post Accident Fission Product Barrier Releases - JAFNPP"

1.0 Reactor Fuel 1.3 Containment Radiation

1.3.2 Site Area Emergency

Drywell radiation > 3000 R/hr

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss, RCS loss

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

The drywell radiation reading is a value which indicates the release of reactor coolant, with elevated activity indicative of fuel damage, into the drywell. The reading is calculated assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with a concentration of 300 μCi/gm dose equivalent I-131 into the drywell atmosphere. Reactor coolant concentrations of this magnitude are several times larger than the maximum concentrations allowed within Technical Specifications (including iodine spiking) and are therefore indicative of fuel damage (approximately 2% - 5% clad failure depending on core inventory and RCS volume). The 3000 R/hr value was conservatively selected from EAP-44 Figures V-2 thru V-5 based on Case #4 (1% noble gas release) one hour after shutdown. The reading is higher than that specified for EAL 1.3.1 and, thus, this EAL indicates a loss of both the fuel clad barrier and the RCS barrier.

It is important to recognize that the radiation monitor may be sensitive to shine from the RPV or RCS piping. Drywell radiation monitors are 17-RE-104 A or B.

PEG Reference(s):

FC3.1

Basis Reference(s):

1. EAP-44 Core Damage Estimation Figures V-2 thru V-5
2. Calculation SL-4370, Sargent & Lundy, May 1985 "High Range Containment Monitor Response to Post Accident Fission Product Barrier Releases - JAFNPP"

1.0 Reactor Fuel 1.3 Containment Radiation

1.3.3 General Emergency

Drywell radiation **> 250,000 R/hr**

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss, RCS loss, Containment potential loss

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

The drywell radiation reading is a value which indicates significant fuel damage well in excess of that required for loss of the RCS barrier and the fuel clad barrier. NUREG-1228 "Source Estimations During Incident Response to Severe Nuclear Power Plant Accidents" states that such readings do not exist when the amount of clad damage is less than 20%. The 250,000 R/hr value was conservatively selected from EAP-44 Figures V-2 thru V-5 based on Case #3 (10% noble gas release) one hour after shutdown. A major release of radioactivity requiring offsite protective actions from core damage is not possible unless a major failure into the reactor coolant has occurred. Regardless of whether the primary containment barrier itself is challenged, this amount of activity in containment could have severe consequences if released. It is, therefore, prudent to treat this as a potential loss of the containment barrier and upgrade the emergency classification to a General Emergency.

It is important to recognize that the radiation monitor may be sensitive to shine from the RPV or RCS piping. Drywell radiation monitors are 17-RE-104 A or B.

PEG Reference(s):

PC3.1

Basis Reference(s):

1. EAP-44 Core Damage Estimation Figures V-2 thru V-5

2. Calculation SL-4370, Sargent & Lundy, May 1985 "High Range Containment Monitor Response to Post Accident Fission Product Barrier Releases - JAFNPP"

1.0 Reactor Fuel 1.4 Other Radiation Monitors

1.4.1 Unusual Event

Any sustained ARM reading > 100 x alarm or offscale hi resulting from an uncontrolled process

NUMARC IC:

Unexpected increase in plant radiation or airborne concentration.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

Valid elevated area radiation levels usually have long lead times relative to the potential for radiological release beyond the site boundary, thus impact to public health and safety is very low.

This EAL addresses unplanned increases in radiation levels inside the plant. These radiation levels represent a degradation in the control of radioactive material and a potential degradation in the level of safety of the plant. Area radiation levels above 100 times the alarm setpoint have been selected because they are readily identifiable on ARM instrumentation. The ARM alarm setpoint is considered to be a bounding value above the maximum normal radiation level in an area. Since ARM setpoints are nominally set one decade over normal levels, 100 times the alarm setpoint provides an appropriate threshold for emergency classification. For those ARMS whose upper range limits are less than 100 times the alarm setpoint, a value of offscale high is used. This EAL escalates to an Alert, if the increases impair the level of safe plant operation.

PEG Reference(s):

AU2.4

Basis Reference(s):

1. EOP-5 Secondary Containment Control
2. AOP-53 Loss of Spent Fuel Pool, Reactor Cavity or Equipment Storage Pit Water Level

1.0 Reactor Fuel 1.4 Other Radiation Monitors

1.4.2 Alert

Sustained Refuel Floor Exhaust Radiation Monitors 17RM-456A or B
≥ hi-hi alarm
OR
Any sustained refuel floor rad monitor > its Maximum Safe Operating Value, Table 1.1

Table 1.1 Refuel Floor Rad Monitors	
18RM-021-12 Spent Fuel Pool (EPIC Pt. A-1229)	1000 mR/hr
18RM-021-14 New Fuel Vault (EPIC Pt. A-1231)	1000 mR/hr
18RM-021-30 Refuel Floor West (EPIC Pt. A-1247)	200,000 mR/hr

NUMARC IC:

Major damage to irradiated fuel or loss of water level that has or will result in the uncovering of irradiated fuel outside the reactor vessel.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL is defined by the specific areas where irradiated fuel is located such as reactor cavity, reactor vessel, or spent fuel pool.

Sufficient time exists to take corrective actions for these conditions and there is little potential for substantial fuel damage. NUREG/CR-4982 "Severe Accident in Spent Fuel Pools in Support of Generic Safety Issue 82" indicates that even if corrective actions are not taken, no prompt fatalities are predicted and the risk of injury is low. In addition, NRC Information Notice No. 90-08, "KR-85 Hazards from Decayed Fuel" presents the following it its discussion:

"In the event of a serious accident involving decayed spent fuel, protective actions would be needed for personnel on site, while offsite doses (assuming an exclusion area radius of one mile from the plant site) would be well below the Environmental Protection Agency's Protective Action Guides. Accordingly, it is important to be able to properly survey and monitor for Kr-85 in the event of an accident with decayed spent fuel.

Thus, an Alert Classification for this event is appropriate. Escalation, if appropriate, would occur via Emergency Director judgment in EAL Category 9.

The basis for the reactor building ventilation monitor setpoint is a spent fuel handling accident and is, therefore, appropriate for this EAL.

Area radiation levels on the refuel floor at or above the Maximum Safe Operating value are indicative of radiation fields which may limit personnel access. Access to the refuel floor is required in order to visually observe water level in the spent fuel pool. Without access to the refuel floor, it would not be possible to determine the applicability of EAL 1.5.2. Area radiation levels on the refuel floor at or above the Maximum Safe Operating value could also adversely affect equipment whose operation may be needed to assure adequate core cooling or shutdown the reactor.

PEG Reference(s):

AA2.1

Basis Reference(s):

1. NUREG-0818, Emergency Action Levels for Light Water Reactors

2. NUREG/CR-4982, Severe Accident in Spent Fuel Pools in Support of Generic Safety Issue 82, July 1987

3. NRC Information Notice No. 90-08, KR-85 Hazards from Decayed Fuel

4. EOP-5 Secondary Containment Control

5. OP-32 Area Radiation Monitoring

6. JAFNPP PSTG Rev. 4

1.0 Reactor Fuel 1.4 Other Radiation Monitors

1.4.3 Alert

Sustained area radiation levels > 15 mR/hr in either:
Control Room
OR
Central Alarm Station and Security Building (SAS)

NUMARC IC:

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.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL addresses increased radiation levels that impede necessary access to operating stations requiring continuous occupancy to maintain safe plant operation or perform a safe plant shutdown. Areas requiring continuous occupancy include the Control Room, the central alarm station (CAS) and the secondary security alarm station (SAS). The security alarm stations are included in this EAL because of their importance to permitting access to areas required to assure safe plant operations.

The value of 15 mR/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. A 30 day duration implies an event potentially more significant than an Alert.

It is the impaired ability to operate the plant that results in the actual or potential degradation of the level of safety of the plant. The cause or magnitude of the increase in radiation levels is not a concern of this EAL. The Emergency Director must consider the source or cause of the increased

radiation levels and determine if any other EALs may be involved. For example, a dose rate of 15 mR/hr in the Control Room may be a problem in itself. However, the increase may also be indicative of high dose rates in the containment due to a LOCA. In this latter case, a Site Area Emergency or a General Emergency may be indicated by other EAL categories.

This EAL could result in declaration of an Alert at JAFNPP due to a radioactivity release or radiation shine resulting from a major accident at the NMP-1 or NMP-2. Such a declaration would be appropriate if the increase impairs safe plant operation.

This EAL is not intended to apply to anticipated temporary radiation increases due to planned events (e. g., radwaste container movement, depleted resin transfers, etc.).

PEG Reference(s):

AA3.1

Basis Reference(s):

1. GDC 19
2. NUREG-0737, "Clarification of TMI Action Plan Requirements", Section III.D.3

1.0 Reactor Fuel 1.4 Other Radiation Monitors

1.4.4 Alert

Sustained abnormal area radiation levels > 8 R/hr [illegible] areas, Table 1.2
AND
Access is required for safe operation or shutdown

Table 1.2 Plant Safety Function Areas
• Reactor Building • Turbine Building • Screenwell/Pumphouse • Diesel Generator Building • Administration Building

NUMARC IC:

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.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL addresses increased radiation levels in areas requiring infrequent access in order to maintain safe plant operation or perform a safe plant shutdown. Area radiation levels at or above 8 R/hr are indicative of radiation fields which may limit personnel access or adversely affect equipment whose operation may be needed to assure adequate core cooling or shutdown the reactor. This basis of the value is described in NMPC memo File Code NMP31027 "Exposure Guidelines For Unusual/Accident Conditions". The areas selected are consistent with those listed in other EALs and represent those structures which house systems and equipment necessary for the safe operation and shutdown of the plant.

It is the impaired ability to operate the plant that results in the actual or potential degradation of the level of safety of the plant. The cause or magnitude of the increase in radiation levels is not a concern of this EAL. The Emergency Director must consider the source or cause of the increased radiation levels and determine if any other EAL may be involved. For example, a dose rate of 8 R/hr may be a problem in itself. However, the increase may also be indicative of high dose rates in the containment due to a LOCA. In this latter case, a Site Area Emergency or a General Emergency may be indicated by other EAL categories.

This EAL could result in declaration of an Alert at JAFNPP due to a radioactivity release or radiation shine resulting from a major accident at the NMP-1 or NMP-2. Such a declaration would be appropriate if the increase impairs safe plant operation.

This EAL is not meant to apply to increases in the containment radiation monitors as these are events which are addressed in other EALs. Nor is it intended to apply to anticipated temporary radiation increases due to planned events (e. g., radwaste container movement, depleted resin transfers, etc.).

PEG Reference(s):

AA3.2

Basis Reference(s):

1. Niagara Mohawk Power Corporation memo File Code NMP31027 "Exposure Guidelines For Unusual/Accident Conditions", Revision 1, 3/18/93

1.0 Reactor Fuel 1.5 Refueling Accidents

1.5.1 Unusual Event

Spent fuel pool/ reactor cavity water level cannot be restored and maintained above the spent fuel pool low water level alarm

NUMARC IC:

Unexpected increase in plant radiation or airborne concentration.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

The above event has a long lead time relative to the potential for radiological release outside the site boundary, thus impact to public health and safety is very low. However, in light of recent industry events, classification as an Unusual Event is warranted as a precursor to a more serious event.

The spent fuel pool low water level alarm setpoint is actuated by 19LS-60. The definition of "... cannot be restored and maintained above ..." allows the operator to visually observe the low water level condition, if possible, and to attempt water level restoration instructions as long as water level remains above the top of irradiated fuel. Water level restoration instructions are performed in accordance with AOP-53.

When the fuel transfer canal is directly connected to the spent fuel pool and reactor cavity, there could exist the possibility of uncovering irradiated fuel in the fuel transfer canal. Therefore, this EAL is also applicable for conditions in which irradiated fuel is being transferred to and from the RPV and spent fuel pool.

PEG Reference(s):

AU2.1

Basis Reference(s):

1. AOP-53 Loss of Spent Fuel Pool, Reactor Cavity or Equipment Storage Pit Water Level

1.0 Reactor Fuel 1.5 Refueling Accidents

1.5.2 Alert

Report of visual observation of irradiated fuel uncovered

NUMARC IC:

Major damage to irradiated fuel or loss of water level that has or will result in the uncovering of irradiated fuel outside the reactor vessel.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL is defined by the specific areas where irradiated fuel is located such as reactor cavity, reactor vessel, or spent fuel pool.

Sufficient time exists to take corrective actions for these conditions and there is little potential for substantial fuel damage. NUREG/CR-4982 "Severe Accident in Spent Fuel Pools in Support of Generic Safety Issue 82" indicates that even if corrective actions are not taken, no prompt fatalities are predicted and the risk of injury is low. In addition, NRC Information Notice No. 90-08, "KR-85 Hazards from Decayed Fuel" presents the following it its discussion:

> "In the event of a serious accident involving decayed spent fuel, protective actions would be needed for personnel on site, while offsite doses (assuming an exclusion area radius of one mile from the plant site) would be well below the Environmental Protection Agency's Protective Action Guides. Accordingly, it is important to be able to properly survey and monitor for Kr-85 in the event of an accident with decayed spent fuel.

Thus, an Alert Classification for this event is appropriate. Escalation, if appropriate, would occur by Emergency Director judgment in EAL Category 9.0.

There is no indication that water level in the spent fuel pool has dropped to the level of the fuel other than by visual observation by personnel on the refueling floor. When the fuel transfer canal is directly connected to the spent fuel pool and reactor cavity, there could exist the possibility of uncovering irradiated fuel in the fuel transfer canal. Therefore, this EAL is applicable for conditions in which irradiated fuel is being transferred to and from the RPV and spent fuel pool.

This EAL applies to spent fuel requiring water coverage and is not intended to address spent fuel which is licensed for dry storage.

PEG Reference(s):

AA2.2

Basis Reference(s):

1. NUREG-0818, Emergency Action Levels for Light Water Reactors
2. NUREG/CR-4982, Severe Accident in Spent Fuel Pools in Support of Generic Safety Issue 82, July 1987
3. NRC Information Notice No. 90-08, KR-85 Hazards from Decayed Fuel

2.0 REACTOR PRESSURE VESSEL (RPV)

The reactor pressure vessel provides a volume for the coolant which covers the reactor core. The RPV and associated pressure piping (reactor coolant system) together provide a barrier to limit the release of radioactive material should the reactor fuel cladding integrity fail.

There are two RPV parameters which are indicative of conditions which may pose a threat to RPV or fuel cladding integrity:

- RPV Water Level: RPV water level is directly related to the status of adequate core cooling, and therefore fuel cladding integrity. Excessive (> Tech. Spec.) reactor coolant to drywell leakage indications are utilized to indicate potential pipe cracks which may propagate to an extent threatening fuel clad, RPV and primary containment integrity. Conditions under which all attempts at establishing adequate core cooling have failed require primary containment flooding.

- Reactor Power/Reactivity Control: The inability to control reactor power below certain levels can pose a direct threat to reactor fuel, RPV and primary containment integrity.

2.0 Reactor Pressure Vessel 2.1 RPV Water Level

2.1.1 Unusual Event

Unidentified drywell leakage > 10 gpm
OR
Reactor coolant to drywell identified leakage > 25 gpm

NUMARC IC:

RCS leakage

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

The conditions of this EAL 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. The 10 gpm value for the unidentified drywell leakage was selected because it is observable with normal Control Room indications. Smaller values must be determined through time-consuming surveillance tests (e. g., mass balances). The 25 gpm value for identified reactor coolant to drywell leakage is set at a higher value because of the significance of identified leakage in comparison to unidentified or pressure boundary leakage.

Only operating modes in which there is fuel in the reactor coolant system and the system is pressurized are specified.

PEG Reference(s):

SU5.1

Basis Reference(s):

None

2.0 Reactor Pressure Vessel 2.1 RPV Water Level

2.1.2 Site Area Emergency

RPV water level cannot be restored and maintained above **0 in.** (TAF)

NUMARC IC:

Loss of reactor vessel water level has or will uncover fuel in the reactor vessel.

FPB loss/potential loss:

Fuel clad potential loss, RCS loss

Mode Applicability:

All

Basis:

The RPV water level used in this EAL is the top of active fuel (TAF). This value corresponds to the level which is used in EOPs to indicate challenge to core cooling and loss of the fuel clad barrier. This is the minimum water level to assure core cooling without further degradation of the clad. Severe core damage can occur and reactor coolant system pressure boundary integrity may not be assured if RPV water level is not maintained above TAF.

Sustained uncovery of the fuel irrespective of the event that causes fuel uncovery is justification alone for declaring a Site Area Emergency. This includes events that could lead to fuel uncovery in any plant operating mode including cold shutdown and refuel. Escalation to a General Emergency occurs through radiological effluence addressed in EAL 1.3.3 for drywell radiation and in the EALs defined for Category 5.0, Radioactivity Release.

The terminology of "cannot be restored and maintained" is intended to be consistent with the interpretation that:

> "The value of the identified parameter(s) is/is not able to be returned to above/below specified limits. This determination includes making an evaluation that considers both current and future systems performance in relation to the current value and trend of the parameter(s). Neither implies that the parameter must actually exceed the limit before the classification is made nor that

the classification must be made before the limit is reached. Does not imply any specific time interval but does not permit prolonged operation beyond a limit without making the specified classification."

This definition would require the emergency classification be made prior to water level dropping below TAF if, based on an evaluation of the current trend of RPV water level and in consideration of current and future injection system performance, that RPV water level will not likely be restored and maintained above TAF. This definition, however, also provides the latitude, based on that same evaluation, not to declare the SAE for those situations in which the RPV water level transiently drops below TAF in the process of RPV water level restoration.

PEG Reference(s):

SS5.1
FC2.1
RCS4.1

Basis Reference(s):

1. JAFNPP PSTG Rev. 4

2.0 Reactor Pressure Vessel 2.1 RPV Water Level

2.1.3 General Emergency

Primary Containment Flooding required

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss, RCS loss, Containment potential loss

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

The condition in this EAL represents imminent melt sequences which, if not corrected, could lead to RPV failure and increased potential for primary containment failure. If the EOPs have been ineffective in restoring RPV water level above the top of active fuel, loss of the fuel clad barrier is imminent. Therefore, declaration of a General Emergency is appropriate when entry to the Primary Containment Flooding EOP is required.

PEG Reference(s):

PC4.1

Basis Reference(s):

1. JAFNPP PSTG Rev. 4

2.0 Reactor Pressure Vessel 2.2 Reactor Power / Reactivity Control

2.2.1 Alert

Any RPS setpoint has been exceeded
AND
Automatic scram fails to result in a control rod pattern which assures reactor shutdown under all conditions without boron

NUMARC IC:

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 while in power operations or hot standby

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, startup/hot standby

Basis:

This condition indicates failure of the automatic protection system to scram the reactor to the extent that reactor shutdown cannot be assured under all conditions without boron.

If a manual scram does not result in reactor power being reduced below the APRM downscale setpoint (2.5%) or torus temeperature exceeds the Boron Injection Inititiation Temperature, escalation to a Site Area Emergency is required. A manual scram is any set of actions by the reactor operators at the reactor control console which causes control rods to be rapidly inserted into the core and brings the reactor subcritical including manual scram push buttons, ARI and mode switch.

In determining whether to declare an emergency based on this EAL the following guidance is provided by NUMARC:

Regarding the occurance of an event in which the EAL is reached with no adverse consequences:

"If an emergency condition no longer exists, there is no reason to declare an emergency. The NRC shall be notified after discovery within 1 hour, meeting 10CFR50.72 reporting criteria. State and local authorities should also be notified as soon as practical, or in accordance with arrangements made in advance."

PEG Reference(s):

SA2.1

Basis Reference(s):

1. JAFNPP PSTG Rev. 4
2. "Methodology for Development of Emergency Action Levels NUMARC/NESP-007 Revision 2 - Questions and Answers, June 1993

2.0 Reactor Pressure Vessel 2.2 Reactor Power / Reactivity Control

2.2.2 Site Area Emergency

Any RPS setpoint has been exceeded
AND
Automatic and manual scrams fail to result in a control rod pattern which assures reactor shutdown under all conditions without boron
AND Either:
Reactor power > 2.5%
OR
Torus temperature > Boron Injection Initiation Temperature

NUMARC IC:

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 scram trip was not successful.

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, startup/hot standby

Basis:

This condition indicates failure of the automatic and/or manual protection system to scram the reactor to the extent which precludes the reactor being made shutdown under all conditions without boron. 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 primary containment.

The failure of automatic initiation of a reactor scram followed by unsuccessful manual initiation actions which can be rapidly taken at the reactor control console does not, by itself, lead to imminent loss of either fuel clad or primary containment barriers. It is the continued criticality under conditions requiring a reactor scram along with the continued addition of heat to containment which poses the imminent threat to primary containment or fuel

clad barriers. In accordance with the EOPs, SLC is initiated based on heat addition to containment in excess of safety system capability under failure to scram conditions.

An immediate manual scram is any set of actions by the reactor operator at the reactor control console which causes control rods to be rapidly inserted into the core and brings the reactor subcritical including manual scram push buttons, ARI and mode switch.

PEG Reference(s):

SS2.1

Basis Reference(s):

1. JAFNPP PSTG Rev. 4
2. "Methodology for Development of Emergency Action Levels NUMARC/NESP-007 Revision 2 - Questions and Answers, June 1993

2.0 Reactor Pressure Vessel 2.2 Reactor Power / Reactivity Control

2.2.3 General Emergency

Any RPS setpoint has been exceeded
AND
Automatic and manual scrams fail to result in a control rod pattern which assures reactor shutdown under all conditions without boron
AND Either:
RPV water level cannot be restored and maintained > -31 in.
OR
Torus temperature and RPV pressure cannot be maintained < HCTL

NUMARC IC:

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.

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, startup/hot standby

Basis:

Under the conditions of this EAL, 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.

An extreme challenge to the ability to cool the core is indicated when RPV water level cannot be restored and maintained above the Minimum Steam Cooling RPV Water Level (-31 in.). This RPV water level is used in the EOPs to define the lowest RPV water level in a failure-to-scram event above which adequate core cooling can be maintained. This situation could be precursor for a core melt sequence.

An extreme challenge to the primary containment is indicated when the inability to remove heat during the early stages of this sequence results in

heatup of the containment. The Heat Capacity Temperature Limit (HCTL) is a measure of the maximum heat load which the primary containment can withstand. This situation could be precursor for a core melt sequence.

In this situation, core degradation can occur rapidly For this reason, the General Emergency declaration is intended to be anticipatory of the loss of two fission product barriers and a potential loss of a third thus permitting the maximum offsite intervention time.

An immediate manual scram is any set of actions by the reactor operator at the reactor control console which causes control rods to be rapidly inserted into the core and brings the reactor subcritical including manual scram push buttons, ARI and mode switch.

PEG Reference(s):

SG2.1

Basis Reference(s):

1. JAFNPP PSTG Rev. 4

3.0 PRIMARY CONTAINMENT (PC)

The primary containment structure is a pressure suppression system. It forms a fission product barrier designed to limit the release of radioactive fission products generated from any postulated accident so as to preclude exceeding offsite exposure limits.

The primary containment structure is a low leakage pressure suppression system housing the reactor pressure vessel (RPV), the reactor coolant recirculation piping and other branch connections of the reactor primary system. The primary containment is equipped with isolation valves for most systems which penetrate the containment boundary. These valves automatically actuate to isolate systems under emergency conditions.

There are four primary containment parameters which are indicative of conditions which may pose a threat to primary containment integrity or indicate degradation of RPV or reactor fuel integrity.

- Primary Containment Pressure: Excessive primary containment pressure is also indicative of either primary system leaks into containment or loss of containment cooling function. Primary containment pressures at or above specified limits pose a direct threat to primary containment integrity and the pressure suppression function.

- Torus Temperature: Excessive torus water temperatures can result in a loss of the pressure suppression capability of containment and thus be indicative of severely degraded RPV and containment conditions.

- Combustible Gas Concentrations: The existence of combustible gas concentrations in containment pose a severe threat to containment integrity and are indicative of severely degraded reactor core and/or RPV conditions.

- Containment Isolation Status: The existence of an unisolable steam line break outside containment constitutes a loss of containment integrity as well as a loss of RCS boundary. Should a loss of fuel cladding integrity occur, the potential for release of large amounts of radioactive materials to the environment exists.

3.0 Containment 3.1 Containment Pressure

3.1.1 Alert

Primary containment pressure cannot be maintained < 2.7 psig due to coolant leakage

NUMARC IC:

N/A

FPB loss/potential loss:

RCS loss

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

The drywell pressure value is the drywell high pressure scram setpoint and is indicative of a LOCA event. The term "cannot be maintained below" is intended to be consistent with the conditions specified in the Primary Containment Control EOP indicative of a high energy release into containment for which normal containment cooling systems are insufficient.

PEG Reference(s):

RCS2.1

Basis Reference(s):

1. JAFNPP PSTG Rev. 4

3.0 Containment 3.1 Containment Pressure

3.1.2 Site Area Emergency

Primary containment pressure cannot be maintained < 2.7 psig
AND
Coolant activity > 300 µCi/gm

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss, RCS loss

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

The drywell pressure value is the drywell high pressure scram setpoint and is indicative of a LOCA event. The term "cannot be maintained below" is intended to be consistent with the conditions specified in the Primary Containment Control EOP indicative of a high energy release into containment for which normal containment cooling systems are insufficient.

Elevated reactor coolant activity represents a potential degradation in the level of safety of the plant and a potential precursor of more serious problems. This amount of coolant activity is well above that expected for iodine spikes and corresponds to about 2% to 5% fuel clad damage. When reactor coolant activity reaches this level, significant clad heating has occurred and thus the fuel clad barrier is considered lost.

The combination of these conditions represents a loss of two fission product barriers and, therefore, declaration of a Site Area Emergency is warranted.

PEG Reference(s):

FC1.1
RCS2.1

Basis Reference(s):

1. JAFNPP PSTG Rev. 4

3.0 Containment 3.1 Containment Pressure

3.1.3 General Emergency

Primary containment venting is required due to PCPL

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss, RCS loss, Containment loss

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

Loss of primary containment is indicated when proximity to the Primary Containment Pressure Limit (PCPL) requires venting irrespective of the offsite radioactivity release rate. To reach the PCPL, primary containment pressure must exceed that predicted in any plant design basis accident analysis. A loss of the RCS barrier must have occurred with a potential loss of the fuel clad barrier.

PEG Reference(s):

PC1.3
PC2.2

Basis Reference(s):

1. JAFNPP PSTG Rev. 4

3.0 Containment 3.2 Torus Temperature

3.2.1 Site Area Emergency

Torus temperature and RPV pressure cannot be maintained < HCTL (non-ATWS)

NUMARC IC:

Complete loss of function needed to achieve or maintain hot shutdown with reactor coolant > 212 °F.

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

This EAL addresses complete loss of functions, including ultimate heat sink, required for hot shutdown with the reactor at pressure and temperature. 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.

Functions required for hot shutdown consist of the ability to achieve reactor shutdown and to discharge decay heat energy from the reactor to the ultimate heat sink. Inability to remove decay heat energy is reflected in an increase in suppression pool temperature. Elevated suppression pool temperature is addressed by the Heat Capacity Temperature Limit (HCTL). The HCTL is a function of RPV pressure and suppression pool temperature. If RPV pressure and suppression pool temperature cannot be maintained below the HCTL, the ultimate heat sink is threatened and declaration of a Site Area Emergency is warranted.

"non-ATWS" has been added parenthetically to discriminate from General Emergency EAL 2.2.4.

PEG Reference(s):

SS4.1

Basis Reference(s):

1. JAFNPP PSTG Rev. 4

3.0 Containment 3.3 Combustible Gas Concentration

3.3.1 Site Area Emergency

≥ 4% H_2 exists in DW or torus

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss, RCS loss

Mode Applicability:

All

Basis:

4% hydrogen concentration is the lowest hydrogen concentation which, in the presence of sufficient oxygen, can support upward flame propagation. This hydrogen concentration is generally considered the lower boundary of the range in which localized deflagrations may occer. To generate such a concentration of combustible gas, loss of both the fuel clad and RCS barriers must have occurred. Therefore, declaration of a Site Area Emergency is warranted.

If hydrogen concentrations increase in conjunction with the presence of oxygen to global deflagration levels (i.e. ≥ 6% hydrogen and ≥ 5% oxygen), venting of the containment irrespective of the offsite radioactive release rate would be required by EOPs and declaration of a General Emergency required.

PEG Reference(s):

SS5.2

Basis Reference(s):

1. JAFNPP PSTG Rev. 4

3.0 Containment 3.3 Combustible Gas Concentration

3.3.2 General Emergency

Primary containment venting is required due to combustible gas concentrations

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss, RCS loss, Containment loss

Mode Applicability:

All

Basis:

6% hydrogen concentration in the presence of 5% oxygen concentration is the lowest concentration at which a deflagration inside of the primary containment could occur. When hydrogen and oxygen concentrations reach or exceed combustible limits, imminent loss of the containment barrier exists. To generate such levels of combustible gas, loss of the fuel clad and RCS barriers must have occurred. Venting of the containment irrespective of the offsite radioactive release rate is required by EOPs for this condition.

PEG Reference(s):

PC1.4
PC2.2

Basis Reference(s):

1. JAFNPP PSTG Rev. 4

3.0 Containment 3.4 Containment Isolation Status

3.4.1 Site Area Emergency

Any steam line or RWCU isolation failure resulting in a release pathway outside primary containment, Table 3.1

Table 3.1 Steam Lines
MSLs HPCI RCIC

NUMARC IC:

N/A

FPB loss/potential loss:

RCS loss, Containment loss

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

This EAL covers containment isolation failures allowing a direct flow path to the environment such as failure of both MSIVs to close with open valves downstream to the turbine or to the condenser. A release pathway outside primary containment exists when steam flow is not prevented by downstream isolations. In the case of a failure of both isolation valves to close but in which no downstream flowpath exists, declaration under this EAL would not be required. The conditions of this EAL represent the loss of both the RCS barrier and the primary containment barrier and thus justifies declaration of a Site Area Emergency.

PEG Reference(s):

PC2.1

Basis Reference(s):

None

3.0 Containment 3.4 Containment Isolation Status

3.4.2 General Emergency

Any steam line or RWCU isolation failure resulting in a release pathway outside primary containment, Table 3.1
AND any:
- **Coolant activity > 300 μCi/gm I-131 equivalent**
- **RPV water level < 0 in. (TAF)**
- **DW radiation > 3000 R/hr**

Table 3.1 Steam Lines
MSLs HPCI RCIC

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss/potential loss, RCS loss, Containment loss

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

The conditions of this EAL include the containment isolation failures allowing a direct flow path to the environment. A release pathway outside primary containment exists when steam flow is not prevented by downstream isolations. In the case of a failure of both isolation valves to close but in which no downstream flowpath exists, declaration under this EAL would not be required. Containment isolation failures which result in a release pathway outside primary containment are the basis for declaration of Site Area Emergency in EAL 3.5.1.

When isolation failures are accompanied by elevated coolant activity, RPV water level below TAF, or high drywell radiation, declaration of a General

Emergency is appropriate due to loss of the primary containment barrier, RCS barrier, and loss or potential loss of the fuel clad barrier.

Elevated reactor coolant activity represents a potential degradation in the level of safety of the plant and a potential precursor of more serious problems. This amount of coolant activity is well above that expected for iodine spikes and corresponds to about 2% to 5% fuel clad damage. When reactor coolant activity reaches this level, significant clad heating has occurred and thus the fuel clad barrier is considered lost.

The RPV water level used in this EAL is the top of active fuel (TAF). This value corresponds to the level which is used in EOPs to indicate challenge to core cooling and loss of the fuel clad barrier. This is the minimum water level to assure core cooling without further degradation of the clad. Severe core damage can occur and reactor coolant system pressure boundary integrity may not be assured if RPV water level is not maintained above TAF.

The drywell radiation reading is a value which indicates the release of reactor coolant, with elevated activity indicative of fuel damage, into the drywell. The reading is calculated assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with a concentration of 300 μCi/gm dose equivalent I-131 into the drywell atmosphere. Reactor coolant concentrations of this magnitude are several times larger than the maximum concentrations allowed within Technical Specifications (including iodine spiking) and are therefore indicative of fuel damage (approximately 2% - 5% clad failure depending on core inventory and RCS volume).

It is important to recognize that the radiation monitor may be sensitive to shine from the RPV or RCS piping. Drywell radiation monitors are 17-RE-104 A or B.

PEG Reference(s):

PC2.1 and FC1.1
PC2.1 and FC2.1
PC2.1 and FC3.1

Basis Reference(s):

1. EAP-44 Core Damage Estimation Figures V-2 thru V-5
2. JAFNPP PSTG Rev. 4
3. Calculation SL-4370, Sargent & Lundy, May 1985 "High Range Containment Monitor Response to Post Accident Fission Product Barrier Releases - JAFNPP"

4.0 SECONDARY CONTAINMENT (SC)

The secondary containment is comprised of the reactor building and associated ventilation, isolation and effluent systems. The secondary containment serves as an effective fission product barrier and is designed to minimize any ground level release of radioactive materials which might result from a serious accident.

The reactor building provides secondary containment during reactor operation and serves as primary containment when the reactor is shutdown and the drywell is open, as during refueling. Because the secondary containment is an integral part of the complete containment system, conditions which pose a threat to vital equipment located in the secondary containment are classifiable as emergencies.

There are two secondary containment parameters which are indicative of conditions which may pose a threat to secondary containment integrity or equipment located in secondary containment or are indicative of a direct release by a primary system into secondary containment:

- Secondary Containment Temperatures: Abnormally high secondary containment area temperatures can also pose a threat to the operability of vital equipment located inside secondary containment including RPV water level instrumentation. High area temperatures may limit personnel accessibility to vital areas. High area temperatures may also be indicative of either primary system discharges into secondary containment or fires.

- Secondary Containment Area Radiation Levels: Abnormally high area radiation levels in secondary containment, although not necessarily posing a threat to equipment operability, may pose a threat to personnel safety and the ability to operate vital equipment due to a lack of accessibility. Abnormally high area radiation levels may also be the result of a primary system discharging into the secondary containment and be indicative of precursors to significant radioactivity release to the environment.

4.0 Secondary Containment 4.1 Reactor Building Temperature

4.1.1 Site Area Emergency

Primary system is discharging outside PC
AND
RB area temperatures are > maximum safe operating levels in two or more areas, EOP-5

NUMARC IC:

N/A

FPB loss/potential loss:

RCS loss, Containment loss

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

The presence of elevated area temperatures in the secondary containment may be indicative of an unisolable primary system leakage outside the primary containment. These conditions represent a loss of the containment barrier and a potential loss of the RCS barrier.

PEG Reference(s):

PC2.3
RCS1.3

Basis Reference(s):

1. JAFNPP PSTG Rev. 4
2. F-EOP-5

4.0 Secondary Containment 4.1 Reactor Building Temperature

4.1.2 General Emergency

Primary system is discharging outside PC
AND
RB area temperatures are > maximum safe operating levels in two or more areas, EOP-5
AND any:
- Coolant activity > **300 µCi/gm** I-131 equivalent
- RPV water level < **0 in.** (TAF)
- DW radiation > **3000 R/hr**

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss/potential loss, RCS loss, Containment loss

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

The presence of elevated area temperatures in the secondary containment may be indicative of an unisolable primary system leakage outside the primary containment. These conditions represent a loss of the containment barrier and a potential loss of the RCS barrier.

When secondary containment area temperatures are accompanied by elevated coolant activity, RPV water level below TAF, or high drywell radiation, declaration of a General Emergency is appropriate due to loss of the primary containment barrier, RCS barrier, and loss or potential loss of the fuel clad barrier.

Elevated reactor coolant activity represents a potential degradation in the level of safety of the plant and a potential precursor of more serious problems. This amount of coolant activity is well above that expected for iodine spikes and corresponds to about 2% to 5% fuel clad damage. When reactor coolant

activity reaches this level, significant clad heating has occurred and thus the fuel clad barrier is considered lost.

The RPV water level used in this EAL is the top of active fuel (TAF). This value corresponds to the level which is used in EOPs to indicate challenge to core cooling and potential loss of the fuel clad barrier. This is the minimum desired water level to assure long-term core cooling without further degradation of the clad. Severe core damage can occur and reactor coolant system pressure boundary integrity may not be assured if RPV water level is not maintained above TAF.

The drywell radiation reading is a value which indicates the release of reactor coolant, with elevated activity indicative of fuel damage, into the drywell. The reading is calculated assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with a concentration of 300 μCi/gm dose equivalent I-131 into the drywell atmosphere. Reactor coolant activity concentrations of this magnitude are several times larger than the maximum concentrations allowed within Technical Specifications (including iodine spiking) and are therefore indicative of fuel damage (approximately 2% - 5% clad failure depending on core inventory and RCS volume).

It is important to recognize that the radiation monitor may be sensitive to shine from the RPV or RCS piping. Drywell radiation monitors are 17-RE-104 A or B.

PEG Reference(s):

PC2.3 and FC1.1
PC2.3 and FC2.1
PC2.3 and FC3.1

Basis Reference(s):

1. EAP-44 Core Damage Estimation Figures V-2 thru V-5
2. JAFNPP PSTG Rev. 4
3. Calculation SL-4370, Sargent & Lundy, May 1985 "High Range Containment Monitor Response to Post Accident Fission Product Barrier Releases - JAFNPP"
4. F-EOP-5

4.0 Secondary Containment 4.2 Reactor Building Radiation Level

4.2.1 Site Area Emergency

Primary system is discharging outside PC
AND
RB area radiation levels are > maximum safe operating levels in two or more areas, EOP-5

NUMARC IC:

N/A

FPB loss/potential loss:

RCS loss, Containment loss

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

The presence of elevated area radiation levels in the secondary containment may be indicative of an unisolable primary system leakage outside the primary containment. These conditions represent a loss of the containment barrier and a potential loss of the RCS barrier.

PEG Reference(s):

PC2.3
RCS1.3

Basis Reference(s):

1. JAFNPP PSTG Rev. 4
2. F-EOP-5

4.0 Secondary Containment 4.2 Reactor Building Radiation Level

4.2.2 General Emergency

Primary system is discharging outside PC
AND
RB area radiation levels are > maximum safe operating levels in two or more areas, EOP-5
AND any:

- Coolant activity > 300 μCi/gm I-131 equivalent
- RPV water level < 0 in. (TAF)
- DW radiation > 3000 R/hr

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss/potential loss, RCS loss, Containment loss

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

The presence of elevated area radiation levels in the secondary containment may be indicative of an unisolable primary system leakage outside the primary containment. These conditions represent a loss of the containment barrier and a potential loss of the RCS barrier.

When secondary containment radiation levels are accompanied by elevated coolant activity, RPV water level below TAF, or high drywell radiation, declaration of a General Emergency is appropriate due to loss of the primary containment barrier, RCS barrier, and loss or potential loss of the fuel clad barrier.

Elevated reactor coolant activity represents a potential degradation in the level of safety of the plant and a potential precursor of more serious problems. This amount of coolant activity is well above that expected for iodine spikes and corresponds to about 2% to 5% fuel clad damage. When reactor coolant

activity reaches this level, significant clad heating has occurred and thus the fuel clad barrier is considered lost.

The RPV water level used in this EAL is the top of active fuel (TAF). This value corresponds to the level which is used in EOPs to indicate challenge to core cooling and loss of the fuel clad barrier. This is the minimum water level to assure core cooling without further degradation of the clad. Severe core damage can occur and reactor coolant system pressure boundary integrity may not be assured if RPV water level is not maintained above TAF.

The drywell radiation reading is a value which indicates the release of reactor coolant, with elevated activity indicative of fuel damage, into the drywell. The reading is calculated assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with a concentration of 300 µCi/gm dose equivalent I-131 into the drywell atmosphere. Reactor coolant activity concentrations of this magnitude are several times larger than the maximum concentrations allowed within Technical Specifications (including iodine spiking) and are therefore indicative of fuel damage (approximately 2% - 5% clad failure depending on core inventory and RCS volume).

It is important to recognize that the radiation monitor may be sensitive to shine from the RPV or RCS piping. Drywell radiation monitors are 17-RE-104 A or B.

PEG Reference(s):

PC2.3 and FC1.1
PC2.3 and FC2.1
PC2.3 and FC3.1

Basis Reference(s):

1. EAP-44 Core Damage Estimation Figures V-2 thru V-5
2. JAFNPP PSTG Rev. 4
3. Calculation SL-4370, Sargent & Lundy, May 1985 "High Range Containment Monitor Response to Post Accident Fission Product Barrier Releases - JAFNPP"
4. F-EOP-5

5.0 RADIOACTIVITY RELEASE

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

At lower levels, abnormal radioactivity releases may be indicative of a failure of containment systems or precursors to more significant releases. At higher release rates, offsite radiological conditions may result which require offsite protective actions.

There are two basic indications of radioactivity release rates which warrant emergency classifications.

- Effluent Monitors: Direct indication of effluent radiation monitoring systems provides a rapid assessment mechanism to determine releases in excess of classifiable limits.

- Dose Projection and/or Environmental Measurements: Projected offsite doses (based on effluent monitor readings) or actual offsite field measurements indicating doses or dose rates above classifiable limits.

5.0 Radioactivity Release 5.1 Effluent Monitors

5.1.1 Unusual Event

A valid reading from an unplanned release on any monitors Table 5.1 column "NUE" for > 60 min. unless sample analysis can confirm release rates < 2 x technical specifications within this time period.

Table 5.1 Effluent Monitor Classification Thresholds				
Low Range Monitors				
Monitor	GE	SAE	Alert	UE
STACK	see Hi Range	see Hi range	see Hi Range	≥5E5 cps
RX BLDG EXH	N/A	N/A	≥2E4 cpm	≥9.9E5 cpm
REFUEL FLR EXH	N/A	N/A	≥9.9E5 cpm	≥2E4 cpm
TURB BLDG EXH	see Hi Range	see Hi range	a≥9.9E5 cpm	≥5E4 cpm
RADW BLDG EXH	see Hi Range	see Hi range	≥9.9E5 cpm	≥2E4 cpm
SW EFF	N/A	N/A	≥40,000 cps	≥400 cps
RADW EFF	N/A	N/A	≥200 x hi-hi trip	≥2 x hi-hi trip
High Range Monitors				
Monitor	GE	SAE	Alert	UE
STACK	≥11,600 mR/hr	≥1160 mR/hr	≥116 mR/hr	N/A
TURB BLDG EXH	≥12 mR/hr*	≥1.2 mR/hr*	N/A	N/A
RADW BLDG	≥33 mR/hr*	≥3.3 mR/hr*	N/A	N/A

* with its corresponding low range monitors upscale

NUMARC IC:

Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds two times the radiological Technical Specifications for 60 minutes or longer.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

Valid means that a radiation monitor reading has been confirmed by the operators to be correct. Unplanned releases in excess of two times the site technical specifications that continue for 60 minutes or longer represent an uncontrolled situation and hence, a potential degradation in the level of safety. The final integrated dose (which is very low in the Unusual Event emergency class) is not the primary concern; it is the degradation in plant control implied by the fact that the release was not isolated within 60 minutes. Therefore, it is not intended that the release be averaged over 60 minutes. For example, a release of 4 times T/S for 30 minutes does not exceed this initiating condition. Further, the Emergency 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.

Monitor indications are calculated on the basis of the methodology of the site Offsite Dose Calculation Manual (ODCM) using annual average meteorology.

Two times the monitors alarm setpoints have been selected for use in this EAL. The alarm setpoints for the listed monitors are conservatively set to ensure Technical Specification radioactivity release limits are not exceeded. Instrumentation that may be used to assess this EAL is listed below:

RadWaste Effluent Radiation Monitor: 17RM-350

Service Water Radiation Monitor: 17RM-351

Turbine Bldg. Exhaust Radiation Monitor: 17RM-431

Turbine Bldg. Exhaust Radiation Monitor: 17RM-432

Reactor Bldg. Vent Radiation Monitors: 17RM-452A/B

Refuel Floor Vent Duct Radiation Monitors: 17RM-456A/B

RadWaste Bldg. Vent Exhaust Radiation Monitors: 17RM-458A/B

Stack Gas Radiation Monitors: 17RM-50A/B

RBCLC process monitors are not included in this EAL. These monitors detect radiation in the closed cooling water loop. Any leaks into Service Water via heat exchangers would be detected by the Service Water monitors. Therefore, the Service Water radiation monitor adequately detects offsite radioactivity releases from this system.

PEG Reference(s):

AU1.1

Basis Reference(s):

1. OP-31 Process Radiation Monitoring Systems
2. CDP-15 Offsite Dose Calculation Manual

5.0 Radioactivity Release 5.1 Effluent Monitors

5.1.2 Alert

A valid reading from an unplanned release on any monitors Table 5.1 column "Alert" for > 15 min. unless dose assessment can confirm releases are below Table 5.2 column "Alert" within this time period.

Table 5.1 Effluent Monitor Classification Thresholds				
Low Range Monitors				
Monitor	GE	SAE	Alert	UE
STACK	see Hi Range	see Hi range	see Hi Range	≥5E5 cps
RX BLDG EXH	N/A	N/A	≥2E4 cpm	≥9.9E5 cpm
REFUEL FLR EXH	N/A	N/A	≥9.9E5 cpm	≥2E4 cpm
TURB BLDG EXH	see Hi Range	see Hi range	≥9.9E5 cpm	≥5E4 cpm
RADW BLDG EXH	see Hi Range	see Hi range	≥9.9E5 cpm	≥2E4 cpm
SW EFF	N/A	N/A	≥40,000 cps	≥400 cps
RADW EFF	N/A	N/A	≥200 x hi-hi trip	≥2 x hi-hi trip
High Range Monitors				
Monitor	GE	SAE	Alert	UE
STACK	≥11,600 mR/hr	≥1160 mR/hr	≥116 mR/hr	N/A
TURB BLDG EXH	≥12 mR/hr*	≥1.2 mR/hr*	N/A	N/A
RADW BLDG	≥33 mR/hr*	≥3.3 mR/hr*	N/A	N/A

* with its corresponding low range monitors upscale

Table 5.2 Dose Projection / Env. Measurement Classification Thresholds			
	GE	SAE	Alert
TEDE	1000 mRem	100 mRem	10 mRem
CDE Thyroid	5000 mRem	500 mRem	N/A
External exposure rate	1000 mRem/hr	100 mRem/hr	10 mRem/hr
Thyroid exposure rate (for 1 hr of inhalation)	5000 mRem/hr	500 mRem/hr	N/A

NUMARC IC:

Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds 200 times radiological Technical Specifications for 15 minutes or longer.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

Valid means that a radiation monitor reading has been confirmed by the operators to be correct. This event escalates from the Unusual Event by increasing the magnitude of the release by a factor of 100 over the Unusual Event level (i. e., 200 times Technical Specifications). Prorating the 500 mR/yr basis of the 10CFR20 non-occupational MPC limits for both time (8766 hr/yr) and the 200 multiplier, the associated site boundary dose rate would be 10 mR/hr. The required release duration was reduced to 15 minutes in recognition of the increased severity.

The values for the gaseous effluent radiation monitors are based upon not exceeding 10 mR/hr at the site boundary as a result of the release. The values are derived from JAF-CALC-MULTI-01162. Since the calculated monitor readings for the Reactor, Turbine and RadWaste Building normal range monitors are in excess of the instruments upper range (1E6) but at the very bottom of the corresponding high range instrument, an indication of 9.9E5 cpm on the normal range has been conservatively utilized.

Instrumentation that may be used to assess this EAL is listed below:

RadWaste Effluent Radiation Monitor: 17RM-350

Service Water Radiation Monitor: 17RM-351

Turbine Bldg. Exhaust Radiation Monitor: 17RM-431

Turbine Bldg. Exhaust Radiation Monitor: 17RM-432

Reactor Bldg. Vent Radiation Monitors: 17RM-452A/B

Refuel Floor Vent Duct Radiation Monitors: 17RM-456A/B

RadWaste Bldg. Vent Exhaust Radiation Monitors: 17RM-458A/B

Stack High Range Effluent Monitors: 17RM-53A/B

RBCLC process monitors are not included in this EAL. These monitors detect radiation in the closed cooling water loop. Any leaks into Service Water via heat exchangers would be detected by the Service Water monitors. Therefore, the Service Water radiation monitor adequately detects offsite radioactivity releases from this system.

PEG Reference(s):

AA1.1

Basis Reference(s):

1. JAF-CALC-MULTI-01162
2. OP-31 Process Radiation Monitoring Systems
3. CDP-15 Offsite Dose Calculation Manual
4. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications

5.0 Radioactivity Release 5.1 Effluent Monitors

5.1.3 Site Area Emergency

A valid reading from an unplanned release on any monitors Table 5.1 column "SAE" for > 15 min. unless dose assessment can confirm releases are below Table 5.2 column "SAE" within this time period.

Table 5.1 Effluent Monitor Classification Thresholds				
Low Range Monitors				
Monitor	GE	SAE	Alert	UE
STACK	see Hi Range	see Hi range	see Hi Range	≥5E5 cpm
RX BLDG EXH	N/A	N/A	≥2E4 cpm	≥9.9E5 cpm
REFUEL FLR EXH	N/A	N/A	≥9.9E5 cpm	≥2E4 cpm
TURB BLDG EXH	see Hi Range	see Hi range	≥9.9E5 cpm	≥5E4 cpm
RADW BLDG EXH	see Hi Range	see Hi range	≥9.9E5 cpm	≥2E4 cpm
SW EFF	N/A	N/A	≥40,000 cps	≥400 cps
RADW EFF	N/A	N/A	≥200 x hi-hi trip	≥2 x hi-hi trip
High Range Monitors				
Monitor	GE	SAE	Alert	UE
STACK	≥11,600 mR/hr	≥1160 mR/hr	≥116 mR/hr	N/A
TURB BLDG EXH	≥12 mR/hr*	≥1.2 mR/hr*	N/A	N/A
RADW BLDG	≥33 mR/hr*	≥3.3 mR/hr*	N/A	N/A

* with its corresponding low range monitors upscale

Table 5.2 Dose Projection / Env. Measurement Classification Thresholds			
	GE	SAE	Alert
TEDE	1000 mRem	100 mRem	10 mRem
CDE Thyroid	5000 mRem	500 mRem	N/A
External exposure rate	1000 mRem/hr	100 mRem/hr	10 mRem/hr
Thyroid exposure rate (for 1 hr. of inhalation)	5000 mRem/hr	500 mRem/hr	N/A

NUMARC IC:

Boundary dose resulting from an actual or imminent release of gaseous radioactivity exceeds 100 mRem TEDE or 500 mRem CDE Thyroid for the actual or projected duration of the release.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

Valid means that a radiation monitor reading has been confirmed by the operators to be correct. The SAE values of Table 5.1 are based on the boundary dose resulting from an actual or imminent release of gaseous radioactivity that exceeds 100 mR whole body or 500 mR child thyroid for the actual or projected duration of the release. The 100 mR integrated dose is based on the proposed 10CFR20 annual average population exposure. The 500 mR integrated child thyroid dose was established in consideration of the 1:5 ratio of the EPA Protective Action Guidelines for whole body thyroid.

These values provide a desirable gradient (one order of magnitude) between the Alert, Site Area Emergency, and General Emergency classifications. It is deemed that exposures less than this limit are not consistent with the Site Area Emergency class description.

Integrated doses are generally not monitored in real-time. In establishing this emergency action level, a duration of one hour is assumed based on site boundary doses for either whole body or child thyroid, whichever is more limiting (depends on source term assumptions).

The FSAR source terms applicable to each monitored pathway are used in conjunction with annual average meteorology in determining indications for the monitors on that pathway.

The values specified in this EAL were derived from JAF-CALC-MULTI-01162. Because of the proximity of the calculated values to the monitor's bottom range, the Turbine Building and RadWaste Building values also specify that the corresponding normal range monitors indicate upscale to preclude declaration based upon signal noise.

PEG Reference(s):

AS1.1

Basis Reference(s):

1. JAF-CALC-MULTI-01162
2. OP-31 Process Radiation Monitoring Systems
3. CDP-15 Offsite Dose Calculation Manual
4. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications

5.0 Radioactivity Release 5.1 Effluent Monitors

5.1.4 General Emergency

A valid reading from an unplanned release on any monitors Table 5.1 column "GE" for > 15 min. unless dose assessment can confirm releases are below Table 5.2 column "GE" within this time period.

Table 5.1 Effluent Monitor Classification Thresholds				
Low Range Monitors				
Monitor	GE	SAE	Alert	UE
STACK	see Hi Range	see Hi range	see Hi Range	≥5E5 cps
RX BLDG EXH	N/A	N/A	≥2E4 cpm	≥9.9E5 cpm
REFUEL FLR EXH	N/A	N/A	≥9.9E5 cpm	≥2E4 cpm
TURB BLDG EXH	see Hi Range	see Hi range	≥9.9E5 cpm	≥5E4 cpm
RADW BLDG EXH	see Hi Range	see Hi range	≥9.9E5 cpm	≥2E4 cpm
SW EFF	N/A	N/A	≥40,000 cps	≥400 cps
RADW EFF	N/A	N/A	≥200 x hi-hi trip	≥2 x hi-hi trip
High Range Monitors				
Monitor	GE	SAE	Alert	UE
STACK	≥11,600 mR/hr	≥1160 mR/hr	≥116 mR/hr	N/A
TURB BLDG EXH	≥12 mR/hr*	≥1.2 mR/hr*	N/A	N/A
RADW BLDG	≥33 mR/hr*	≥3.3 mR/hr*	N/A	N/A

* with its corresponding low range monitors upscale

Table 5.2 Dose Projection / Env. Measurement Classification Thresholds			
	GE	SAE	Alert
TEDE	1000 mRem	100 mRem	10 mRem
CDE Thyroid	5000 mRem	500 mRem	N/A
External exposure rate	1000 mRem/hr	100 mRem/hr	10 mRem/hr
Thyroid exposure rate (for 1 hr. of inhalation)	5000 mRem/hr	500 mRem/hr	N/A

NUMARC IC:

Boundary dose resulting from an actual or imminent release of gaseous radioactivity exceeds 1000 mRem TEDE or 5000 mRem CDE Thyroid for the actual or projected duration of the release using actual meteorology.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

Valid means that a radiation monitor reading has been confirmed by the operators to be correct. The GE values of Table 5.1 are based on the boundary dose resulting from an actual or imminent release of gaseous radioactivity that exceeds 1000 mR whole body or 5000 mR child thyroid for the actual or projected duration of the release. The 1000 mR whole body and the 5000 mR child thyroid integrated dose are based on the EPA protective action guidance which indicates that public protective actions are indicated if the dose exceeds 1 rem whole body or 5 rem child thyroid. This is consistent with the emergency class description for a General Emergency. This level constitutes the upper level of the desirable gradient for the Site Area Emergency. Actual meteorology is specifically identified since it gives the most accurate dose assessment. Actual meteorology (including forecasts) should be used whenever possible.

Integrated doses are generally not monitored in real-time. In establishing this emergency action level, a duration of one hour is assumed based on a site boundary doses for either whole body or child thyroid, whichever is more limiting (depends on source term assumptions).

The FSAR source terms applicable to each monitored pathway are used in conjunction with annual average meteorology in determining indications for the monitors on that pathway.

The values specified in this EAL were derived from JAF-CALC-MULTI-01162. Because of the proximity of the calculated values to the monitor's bottom range, the Turbine Building and RadWaste Building values also specify that the corresponding normal range monitors indicate upscale to preclude declaration based upon signal noise.

PEG Reference(s):

AG1.1

Basis Reference(s):

1. JAF-CALC-MULTI-01162
2. OP-31 Process Radiation Monitoring Systems
3. CDP-15 Offsite Dose Calculation Manual
4. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications

5.0 Radioactivity Release 5.2 Dose Projections/ Environmental Measurements

5.2.1 Unusual Event

Confirmed sample analyses for gaseous or liquid release rates > 2 x technical specifications limits for > 60 min.

NUMARC IC:

Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds two times the radiological Technical Specifications for 60 minutes or longer.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

Confirmed sample analyses in excess of two times the site technical specifications that continue for 60 minutes or longer represent an uncontrolled situation and hence, a potential degradation in the level of safety. The final integrated dose (which is very low in the Unusual Event emergency class) is not the primary concern; it is the degradation in plant control implied by the fact that the release was not isolated within 60 minutes. Therefore, it is not intended that the release be averaged over 60 minutes. For example, a release of 4 times T/S for 30 minutes does not exceed this initiating condition. Further, the Emergency 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.

PEG Reference(s):

AU1.2

Basis Reference(s):

1. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications

5.0 Radioactivity Release **5.2 Dose Projections/ Environmental Measurements**

5.2.2 Alert

Confirmed sample analyses for gaseous or liquid release rates > 200 x technical specifications limits for > 15 min.

NUMARC IC:

Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds 200 times radiological Technical Specifications for 15 minutes or longer.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

Confirmed sample analyses in excess of two hundred times the site technical specifications that continue for 15 minutes or longer represent an uncontrolled situation and hence, a potential degradation in the level of safety. This event escalates from the Unusual Event by increasing the magnitude of the release by a factor of 100 over the Unusual Event level (i. e., 200 times Technical Specifications). Prorating the 500 mR/yr basis of the 10CFR20 non-occupational MPC limits for both time (8766 hr/yr) and the 200 multiplier, the associated site boundary dose rate would be 10 mR/hr. The required release duration was reduced to 15 minutes in recognition of the increased severity.

PEG Reference(s):

AA1.2

Basis Reference(s):

1. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications

5.0 Radioactivity Release 5.2 Dose Projections/ Environmental Measurements

5.2.3 Alert

Dose projections or field surveys resulting from actual or imminent release which indicate doses / dose rates > Table 5.2 column "Alert" at the site boundary or beyond.

Table 5.2 Dose Projection / Env. Measurement Classification Thresholds			
	GE	SAE	Alert
TEDE	1000 mRem	100 mRem	10 mRem
CDE Thyroid	5000 mRem	500 mRem	N/A
External exposure rate	1000 mRem/hr	100 mRem/hr	10 mRem/hr
Thyroid exposure rate (for 1 hr. of inhalation)	5000 mRem/hr	500 mRem/hr	N/A

NUMARC IC:

Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds 200 times radiological Technical Specifications for 15 minutes or longer

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

Offsite integrated doses in excess of 10 mR TEDE or dose rates in excess of 10 mR/hr TEDE represent an uncontrolled situation and hence, a potential degradation in the level of safety. This event escalates from the Unusual Event by increasing the magnitude of the release by a factor of 100 over the Unusual Event level (i. e., 200 times Technical Specifications). Prorating the

500 mR/yr basis of 10CFR20 for both time (8766 hr/yr) and the 200 multiplier, the associated site boundary dose rate would be 10 mR/hr.

As previously stated, the 10 mR/hr value is based on a proration of 200 times the 500 mR/yr basis of 10CFR20, rounded down to 10 mR/hr.

PEG Reference(s):

AA1.2

Basis Reference(s):

1. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications

5.0 Radioactivity Release 5.2 Dose Projections/ Environmental Measurements

5.2.4 Site Area Emergency

Dose projections or field surveys resulting from actual or imminent release which indicate doses / dose rates > Table 5.2 column "SAE" at the site boundary or beyond.

Table 5.2 Dose Projection / Env. Measurement Classification Thresholds			
	GE	SAE	Alert
TEDE	1000 mRem	100 mRem	10 mRem
CDE Thyroid	5000 mRem	500 mRem	N/A
External exposure rate	1000 mRem/hr	100 mRem/hr	10 mRem/hr
Thyroid exposure rate (for 1 hr. of inhalation)	5000 mRem/hr	500 mRem/hr	N/A

NUMARC IC:

Boundary dose resulting from an actual or imminent release of gaseous radioactivity exceeds 100 mRem TEDE or 500 mRem CDE Thyroid for the actual or projected duration of the release.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

The 100 mR integrated TEDE dose in this EAL is based on the proposed 10CFR20 annual average population exposure. This value also provides a desirable gradient (one order of magnitude) between the Alert, Site Area Emergency, and General Emergency classes. It is deemed that exposures less than this limit are not consistent with the Site Area Emergency class

description. The 500 mR integrated CDE thyroid dose was established in consideration of the 1:5 ratio of the EPA Protective Action Guidelines for whole body thyroid. In establishing the dose rate emergency action levels, a duration of one hour is assumed. Therefore, the dose rate EALs are based on a site boundary dose rate of 100 mR/hr TEDE or 500 mR/hr CDE thyroid, whichever is more limiting.

PEG Reference(s):

AS1.3
AS1.4

Basis Reference(s):

1. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications

5.0 **Radioactivity Release** 5.2 **Dose Projections/ Environmental Measurements**

5.2.5 General Emergency

Dose projections or field surveys resulting from actual or imminent release which indicate doses / dose rates > Table 5.2 column "GE" at the site boundary or beyond.

Table 5.2 Dose Projection / Env. Measurement Classification Thresholds			
	GE	SAE	Alert
TEDE	1000 mRem	100 mRem	10 mRem
CDE Thyroid	5000 mRem	500 mRem	N/A
External exposure rate	1000 mRem/hr	100 mRem/hr	10 mRem/hr
Thyroid exposure rate (for 1 hr. of inhalation)	5000 mRem/hr	500 mRem/hr	N/A

NUMARC IC:

Boundary dose resulting from an actual or imminent release of gaseous radioactivity exceeds 1000 mRem TEDE or 5000 mRem CDE Thyroid for the actual or projected duration of the release using actual meteorology.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

The General Emergency values of Table 5.2 are based on the boundary dose resulting from an actual or imminent release of gaseous radioactivity that exceeds 1000 mR TEDE or 5000 mR CDE thyroid for the actual or projected duration of the release. The 1000 mR TEDE and the 5000 mR CDE thyroid integrated dose are based on the EPA protective action guidance which

indicates that public protective actions are indicated if the dose exceeds 1 rem TEDE or 5 rem CDE thyroid. This is consistent with the emergency class description for a General Emergency. This level constitutes the upper level of the desirable gradient for the Site Area Emergency. Actual meteorology is specifically identified since it gives the most accurate dose assessment. Actual meteorology (including forecasts) should be used whenever possible. In establishing the dose rate emergency action levels, a duration of one hour is assumed. Therefore, the dose rate EALs are based on a site boundary dose rate of 1000 mR/hr TEDE or 5000 mR/hr CDE thyroid, whichever is more limiting.

PEG Reference(s):

AG1.3
AG1.4

Basis Reference(s):

1. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications

6.0 ELECTRICAL FAILURES

Loss of vital plant electrical power can compromise plant safety system operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity.

The events of this category have been grouped into the following two loss of electrical power types:

- Loss of AC Power Sources: This category includes losses of onsite and/or offsite AC power sources including station blackout events.
- Loss of DC Power Sources: This category involves total losses of vital plant 125 V DC power sources.

6.0 Electrical Failures 6.1 Loss of AC Power Sources

6.1.1 Unusual Event

Loss of power for >15 min. to all:

- Reserve Station Transformer T-2
- Reserve Station Transformer T-3
- Station Service Transformer (if T-4 back fed from Station Main Transformer T-1A/T1B)

NUMARC IC:

Loss of all offsite power to essential busses for greater than 15 minutes.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

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

Backfeeding of the station transformer has been included to allow for those conditions in which maintenance is being performed on the station reserve transformers or 115 kv system. It is recognized that this is not a readily available source of emergency power under emergency conditions and should only be taken credit for those conditions under which backfeeding has already been established.

PEG Reference(s):

SU1.1

Basis Reference(s):

1. OP-44 115 kv system
2. OP-45 345 kv system
3. OP-45A Backfeeding Normal Station Service Transformer
4. OP-46A 4160 V & 600 V Normal AC Power Distribution
5. OP-22 Diesel Generator Emergency Power

6.0 Electrical Failures 6.1 Loss of AC Power Sources

6.1.2 Alert

Loss of all vital bus AC power for >15 min.

NUMARC IC:

Loss of all offsite power and loss of all onsite AC power to essential busses during cold shutdown, refueling or defueled mode.

FPB loss/potential loss:

N/A

Mode Applicability:

Cold shutdown, Refuel, Defuel

Basis:

Loss of all AC power compromises all plant safety systems requiring electric power. This EAL is indicated by:

Loss of power for > 15 min. to all:

- Reserve Station Transformer T-2
- Reserve Station Transformer T-3
- Station Service Transformer T-4 (345 kv backfeed)

AND

failure of all DGs to power any vital bus

AND

failure to restore power to 10500 or 10600 in ≤ 15 min.

When in cold shutdown, refueling, or defueled mode this event is classified as an Alert. This is because of the significantly reduced decay heat, lower temperature and pressure, thus increasing the time to restore one of the emergency busses, relative to that specified for the Site Area Emergency EAL. Escalating to the Site Area Emergency, if appropriate, is by Abnormal Rad Levels/Radiological Effluent, or Emergency Director Judgment ICs. Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Backfeeding of the normal station transformer has been included to allow for those conditions in which maintenance is being performed on the station

reserve transformers or 115 kv system. It is recognized that this is not a readily available source of emergency power under emergency conditions and should only be taken credit for those conditions under which backfeeding has already been established.

PEG Reference(s):

SA1.1

Basis Reference(s):

1. OP-44 115 kv system
2. OP-45 345 kv system
3. OP-45A Backfeeding Normal Station Service Transformer
4. OP-46A 4160 V & 600 V Normal AC Power Distribution
5. OP-22 Diesel Generator Emergency Power

6.0 Electrical Failures 6.1 Loss of AC Power Sources

6.1.3 Alert

Available vital bus AC power reduced to only one of the following sources for >15 min.:

- Reserve Station Transformer T-2
- Reserve Station Transformer T-3
- Station Service Transformer T-4
- EDG A (10500)
- EDG B (10600)
- EDG C (10500)
- EDG D (10600)

NUMARC IC:

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 with reactor coolant > 212 °F.

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

The condition indicated by this EAL is the degradation of the offsite power with a concurrent failure of all but one emergency generator to supply power to its emergency buss. Another related condition could be the loss of all offsite power and loss of all onsite emergency diesels with emergency busses being fed from the unit main generator, or the loss of all onsite emergency diesels with only one train of emergency busses being fed from offsite power. The subsequent loss of this single power source would escalate the event to a Site Area Emergency.

PEG Reference(s):

SA5.1

Basis Reference(s):

1. OP-44 115 kv system
2. OP-45 345 kv system
3. OP-45A Backfeeding Normal Station Service Transformer
4. OP-46A 4160 V & 600 V Normal AC Power Distribution
5. OP-22 Diesel Generator Emergency Power

6.0 Electrical Failures 6.1 Loss of AC Power Sources

6.1.4 Site Area Emergency

Loss of all vital bus AC power for >15 min.

NUMARC IC:

Loss of all offsite power and loss of all onsite AC power to essential busses with reactor coolant > 212 °F.

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

Loss of all AC power compromises all plant safety systems requiring electric power. This EAL is indicated by:

Loss of power to Reserve Station Transformer T-2 and T-3 and Station Service Transformer T-4 fed from the main generator
AND
failure of all DGs to power any vital bus
AND
failure to restore power to 10500 or 10600 in ≤ 15 min.

Prolonged loss of all AC power will cause core uncovery and loss of containment integrity, thus this event can escalate to a General Emergency. The time duration selected, 15 minutes, excludes transient or momentary power losses.

PEG Reference(s):

SS1.1

Basis Reference(s):

1. OP-44 115 kv system
2. OP-45 345 kv system
3. OP-45A Backfeeding Normal Station Service Transformer
4. OP-46A 4160 V & 600 V Normal AC Power Distribution
5. OP-22 Diesel Generator Emergency Power

6.0 Electrical Failures 6.1 Loss of AC Power Sources

6.1.5 General Emergency

Loss of all vital bus AC power
AND either:
Power restoration to any emergency bus is not likely in ≤ 4 hrs
OR
RPV water level cannot be restored and maintained > 0 in. (TAF)

NUMARC IC:

Prolonged loss of all offsite power and prolonged loss of all onsite AC power with reactor coolant > 212 °F.

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

Loss of all AC power compromises all plant safety systems requiring electric power. Prolonged loss of all AC power will lead to loss of fuel clad, RCS, and containment. Although this EAL may be viewed as redundant to the RPV Water Level EALs, its inclusion is necessary to better assure timely recognition and emergency response.

This EAL is specified to assure that in the unlikely event of 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, the Emergency Director should declare a General Emergency based on two major considerations:

1. Are there any present indications that core cooling is already degraded to the point that Loss or Potential Loss of fission product barriers is imminent?

2. If there are no present indications of such core cooling degradation, how likely is it that power can be restored in time to assure that a loss of two barriers with a potential loss of the third barrier can be prevented?

Thus, indication of continuing core cooling degradation must be based on fission product barrier monitoring with particular emphasis on Emergency Director judgment as it relates to imminent loss or potential loss of fission product barriers and degraded ability to monitor fission product barriers.

The time to restore AC power is based on site blackout coping analysis performed in conformance with 10CFR50.63 and Regulatory Guide 1.155, "Station Blackout", with appropriate allowance for offsite emergency response.

PEG Reference(s):

SG1.1

Basis Reference(s):

1. OP-44 115 kv system
2. OP-45 345 kv system
3. OP-45A Backfeeding Normal Station Service Transformer
4. OP-46A 4160 V & 600 V Normal AC Power Distribution
5. OP-22 Diesel Generator Emergency Power
6. Misc. Calculation JAF-CALC-89-012 "Determination of Required SBO Coping Duration Per NUMARC 8700" Rev. 0 3/28/93
7. JAFNPP PSTG Rev. 4

6.0 Electrical Failures 6.2 Loss of DC Power Sources

6.2.1 Unusual Event

< 105 vdc on 71-BCB-2A and B for >15 min.

NUMARC IC:

Unplanned loss of required DC power during cold shutdown or refueling mode for greater than 15 minutes.

FPB loss/potential loss:

N/A

Mode Applicability:

Cold shutdown, Refuel

Basis:

The purpose of this EAL is to recognize a loss of DC power compromising the ability to monitor and control the removal of decay heat during cold shutdown or refueling operations. This EAL is intended to be anticipatory in as much as the operating crew may not have necessary indication and control of equipment needed to respond to the loss.

The bus voltage is based on the minimum bus voltage necessary for the operation of safety related equipment. This voltage value incorporates a margin of at least 15 minutes of operation before the onset of inability to operate loads.

PEG Reference(s):

SU7.1

Basis Reference(s):

1. OP-43A 125 V DC Power System
2. AOP-45 Loss of DC Power System 'A'
3. AOP-46 Loss of DC Power System 'B'

6.0 Electrical Failures 6.2 Loss of DC Power Sources

6.2.2 Site Area Emergency

< 105 vdc on 71-BCB-2A and B for > 15 min.

NUMARC IC:

Loss of all vital DC power with reactor coolant > 212 °F.

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

Loss of all DC power compromises ability to monitor and control plant safety functions. Prolonged loss of all DC power will cause core uncovering and loss of containment integrity when there is significant decay heat and sensible heat in the reactor system. Escalation to a General Emergency would occur by other EAL categories. Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

The bus voltage is based on the minimum bus voltage necessary for the operation of safety related equipment. This voltage value incorporates a margin of at least 15 minutes of operation before the onset of inability to operate loads.

PEG Reference(s):

SS3.1

Basis Reference(s):

1. OP-43A 125 V DC Power System
2. AOP-45 Loss of DC Power System 'A'
3. AOP-46 Loss of DC Power System 'B'

7.0 EQUIPMENT FAILURES

Numerous plant system related equipment failure events which warrant emergency classification, based upon their potential to pose actual or potential threats to plant safety, have been identified in this category.

The events of this category have been grouped into the following event types:

- Technical Specifications: Only one EAL falls under this event type related to the failure of the plant to be brought to the required plant operating condition required by technical specifications.

- System Failures or Control Room Evacuation: This category includes events which are indicative of losses of operability of safety systems such as ECCS, isolation functions, Control Room habitability or cold and hot shutdown capabilities.

- Loss of Indication, Alarm, or Communication Capability: Certain events which degrade the plant operators ability to effectively assess plant conditions or communicate with essential personnel within or external to the plant warrant emergency classification. Under this event type are losses of annunciators and/or communication equipment.

7.0 Equipment Failures 7.1 Technical Specifications

7.1.1 Unusual Event

Plant is not brought to required operating mode within Technical Specifications LCO Action Statement Time

NUMARC IC:

Inability to reach required shutdown within Technical Specification Limits.

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

Limiting Conditions of 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 Specification requires a one hour report under 10CFR50.72 (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 Notification of an Unusual Event is required when the plant is not brought to the required operating mode within the allowable action statement time in the Technical Specifications. Declaration of an Unusual Event 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 EALs.

PEG Reference(s):

SU2.1

Basis Reference(s):

1. Technical Specifications Section 3.0.A and 3.0.B

7.0 Equipment Failures **7.2 System Failures or Control Room Evacuation**

7.2.1 Unusual Event

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

NUMARC IC:

Natural and destructive phenomena affecting the protected area.

FPB loss/potential loss:

N/A

Mode Applicability:

Power Operation, startup/hot standby, hot shutdown

Basis:

This EAL is intended to address 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 through other EALs. This EAL is consistent with the definition of an Unusual Event while maintaining the anticipatory nature desired and recognizing the risk to non-safety related equipment.

PEG Reference(s):

HU1.6

Basis Reference(s):

None

7.0 Equipment Failures 7.2 System Failures or Control Room Evacuation

7.2.2 Alert

Entry into AOP-43, "Shutdown from Outside the Control Room"

NUMARC IC:

Control room evacuation has been initiated.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

With the Control Room evacuated, additional support, monitoring and direction through the Technical Support Center and/or other Emergency Operations Center is necessary. Inability to establish plant control from outside the Control Room will escalate this event to a Site Area Emergency.

PEG Reference(s):

HA5.1

Basis Reference(s):

1. AOP-43 Shutdown from Outside the Control Room

7.0 Equipment Failures 7.2 System Failures or Control Room Evacuation

7.2.3 Alert

Reactor coolant temperature cannot be maintained < 212 °F

NUMARC IC:

Inability to maintain plant in cold shutdown.

FPB loss/potential loss:

N/A

Mode Applicability:

Cold shutdown, refuel

Basis:

This EAL addresses complete loss of functions required for core cooling during refueling and cold shutdown modes. Escalation to Site Area Emergency or General Emergency would be through other EALs.

A reactor coolant temperature increase that approaches or exceeds the cold shutdown technical specification limit warrants declaration of an Alert irrespective of the availability of technical specification required functions to maintain cold shutdown. The concern of this EAL is the loss of ability to maintain the plant in cold shutdown which is defined by reactor coolant temperature and not the operability of equipment which supports removal of heat from the reactor.

PEG Reference(s):

SA3.1

Basis Reference(s):

1. AOP-30 Loss of Shutdown Cooling

7.0 Equipment Failures

7.2 System Failures or Control Room Evacuation

7.2.4 Site Area Emergency

Control Room evacuation
AND
Plant control cannot be established per AOP-43, "Shutdown from Outside the Control Room" in ≤ 30 min.

NUMARC IC:

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

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL indicates that expeditious transfer of safety systems has not occurred but fission product barrier damage may not yet be indicated. The time interval for transfer is based on analysis or assessments as to how quickly control must be reestablished without core uncovering and/or core damage. In cold shutdown and refueling modes, operator concern is directed toward maintaining core cooling such as is discussed in Generic Letter 88-17, "Loss of Decay Heat Removal." In power operation , hot standby, and hot shutdown modes, operator concern is primarily directed toward monitoring and controlling plant parameters dictated by the EOPs and thereby assuring fission product barrier integrity.

PEG Reference(s):

HS2.1

Basis Reference(s):

1. Generic Letter 88-17, "Loss of Decay Heat Removal"
2. AOP-43 "Shutdown from Outside the Control Room"
3. AOP-30 "Loss of Shutdown Cooling"
4. Appendix R
5. JPN-85-90 "Appendix R to 10CFR50, Section III.L Exemption Request Regarding Alternate Shutdown Capability"

7.3.1 Unusual Event

Unplanned loss of safety system annunciators or indicators on all of the following panels for > 15 min.:

- 09-3
- 09-4
- 09-5
- 09-6
- 09-7
- 09-8
- 09-75

AND
Increased surveillance is required for safe plant operation

NUMARC IC:

Unplanned loss of most or all safety system annunciation or indication in the control room for greater than 15 minutes

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

This EAL recognizes 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 (EPIC).

"Unplanned" loss of annunciators or indicators excludes scheduled maintenance and testing activities.

It is not intended that plant personnel perform a detailed count of the instrumentation lost but the use of the value as a judgment by the Shift Supervisor as the threshold for determining the severity of the plant conditions. This judgment is supported by the specific opinion of the Shift Supervisor that additional operating personnel will be required to provide increased monitoring of system operation to safely operate the plant.

It is further recognized that most plant designs provide redundant safety system indication powered from separate uninterruptable 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 a specific, or several, safety system indicators should remain a function of that specific system or component operability status. This will be addressed by their specific Technical Specification. The initiation of a Technical Specification imposed plant shutdown related to the instrument loss will be reported via 10CFR50.72. If the shutdown is not in compliance with the Technical Specification action, the Unusual Event is based on EAL 7.1.1, Inability to Reach Required Shutdown Within Technical Specification Limits.

Annunciators or indicators for this EAL must include those identified in the Abnormal Operating procedures, in the Emergency Operating Procedures, and in other EALs (e. g., area, process, and/or effluent rad monitors, etc.).

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

Due to the limited number of safety systems in operation during cold shutdown, refueling, and defueled modes, this EAL is not applicable during these modes of operation.

This Unusual Event will be escalated to an Alert if a transient is in progress during the loss of annunciation or indication.

PEG Reference(s):

SU3.1

Basis Reference(s):

None

7.0 Equipment Failures 7.3 Loss of Indications/Alarm/ Communication Capability

7.3.2 Unusual Event

Unplanned loss of all communications capability affecting the ability to either:

Perform routine onsite operations
OR
Notify offsite agencies or personnel

NUMARC IC:

Unplanned loss of all onsite or offsite communications capabilities.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

The purpose of this EAL is to recognize a loss of communications capability that either defeats the plant operations staff ability to perform routine tasks necessary for plant operations or the ability to communicate problems with offsite authorities. The loss of offsite communications ability is expected to be significantly more comprehensive than the condition addressed by 10CFR50.72.

The onsite communications loss must encompass the loss of all means of routine communications. A list of available onsite communications systems which may be utilized for onsite communications is provided in Table 7.1.

Table 7.1 Communications Systems		
System	Onsite	Offsite
Page/Party System (Gaitronics)	x	
Sound Powered Phones	x	
Control Room/Portable Unit Radios	x	
Plant Telephone System	x	x
RECS		x
Dedicated Phone lines including NRC		x
Health Physics Network and FTS 2000		x
Offsite radio systems		x

The offsite communications loss must encompass the loss of all means of communications with offsite authorities. A list of available offsite communications systems which may be utilized for offsite communications is provided in Table 7.1. This EAL is intended to be used only when extraordinary means are being utilized to make communications possible (relaying of information from radio transmissions, individuals being sent to offsite locations, etc.).

PEG Reference(s):

SU6.1

Basis Reference(s):

1. JAFNPP Emergency Plan Section 7 "Emergency Facilities and Equipment"

7.3.3 Alert

Unplanned loss of safety system annunciators or indicators on all of the following panels for > 15 min.:

- 09-3
- 09-4
- 09-5
- 09-6
- 09-7
- 09-8
- 09-75

AND

increased surveillance is required for safe plant operation

AND either:

Plant transient in progress

OR

EPIC is unavailable

NUMARC IC:

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.

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

This EAL recognizes 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 (SPDS, plant computer, etc.).

"Unplanned" loss of annunciators or indicators does not include scheduled maintenance and testing activities.

It is not intended that plant personnel perform a detailed count of the instrumentation lost but the use of judgment by the shift supervisor as the threshold for determining the severity of the plant conditions. This judgment is supported by the specific opinion of the Shift Supervisor that additional operating personnel will be required to provide increased monitoring of system operation to safely operate the plant.

It is further recognized that most plant designs provide redundant safety system indication powered from separate uninterruptable 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 10CFR50.72.

Annunciators or indicators for this EAL includes 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.).

"Significant transient" includes response to automatic or manually initiated functions such as scrams, runbacks involving greater than 25% thermal power change, ECCS injections, or thermal power oscillations of 10% or greater.

If both a major portion of the annunciation system and all computer monitoring are unavailable to the extent that the additional operating personnel are required to monitor indications, the Alert is required.

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 if the operating crew cannot monitor the transient in progress.

PEG Reference(s):

SA4.1

Basis Reference(s):

None

7.3.4 Site Area Emergency

Loss of annunciators or indicators on all of the following panels:

- 09-3
- 09-4
- 09-5
- 09-6
- 09-7
- 09-8
- 09-75

AND

EPIC is unavailable

AND

Indications to monitor all RPV and primary containment EOP parameters are lost

AND

Plant transient is in progress

NUMARC IC:

Inability to monitor a significant transient in progress.

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, startup/hot standby, hot shutdown

Basis:

This EAL recognizes 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.

Annunciators for this EAL should be limited to include those identified in the Abnormal Operating Procedures, in the Emergency Operating Procedures, and in other EALs (e. g., rad monitors, etc.).

"Significant transient" includes response to automatic or manually initiated functions such as scrams, runbacks involving greater than 25% thermal power change, ECCS injections, or thermal power oscillations of 10% or greater.

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 and in a coolable geometry, to remove heat from the core, to maintain the reactor coolant system intact, and to maintain containment intact.

"Planned" actions are excluded from this EAL 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.

PEG Reference(s):

SS6.1

Basis Reference(s):

1. JAFNPP PSTG Rev. 4

8.0 Hazards

Hazards are those non-plant system related events which can directly or indirectly impact plant operation or reactor plant and personnel safety.

The events of this category have been grouped into the following types:

- Security Threats: This category includes unauthorized entry attempts into the Protected Area as well as bomb threats and sabotage attempts. Also addressed are actual security compromises threatening loss of physical control of the plant.

- Fire or Explosion: Fires can pose significant hazards to personnel and reactor safety. Appropriate for classification are certain fires within the site Protected Area or which may affect operability of vital equipment.

- Man-made Events: Man-made events are those non-naturally occurring events which can cause damage to plant facilities such as aircraft crashes, missile impacts, toxic or flammable gas leaks or explosions from whatever source.

- Natural Events: Events such as hurricanes, earthquakes or tornadoes which have potential to cause damage to plant structures or equipment significant enough to threaten personnel or plant safety.

8.0 Hazards 8.1 Security Threats

8.1.1 Unusual Event

Bomb device or other indication of attempted sabotage discovered within plant Protected Area
OR
Any security event which represents a potential degradation in the level of safety of the plant.

NUMARC IC:

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

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL is based on the JAFNPP Security Contingency Plan. Security events which do not represent at least a potential degradation in the level of safety of the plant, are reported under 10CFR73.71 or in some cases under 10CFR50.72.

The plant Protected Area boundary is defined in the Security Plan (blue book). Bomb devices discovered within the plant vital area would result in EAL escalation.

PEG Reference(s):

HU4.1
HU4.2

Basis Reference(s):

1. JAFNPP Security Contingency Plan
2. FSAR Figure 2.1-4
3. JAFNPP Security Plan

8.0 Hazards 8.1 Security Threats

8.1.2 Alert

Intrusion into plant Protected Area by an adversary
OR
Any security event which represents an actual substantial degradation of the level of safety of the plant.

NUMARC IC:

Security event in a plant protected area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This class of security events represents an escalated threat to plant safety above that contained in the Unusual Event. For the purposes of this EAL, the intrusion by an adversary inside the Protected Area boundary can be considered a significant security threat. Intrusion into a vital area by an adversary will escalate this event to a Site Area Emergency.

PEG Reference(s):

HA4.1
HA4.2

Basis Reference(s):

1. JAFNPP Security Contingency Plan
2. FSAR Figure 2.1-4
3. JAFNPP Security Plan

8.0 Hazards 8.1 Security Threats

8.1.3 Site Area Emergency

Intrusion into a plant security vital area by an adversary
OR
Any security event which represents actual or likely failures of plant systems needed to protect the public.

NUMARC IC:

Security event in a plant vital area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This class of security events represents an escalated threat to plant safety above that contained in the Alert in that an adversary has progressed from the Protected Area to a security vital area. Security vital areas include:

- Pump Room for RHR/ESW Cooling Water
- Cable Tunnels
- Battery Room
- Cable Spreading Room
- Diesel Generator Room
- Electrical Switchgear Room
- Relay Room
- Control Room
- Remote Safe Shutdown Panel for MSIV/ADS No. 25ASP-4.5
- Reactor Building
- Central Alarm Station - Security Building
- Emergency Security Generator Room - Security Building

PEG Reference(s):

HS1.1
HS1.2

Basis Reference(s):

1. FSAR Figure 2.1-4
2. JAFNPP Security Plan

8.0 Hazards 8.1 Security Threats

8.1.4 General Emergency

Security event which results in:
Loss of plant control from the Control Room
OR
Loss of remote shutdown capability

NUMARC IC:

Security event resulting in loss of ability to reach and maintain cold shutdown.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL encompasses conditions under which unauthorized personnel have taken physical control of vital areas required to reach and maintain safe shutdown.

PEG Reference(s):

HG1.1
HG1.2

Basis Reference(s):

None

8.0 Hazards 8.2 Fire or Explosion

8.2.1 Unusual Event

Confirmed fire in or contiguous to any plant area, Table 8.2 or Table 8.3, not extinguished in ≤ 15 min. of Control Room notification

Table 8.2 Plant Areas
• RadWaste Building/Track Bay • Reactor Track Bay • Boiler House • Security Building • CAS Building • #2 Oil Storage Shack • H_2 Storage Facility • CAD N_2 Storage Building

Table 8.3 Plant Vital Areas
• Reactor Building • Control Room/ Relay Room • Turbine Building • Screenwell/Pumphouse • Diesel Generator Building

NUMARC IC:

Fire within protected area boundary not extinguished within 15 minutes of detection.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

The purpose of this EAL is to address the magnitude and extent of fires that may be potentially significant precursors to damage to safety systems. This excludes such items as fires within administration buildings, waste-basket fires, and other small fires of no safety consequence.

PEG Reference(s):

HU2.1

Basis Reference(s):

1. FSAR Section 12.3

8.0 Hazards **8.2 Fire or Explosion**

8.2.2 Alert

Fire or explosion in any plant area, Table 8.2 or Table 8.3, which results in damage to plant equipment or structures needed for safe plant operation

Table 8.2 Plant Areas
• RadWaste Building/Track Bay • Reactor Track Bay • Boiler House • Security Building • CAS Building • #2 Oil Storage Shack • H_2 Storage Facility • CAD N_2 Storage Building

Table 8.3 Plant Vital Areas
• Reactor Building • Control Room/ Relay Room/Cable Spreading Rm. • Turbine Building • Screenwell/Pumphouse • Diesel Generator Building • Battery Room/Battery Corridor

NUMARC IC:

Fire or explosion affecting the operability of plant safety systems required to establish or maintain safe shutdown.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

The listed areas contain functions and systems required for the safe shutdown of the plant. The JAFNPP safe shutdown analysis was consulted for equipment and plant areas required for the applicable mode.

With regard to explosions, only those explosions of sufficient force to damage permanent structures or equipment required for safe operation within the identified plant areas should be considered. As used here, an explosion is a rapid, violent, unconfined combustion, or a catastrophic failure of pressurized equipment, that potentially imparts significant energy to nearby structures and materials. No attempt is made in this EAL to assess the actual magnitude of the damage. The declaration of an Alert and the activation of the TSC will provide the Emergency Director with the resources needed to perform damage assessments. The Emergency Director also needs to consider any security aspects of the explosions.

PEG Reference(s):

HA2.1

Basis Reference(s):

1. FSAR Section 12.3

8.0 Hazards **8.3 Man-Made Events**

8.3.1 Unusual Event

Vehicle crash into or projectile which impacts plant structures or systems within Protected Area boundary

NUMARC IC:

Natural and destructive phenomena affecting the protected area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

The Protected Area boundary is within the security isolation zone and is defined in the Site Security Plan (blue book).

This EAL addresses such items as plane, helicopter, train, car, truck, or barge crash, or impact of other projectiles that may potentially damage 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.

PEG Reference(s):

HU1.4

Basis Reference(s):

1. JAFNPP Site Security Plan

8.0 Hazards 8.3 Man-Made Events

8.3.2 Unusual Event

Report by plant personnel of an explosion within Protected Area boundary resulting in visible damage to permanent structures or equipment

NUMARC IC:

Natural and destructive phenomena affecting the protected area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

The Protected Area boundary is within the security isolation zone and is defined in the site security plan.

For this EAL, only those explosions of sufficient force to damage permanent structures or equipment within the Protected Area should be considered. As used here, an explosion is a rapid, violent, unconfined combustion, or a catastrophic failure of pressurized equipment, that potentially imparts significant energy to near by structures and materials. 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 (e. g., deformation, scorching) is sufficient for declaration. The Emergency Director also needs to consider any security aspects of the explosion.

PEG Reference(s):

HU1.5

Basis Reference(s):

1. JAFNPP Site Security Plán

8.0 Hazards 8.3 Man-Made Events

8.3.3 Unusual Event

Report or detection of toxic or flammable gases that could enter or have entered within the Protected Area boundary in amounts that could affect the health of plant personnel or safe plant operation
OR
Report by local, county or state officials for potential evacuation of site personnel based on offsite event

NUMARC IC:

Release of toxic or flammable gases deemed detrimental to safe operation of the plant.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL is based on releases in concentrations within the site boundary that will affect the health of plant personnel or affecting the safe operation of the plant with the plant being within the evacuation area of an offsite event (i. e., tanker truck accident releasing toxic gases, etc.). The evacuation area is as determined from the DOT Evacuation Tables for Selected Hazardous Materials, in the DOT Emergency Response Guide for Hazardous Materials.

Should an explosion occur within a specified plant area, an Alert would be declared based on EAL 8.2.2

PEG Reference(s):

HU3.1
HU3.2

Basis Reference(s):

None

8.0 Hazards **8.3 Man-Made Events**

8.3.4 Alert

Vehicle crash or projectile impact which precludes personnel access to or damages equipment in plant vital areas, Table 8.3

Table 8.3 Plant Vital Areas
• Reactor Building • Control Room/ Relay Room/Cable Spreading Rm. • Turbine Building • Screenwell/Pumphouse • Diesel Generator Building • Battery Room/Battery Corridor

NUMARC IC:

Natural and destructive phenomena affecting the plant vital area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL addresses events that may have resulted 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. 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.

This EAL addresses such items as plane, helicopter, train, car, truck, or barge crash, or impact of other projectiles into a plant vital area.

PEG Reference(s):

HA1.5

Basis Reference(s):

1. JAFNPP Site Security Plan

8.0 Hazards 8.3 Man-Made Events

8.3.5 Alert

Report or detection of toxic or flammable gases within a plant vital area, Table 8.3, in concentrations that will be life threatening to plant personnel or preclude access to equipment needed for safe plant operation

Table 8.3 Plant Vital Areas
• Reactor Building • Control Room/ Relay Room/Cable Spreading Rm. • Turbine Building • Screenwell/Pumphouse • Diesel Generator Building • Battery Room/Battery Corridor

NUMARC IC:

Release of toxic or flammable gases within a facility structure which jeopardizes operation of systems required to maintain safe operations or to establish or maintain cold shutdown.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL is based on gases that have entered a plant structure precluding access to equipment necessary for the safe operation of the plant. This EAL applies to buildings and areas contiguous to plant vital areas or other significant buildings or areas. The intent of this EAL is not to include buildings (i. e., warehouses) or other areas that are not contiguous or immediately adjacent to plant vital areas. Discharge of fire suppresion systems is not covered in this EAL. It is appropriate that increased monitoring be done to ascertain whether consequential damage has occurred.

PEG Reference(s):

HA3.1
HA3.2

Basis Reference(s):

1. FSAR Section 12.3

8.0 Hazards 8.4 Natural Events

8.4.1 Unusual Event

Earthquake felt inplant based upon a consensus of Control Room Operators on duty
AND either:
JAFNPP seismic activity alarm (EPIC A-124) actuated
OR
Confirmation of earthquake received on NMP-1 or NMP-2 seismic instrumentation

NUMARC IC:

Natural and destructive phenomena affecting the protected area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

JAFNPP seismic instrumentation actuates at 0.01 g.

Damage to some portions of the site may occur but it should not affect ability of safety functions to operate. Methods of detection can be based on instrumentation validated by a reliable source, operator assessment, or indication received from NMP-1 or JAFNPP instrumentation. 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 inventory ground motion is felt at the nuclear plant site and recognized as an earthquake based on a consensus of Control Room operators on duty at the time, and (b) for plants with operable seismic instrumentation, the seismic switches of the plant are activated. For most plants with seismic instrumentation , the seismic switches are set at an acceleration of about 0.01 g."

PEG Reference(s):

HU1.1

Basis Reference(s):

1. AOP-14 Earthquake
2. EPRI document, "Guidelines for Nuclear Plant Response to an Earthquake", dated October 1989

8.0 Hazards 8.4 Natural Events

8.4.2 Unusual Event

Report by plant personnel of tornado striking within plant Protected Area boundary

NUMARC IC:

Natural and destructive phenomena affecting the protected area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL is based on the assumption that a tornado striking (touching down) within the Protected Area boundary may have potentially damaged plant structures containing functions or systems required for safe shutdown of the plant. If such damage is confirmed visually or by other in-plant indications, the event may be escalated to Alert.

The JAFNPP Protected Area boundary is illustrated in FSAR Figure 2.1-4.

PEG Reference(s):

HU1.2

Basis Reference(s):

1. AOP-13 Hurricanes, Tornadoes, and High Winds
2. FSAR Figure 2.1-4

8.0 Hazards 8.4 Natural Events

8.4.3 Unusual Event

Lake water level > 248 ft
OR
ESW intake bay water level < 237 ft

NUMARC IC:

Natural and destructive phenomena affecting the protected area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This covers high and low lake water level conditions that could be precursors of more serious events. The high lake level is based upon the maximum attainable uncontrolled lake water level as specified in the FSAR. The low level is based on ESW intake bay water level and corresponds to the design minimum lake level.

PEG Reference(s):

HU1.7

Basis Reference(s):

1. FSAR Section 2.4.3.5
2. Safety Evaluation JAF-SE-93-034 "Evaluation of Maximum and Minimum Water Levels at Screenwell for Safe Operation of Class I Equipment"

8.0 Hazards 8.4 Natural Events

8.4.4 Alert

Earthquake felt inplant based upon a consensus of Control Room Operators on duty
AND
JAFNPP seismic activity alarm (EPIC A-124) actuated
AND
Confirmation of seismic event > **0.08 g** by NMP-2

NUMARC IC:

Natural and destructive phenomena affecting the plant vital area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL addresses events that may have resulted 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. 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.

This EAL is based on the FSAR design operating basis earthquake of 0.08 g. Seismic events of this magnitude can cause damage to plant safety functions.

PEG Reference(s):

HA1.1

Basis Reference(s):

1. AOP-14 Earthquake
2. Technical Specifications Section 5.6
3. FSAR Section 12.4.6.1
4. FSAR Section 12.3
5. FSAR Section 2.4.3.7

8.0 Hazards **8.4 Natural Events**

8.4.5 Alert

Sustained winds > 90 mph
OR
Tornado strikes a plant vital area, Table 8.3

Table 8.3 Plant Vital Areas
• Reactor Building • Control Room/ Relay Room/Cable Spreading Rm • Turbine Building • Screenwell/Pumphouse • Diesel Generator Building Battery Room/Battery Corridor

NUMARC IC:

Natural and destructive phenomena affecting the plant vital area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL addresses events that may have resulted 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. 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.

This EAL is based on the FSAR design basis of 90 mph. Wind loads of this magnitude can cause damage to safety functions.

The JAFNPP Protected Area boundary is illustrated in FSAR Figure 2.1-4.

PEG Reference(s):

HA1.2

Basis Reference(s):

1. FSAR Section 12.4.6.1
2. FSAR Section 12.3
3. FSAR Section 2.4.3.7
4. EAP-42 Obtaining Meteorological Data
5. FSAR Figure 2.1-4

8.0 Hazards **8.4 Natural Events**

8.4.6 Alert

Any natural event which results in a report of visible structural damage or assessment by Control Room personnel of actual damage to equipment needed for safe plant operation, Table 8.3

Table 8.3 Plant Vital Areas
• Reactor Building • Control Room/ Relay Room/Cable Spreading Rm • Turbine Building • Screenwell/Pumphouse • Diesel Generator Building Battery Room/Battery Corridor

NUMARC IC:

Natural and destructive phenomena affecting the plant vital area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL addresses events that may have resulted in a plant vital area being subjected to levels beyond design limits, and thus damage may be assumed to have occurred to plant safety systems. 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.

This EAL specifies areas in which structures containing systems and functions required for safe shutdown of the plant are located.

PEG Reference(s):

HA1.3

Basis Reference(s):

1. FSAR Figure 2.1-4

8.0 Hazards 8.4 Natural Events

8.4.7 Alert

Lake water level **> 255 ft**
OR
ESW intake bay water level **< 235 ft**

NUMARC IC:

Natural and destructive phenomena affecting the plant vital area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL addresses events that may have resulted 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. 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.

This EAL covers high and low lake water level conditions that exceed levels which threaten vital equipment. The high lake level is based upon the revised design flood level for the screenwell interior walls and gates. The low ESW intake bay water level corresponds to the top of the ESW and RHR Service Water pump suctions.

PEG Reference(s):

HA1.7

Basis Reference(s):

1. FSAR Section 2.4.3.5
2. Safety Evaluation JAF-SE-93-034 "Evaluation of Maximum and Minimum Water Levels at Screenwell for Safe Operation of Class I Equipment"

9.0 OTHER

The EALs defined in categories 1.0 through 8.0 specify the predetermined symptoms or events which are indicative of emergency or potential emergency conditions, and which warrant classification. While these EALs have been developed to address the full spectrum of possible emergency conditions which may warrant classification and subsequent implementation of the Emergency Plan, a provision for classification of emergencies based on operator/management experience and judgment is still necessary. The EALs of this category provide the Shift Supervisor or Emergency Director the latitude to classify emergency conditions consistent with the established classification criteria, based upon their judgment.

9.0 Other

9.1.1 Unusual Event

Any event, as determined by the Shift Supervisor or Emergency Director, that could lead to or has led to a potential degradation of the level of safety of the plant.

NUMARC IC:

Emergency Director Judgment

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the Unusual Event emergency class.

From a broad perspective, one area that may warrant Emergency 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. Another example to consider would be exceeding a plant safety limit as defined in Technical Specifications.

PEG Reference(s):

HU5.1

Basis Reference(s):

None

9.0 Other

9.1.2 Unusual Event

Any event, as determined by the Shift Supervisor or Emergency Director, that could lead to or has led to a loss or potential loss of containment, Attachment A.

Loss of containment indicators may include a rapid unexplained decrease following initial increase in containment pressure

NUMARC IC:

N/A

FPB loss/potential loss:

Containment loss/potential loss

Mode Applicability:

Power operations, Startup/Hot standby, Hot Shutdown

Basis:

This EAL addresses any other factors that are to be used by the Emergency Director in determining whether the containment barrier is lost or potentially lost. In addition, the inability to monitor the barrier should also be incorporated in this EAL as a factor in Emergency Director judgment that the barrier may be considered lost or potentially lost.

PEG Reference(s):

PC6.1

Basis Reference(s):

None

9.0 Other

9.1.3 Alert

Any event, as determined by the Shift Supervisor or Emergency Director, that could cause or has caused actual substantial degradation of the level of safety of the plant.

NUMARC IC:

Emergency Director Judgment

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the Alert emergency class.

PEG Reference(s):

HA6.1

Basis Reference(s):

None

9.0 Other

9.1.4 Alert

Any event, as determined by the Shift Supervisor or Emergency Director, that could lead or has led to a loss or potential loss of either fuel clad or RCS barrier, Attachment A.

NUMARC IC:

N/A

FPB loss/potential loss:

Loss or potential loss of either fuel clad or RCS barrier

Mode Applicability:

Power operations, Startup/Hot standby, Hot Shutdown

Basis:

This EAL addresses any other factors that are to be used by the Emergency Director in determining whether the fuel clad or RCS barriers are lost or potentially lost. In addition, the inability to monitor the barriers should also be considered in this EAL as a factor in Emergency Director judgment that the barriers may be considered lost or potentially lost.

PEG Reference(s):

FC5.1
RCS6.1

Basis Reference(s):

None

9.0 Other

9.1.5 Site Area Emergency

As determined by the Shift Supervisor or Emergency Director, events are in progress which indicate actual or likely failures of plant systems needed to protect the public. Any releases are not expected to result in exposures which exceed EPA PAGs.

NUMARC IC:

Emergency Director Judgment

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency class description for Site Area Emergency.

PEG Reference(s):

HS3.1

Basis Reference(s):

None

9.0 Other

9.1.6 Site Area Emergency

Any event, as determined by the Shift Supervisor or Emergency Director, that could lead or has led to either:

Loss or potential loss of both fuel clad and RCS barrier, Attachment A
OR
Loss or potential loss of either fuel clad or RCS barrier in conjunction with a loss of containment, Attachment A

Loss of containment indicators may include a rapid unexplained decrease following initial increase in containment pressure

NUMARC IC:

N/A

FPB loss/potential loss:

Loss or potential loss of both fuel clad and RCS barrier
OR
Loss or potential loss of either fuel clad or RCS barrier in conjunction with a loss of containment

Mode Applicability:

Power operations, Startup/Hot standby, Hot Shutdown

Basis:

This EAL addresses unanticipated conditions affecting fission product barriers which are not addressed explicitly elsewhere. Declaration of an emergency is warranted because conditions exist which are believed by the Emergency Director to fall under the emergency class description for Site Area Emergency.

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

PEG Reference(s):

FC5.1
RCS6.1
PC6.1
PC1.1
PC1.2

Basis Reference(s):

None

9.0 Other

9.1.7 General Emergency

As determined by the Shift Supervisor or Emergency Director, events are in progress which indicate actual or imminent core damage and the potential for a large release of radioactive material in excess of EPA PAGs outside the site boundary.

NUMARC IC:

Emergency Director Judgment

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to be consistent with the General Emergency classification description.

Releases can reasonably be expected to exceed EPA PAG plume exposure levels outside the site boundary.

PEG Reference(s):

HG2.1

Basis Reference(s):

None

9.0 Other

9.1.8 General Emergency

Any event, as determined by the Shift Supervisor or Emergency Director, that could lead or has led to a loss of any two fission product barriers and loss or potential loss of the third, Attachment A.

Loss of containment indicators may include a rapid unexplained decrease following initial increase in containment pressure

NUMARC IC:

N/A

FPB loss/potential loss:

Loss of any two fission product barriers and loss or potential loss of the third

Mode Applicability:

Power operations, Startup/Hot standby, Hot Shutdown

Basis:

This EAL addresses unanticipated conditions affecting fission product barriers which are not addressed explicitly elsewhere. Declaration of an emergency is warranted because conditions exist which are believed by the Emergency Director to fall under the emergency class description for the General Emergency class.

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

PEG Reference(s):

FC5.1
RCS6.1
PC6.1
PC1.1
PC1.2

Basis Reference(s):

None

ATTACHMENT A

FISSION PRODUCT BARRIER LOSS & POTENTIAL LOSS INDICATORS

Fission Product Barrier Loss / Potential Loss Matrix

(Those thresholds for which loss or potential is determined to be imminent, classify as though the threshold(s) has been exceeded)

Fuel Cladding

Potential Loss	Loss
RPV water level cannot be restored and maintained above 0 in. (TAF)	RPV water level cannot be restored and maintained above 0 in. (TAF)
Emergency Director Judgment	Coolant activity > 300 µCi/gm I-131 equivalent
	Offgas radiation ≥ 10 x hi-hi alarm
	Drywell radiation ≥ 3000 R/hr
	Emergency Director Judgment

RCS

Potential Loss	Loss
RCS leakage greater than 50 gpm inside the drywell	RPV water level cannot be restored and maintained above 0 in. (TAF)
Primary system is discharging outside PC AND RB area radiation levels are > maximum safe operating levels in two or more areas, EOP-5	Primary containment pressure cannot be maintained < 2.7 psig due to coolant leakage
Primary system is discharging outside PC AND RB area temperatures are > maximum safe operating levels in two or more areas, EOP-5	Drywell radiation ≥ 300 R/hr
Emergency Director Judgment	Emergency Director Judgment

Fission Product Barrier Loss / Potential Loss Matrix

(Those thresholds for which loss or potential is determined to be imminent, classify as though the threshold(s) has been exceeded)

Containment

Potential Loss	Loss
Drywell radiation > 250,000 R/hr Emergency Director Judgment	Primary containment venting is required due to PCPL Primary containment venting is required due to combustible gas concentrations Any steam line (MSL, HPCI, RCIC) or RWCU isolation failure resulting in a release pathway outside primary containment Primary system is discharging outside PC AND RB area radiation levels are > maximum safe operating levels in two or more areas, EOP-5 Primary system is discharging outside PC AND RB area temperatures are > maximum safe operating levels in two or more areas, EOP-5 Emergency Director Judgment Loss of containment indicatoion may include rapid unexplained decrease following initial increase in containment pressure

ATTACHMENT B

WORD LIST/DEFINITIONS

Actuate

To put into operation; to move to action; commonly used to refer to automated, multi-faceted operations. "Actuate ECCS".

Adversary

As applied to security EALs, an individual whose intent is to commit sabotage, disrupt Station operations or otherwise commit a crime on station property.

Adequate Core Cooling

Heat removal from the reactor sufficient to prevent rupturing the fuel clad.

Alert

Events are in process or have occurred which involve an actual or 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.

Adversary

As applied to security EALs, an individual whose intent is to commit sabotage, disrupt Station operations or otherwise commit a crime on station property.

Available

The state or condition of being ready and able to be used (placed into operation) to accomplish the stated (or implied) action or function. As applied to a system, this requires the operability of necessary support systems (electrical power supplies, cooling water, lubrication, etc.).

Can/Cannot be determined (</>)

The current value or status of an identified parameter relative to that specified can/cannot be ascertained using all available indications (direct and indirect, singly or in combination).

Can/Cannot be maintained above/below (</>)

The value of the identified parameter(s) is/is not able to be kept above /below specified limits. This determination includes making an evaluation that considers both current and future system performance in relation to the current value and trend of the parameter(s). Neither implies that the parameter must actually exceed the limit before the action is taken nor that the action must be taken before the limit is reached.

Can/Cannot be restored above/below (</>)

The value of the identified parameter(s) is/is not able to be returned to above/below specified limits after having passed those limits. This determination includes making an evaluation that considers both current and future systems performances in relation to the current value and trend of the parameter(s). Does not imply any specific time interval but does not permit prolonged operation beyond a limit without taking the specified action.

As applied to loss of electrical power sources (ex.: Power cannot be restored to any vital bus in **≥ 4 hrs**) the specified power source cannot be returned to service within the specified time. This determination includes making an evaluation that considers both current and future restoration capabilities. Implies that the declaration should be made as soon as the determination is made that the power source cannot be restored within the specified time.

Close

To position a valve or damper so as to prevent flow of the process fluid.

To make an electrical connection to supply power.

Confirm / Confirmation

To validate, through visual observation or physical inspection, that an assumed condition is as expected or required, without taking action to alter the "as found" configuration.

Contiguous

Being in actual contact; touching along a boundary or at a point

Control

Take action, as necessary, to maintain the value of a specified parameter within applicable limits; to fix or adjust the time, amount, or rate of; to regulate or restrict.

Decrease

To become progressively less in size, amount, number, or intensity.

Discharge

Removal of a fluid/gas from a volume or system.

Drywell

That component of the BWR primary containment which houses the RPV and associated piping.

Enter

To go into.

Establish

To perform actions necessary to meet a stated condition. "Establish communication with the Control Room."

Evacuate

To remove the contents of; to remove personnel from an area.

Exceeds

To go or be beyond a stated or implied limit, measure, or degree.

Exist

To have being with respect to understood limitations or conditions.

Failure

A state of inability to perform a normal function.

General Emergency

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.

If

Logic term which indicates that taking the action prescribed is contingent upon the current existence of the stated condition(s). If the identified conditions do not exist, the prescribed action is not to be taken and execution of operator actions must proceed promptly in accordance with subsequent instructions.

Increase

To become progressively greater in size, amount, number or intensity.

Indicate

To point out or point to; to display the value of a process variable; to be a sign or symbol.

Initiate

The act of placing equipment or a system into service, either manually or automatically. Activation of a function or protective feature (i.e. initiate a manual scram).

Injection

The act of forcing a fluid into a volume or vessel.

Inoperable

Not able to perform it's intended function

Intrusion

The act of entering without authorization

Loss

Failure of operability or lack of access to.

Maintain

Take action, as necessary, to keep the value of the specified parameter within the applicable limits.

Maximum Safe Operating (parameter)

The highest value of the identified operating parameter beyond which, required personnel access or continued operation of equipment important to safety cannot be assured.

Monitor

Observe and evaluate at a frequency sufficient to remain apprised of the value, trend, and rate of change of the specified parameter.

Notify

To give notice of or report the occurrence of; to make known to; to inform specified personnel; to advise; to communicate; to contact; to relay.

Open

To position a valve or damper so as to allow flow of the process fluid.

To break an electrical connection which removes a power supply from an electrical device.

To make available for entry or passage by turning back, removing, or clearing away.

Operable

Able to perform it's intended function

Perform

To carry out an action; to accomplish; to affect; to reach an objective.

Primary Containment

The airtight volume immediately adjacent to and surrounding the RPV, consisting of the drywell and wetwell in a BWR plant.

Primary System

The pipes, valves, and other equipment which connect directly to the RPV or reactor coolant system such that a reduction in RPV pressure will effect a decrease in the steam or water being discharged through an unisolated break in the system.

Remove

To change the location or position of.

Report

To describe as being in a specific state.

Require

To demand as necessary or essential.

Restore

Take the appropriate action requires to return the value of an identified parameter to within applicable limits.

Rise

Describes an increase in a parameter as the result of an operator or automatic action.

Sample

To perform an analysis on a specified media to determine its properties.

Scram

To take action to cause shutdown of the reactor by rapidly inserting a control rod or control rods (BWR).

Secondary Containment

The airtight volume immediately adjacent to or surrounding the primary containment in a BWR plant.

Shut down

To perform operations necessary to cause equipment to cease or suspend operation; to stop. "Shut down unnecessary equipment."

Shutdown

As applied to the BWR reactor, subcritical with reactor power below the heating range.

Site Area Emergency

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 except near the site boundary.

Suppression pool

The volume of water in a BWR plant intended to condense steam discharged from a primary system break inside the drywell.

Sustained

Prolonged. Not intermittent or of transitory nature

Trip

To de-energize a pump or fan motor; to position a breaker so as to interrupt or prevent the flow of current in the associated circuit; to manually activate a semi-automatic feature.

Uncontrolled

An evolution lacking control but is not the result of operator action.

Unplanned

Not as an expected result of deliberate action.

Until

Indicates that the associated prescribed action is to proceed only so long as the identified condition does not exist.

Unusual Event

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.

Valid

Supported or corroborated on a sound basis.

Vent

To open an effluent (exhaust) flowpath from an enclosed volume; to reduce pressure in an enclosed volume.

Verify

To confirm a condition and take action to establish that condition if required. "Verify reactor trip, verify SI pumps running."

Vital Area

Any plant area which contains vital equipment.

Attachment VI to JPN-95-026

Fission Product Barrier Evaluation, Revision 1, New York Power Authority, James A. FitzPatrick Nuclear Power Plant

New York Power Authority
Docket No. 50-333

Fission Product Barrier Evaluation

Revision 1

New York Power Authority

James A FitzPatrick Nuclear Power Plant

Revision 1

2/25/95

Operations Support Services, Inc.
233 Water Street 2nd Floor Plymouth, MA 02360

Evaluation of

JAFNPP Fission Product Barrier

Emergency Action Levels

The Fission Product Barrier (FPB) degradation category for a BWR plant is illustrated in the following table which is designated "Table 3" in NESP-007, Revision 2.

The Initiating Condition (IC) for each of the four emergency classifications (Unusual Event, Alert, Site Area Emergency, and General Emergency) are designated FU1, FA1, FS1, and FG1, respectively.

Each IC is defined by one or more EALs or combination of EALs which are indicative of a loss or potential loss of one or more of the three fission product barriers. The three fission product barriers are:

- Fuel Clad (FC)
- Reactor Coolant System (RCS)
- Primary Containment (PC)

NESP-007, Revision 2, prescribes example EALs for each of the three fission product barriers. An EAL is defined by one or more plant conditions. For example, there are five FC barrier example EALs, six RCS barrier example EALs, and six PC example EALs. Each EAL may consist of one or more conditions representing a loss of the barrier and a potential loss of the barrier. Some EALs may have only loss conditions, others only potential loss conditions, some have both loss and potential loss conditions. Each EAL is given a sequential number in Table 3. In the following list under the column labeled "NESP-007", NUMARC EALs with a defined condition (i. e., labeled as needing "site-specific" input in Table 3) are identified with a "yes", and those without a defined condition (i. e. labeled "not applicable" in Table 3) are identified with a "no". Similarly, EAL conditions applicable to JAFNPP are identified with a yes/no under the column labeled "JAFNPP".

		NUMARC		JAFNPP	
Barrier	EAL #	Loss	Pot. Loss	Loss	Pot. Loss
FC	1	Yes	No	Yes(FC1.1)	No
	2	Yes	Yes	Yes(FC2.1)	Yes(FC2.1)
	3	Yes	No	Yes(FC3.1)	No
	4	Yes	Yes	Yes(FC4.1)	No
	5	Yes	Yes	Yes(FC5.1)	Yes(FC5.1)
RCS	1a	Yes	Yes	No	Yes(RCS1.2)
	1b	No	Yes	No	Yes(RCS1.3)
	2	Yes	No	Yes(RCS2.1)	No
	3	Yes	No	Yes(RCS3.1)	No
	4	Yes	No	Yes(RCS4.1)	No
	5	Yes	Yes	No	No
	6	Yes	Yes	Yes(RCS6.1)	Yes(RCS6.1)
PC	1a	Yes	Yes	No	Yes (PC1.3)
	1b	Yes	Yes	No	Yes (PC1.4)
	2a	Yes	No	Yes(PC2.1)	No
	2b	Yes	No	Yes(PC2.2)	No
	2c	Yes	No	Yes(PC2.3)	No
	3	No	Yes	No	Yes(PC3.1)
	4	No	Yes	No	Yes(PC4.1)
	5	Yes	Yes	No	No
	6	Yes	Yes	Yes(PC6.1)	Yes(PC6.1)

Based on the classification key given at the beginning of Table 3, the number of example EALs, and the number of loss and potential loss conditions, the set of conditions that can yield a given emergency classification can be computed.

The maximum, theoretically possible set of conditions that can yield an Unusual Event classification is given in column 1 of Table A. These consist of the PC loss and PC potential loss conditions.

The maximum, theoretically possible set of conditions that can yield an Alert classification is given in column 1 of Table B. These consist of FC loss and potential loss conditions, and RCS loss and potential loss conditions.

The maximum, theoretically possible set of conditions that can yield a Site Area Emergency classification is given in column 1 of Table C. These consist of any of the following conditions:

- Loss of FC and RCS, or
- Potential loss of FC and RCS, or
- Potential loss of FC or RCS
  and
  Loss of another barrier

The third set of conditions listed above can be represented by the following conditions to eliminate reference to "loss of another barrier":

- Potential loss of FC and loss of RCS, or
- Potential loss of FC and loss of PC, or
- Potential loss of RCS and loss of FC, or
- Potential loss of RCS and loss of PC

The maximum, theoretically possible set of conditions that can yield a General Emergency classification is given in column 1 of Table D. These consist of the following conditions:

- Loss of any two barriers, and
- Potential loss of a third

These conditions can be represented by the following conditions to correlate barrier loss and potential loss to the three specific barriers:

- Loss of FC and loss of RCS and potential loss of PC, or
- Loss of RCS and loss of PC and potential loss of FC, or
- Loss of PC and loss of FC and potential loss of RCS

Since the EAL conditions are listed numerically in Table 3, Tables A through D utilize a similar numbering system which is modified by letter abbreviations to define each set of conditions. For example, condition "FC1-loss" corresponds to a loss of the Fuel Clad barrier due to primary coolant activity level greater than the site-specific value. Similarly, "RCS1b-pot. loss" corresponds to a potential loss of the

Reactor Coolant System barrier due to unisolable primary system leakage outside the drywell, and so on.

An evaluation of each condition or set of conditions listed in Tables A through D is made to determine if it properly defines the appropriate threshold for the classification. If a condition or set of conditions is appropriate, a comment reflecting this conclusion is recorded in the "Remarks" column. If a condition or set of conditions is determined to be inappropriate, it is lined out and the reason for this conclusion is similarly recorded in the "Remarks" column. Where additional space is required to complete comments, the comments are recorded by number in Appendix 1 of this document. The numbers of the comments are recorded in the "Remarks" column with the associated condition or set of conditions to which they apply.

A summary of the results of the fission product barrier evaluation is presented in Appendix 2.

RECOGNITION CATEGORY F

FISSION PRODUCT BARRIER DEGRADATION

INITIATING CONDITION MATRIX TABLE 3 BWR

UNUSUAL EVENT		ALERT		SITE AREA EMERGENCY		GENERAL EMERGENCY	
FU1	Any loss or any potential loss of containment Op. Modes: Power operation Hot Standby/Startup (BWR) Hot Shutdown	FA1	Any loss or any potential loss of either fuel clad or RCS. Op. Modes: Power operation Hot Standby/Startup (BWR) Hot Shutdown	FS1	Loss of both fuel clad and RCS OR Potential loss of both fuel clad and RCS OR Potential loss of either fuel clad or RCS, and loss of any additional barrier. Op. Modes: Power operation Hot Standby/Startup (BWR) Hot Shutdown	FG1	Loss of any two barriers AND Potential loss of third barrier. Op. Modes: Power operation Hot Standby/Startup (BWR) Hot Shutdown

NOTES:

1. Although the logic used for these initiating conditions appears overly complex, it is necessary to reflect the following considerations:

   - The fuel clad barrier and the RCS barrier are weighted more heavily than the containment barrier (see Sections 3.4 and 3.8 for more information on this point). Unusual Event ICs associated with RCS and Fuel Clad barriers are addressed under System Malfunction ICs.
   - At the Site Area Emergency level, there must be some ability to dynamically assess how far present conditions are for General Emergency. For example, if Fuel Clad barrier and RCS barrier "Loss" EALs existed, this would indicate to the Emergency Director that, in additional to offsite dose assessments, continual assessments of radioactive inventory and containment integrity must be focused on. If, on the other hand, both Fuel Clad barrier and RCS barrier "Potential Loss" EALs existed, the Emergency Director would have more assurance that there was no immediate need to escalate to a General Emergency.
   - The ability to escalate to higher emergency classes as an event gets worse must be maintained. For example, RCS leakage steadily increasing would represent an increasing risk to public health and safety.

2. Fission Product Barrier ICs must be capable of addressing event dynamics. Thus, the EAL Reference Tables 3 and 4 state that IMMINENT (i. e., within 1 to 2 hours) loss or potential loss should result in a classification as if the affected threshold(s) are already exceeded, particularly for the higher emergency classes.

RECOGNITION CATEGORY F

INITIATING CONDITION MATRIX TABLE 3 BWR

Fuel Clad Barrier Example EALs*

Loss	Potential Loss
1. Primary Coolant Activity Level	
Coolant activity greater than (site-specific) value	Not Applicable
2. Reactor Vessel Water Level	
Level less than (site-specific) value	Level less than (site-specific) value
3. Drywell Radiation Monitoring	
Drywell radiation monitor reading greater than (site-specific) R/hr	Not Applicable
4. Other (site-specific) indications	
(site-specific) as applicable	(site-specific) as applicable
5. Emergency Director Judgment	
Any condition in the judgment of the Emergency Director that indicates loss or potential loss of the fuel clad barrier	

* Determine which combination of the three barriers are lost or have a potential loss and use the following key to classify the event. Also, an event for multiple events could occur which result in the conclusion that exceeding the loss or potential loss thresholds is imminent (i. e., within 1 to 3 hours). In this imminent loss situation, use judgment and classify as if the thresholds are exceeded.

RECOGNITION CATEGORY F

INITIATING CONDITION MATRIX TABLE 3 BWR

RCS Barrier Example EALs*

Loss	Potential Loss
1. RCS Leak Rate	
(site-specific) indication of main steam line break	RCS leakage greater than 50 gpm inside the drywell OR unisolatble primary system leakage outside drywell as indicated by area temperature or area radiation alarm
2. Drywell Pressure	
Pressure greater than (site-specific) psig	Not applicable
3. Drywell Radiation Monitoring	
Drywell radiation monitor reading greater than (site-specific) R/hr	Not applicable
4. Reactor Vessel Water Level	
Level less than (site-specific) value	Not applicable
5. Other (site-specific) indications	
(site-specific) as applicable	(site-specific) as applicable
6. Emergency Director Judgment	
Any condition in the judgment of the Emergency Director that indicates loss or potential loss of the RCS barrier	

RECOGNITION CATEGORY F

INITIATING CONDITION MATRIX TABLE 3 BWR

Primary Containment Barrier Example EALs*

	Loss	Potential Loss
1.	**Drywell Pressure**	
	Rapid unexplained decrease following initial increase OR Drywell pressure response not consistent with LOCA conditions	(site-specific) psig and increasing OR explosive mixture exists
2.	**Containment Isolation Valve after Containment Isolation**	
	Failure of both values in any one line to close and downstream pathway to the environment exists OR	Not applicable
	Intentional venting per EOPs OR	Not applicable
	Unisolable primary system leakage outside drywell as indicated by area temperature or area radiation alarm	Not applicable
3.	**Significant Radioactive Inventory in Containment**	
	Not applicable	Containment radiation monitor reading greater than (site-specific) R/hr
4.	**Reactor Vessel Water Level**	
	Not applicable	Reactor vessel water level less than (site-specific) value and the maximum core uncovery time limit is in the unsafe region
5.	**Other (site-specific) Indications**	
	(site-specific) as applicable	(site-specific) as applicable
6.	**Emergency Director Judgment**	
	Any condition in the judgment of the Emergency Director that indicates loss or potential loss of the containment barrier	

Table A - BWR Fission Product Barrier

Unusual Events

NESP-007	Remarks
Loss or pot. loss of PC	
~~PC1a-loss~~	Condition not supported in PEG.
~~PC1b-loss~~	Condition not supported in PEG.
~~PC2a-loss~~	21
~~PC2b-loss~~	1
~~PC2c-loss~~	2
~~PC5-loss~~	Condition not supported in PEG.
~~PC6-loss~~	Subsumed in "Judgment" EAL.
~~PC1a-pot. loss~~	3
~~PC1b-pot. loss~~	3, 25
~~PC3-pot. loss~~	4, 26
~~PC4-pot. loss~~	5, 27
~~PC5-pot. loss~~	Condition not supported in PEG.
~~PC6-pot. loss~~	Subsumed in "Judgment" EAL.

Table B – BWR Fission Product Barrier

Alerts

NESP-007	Remarks
Loss or pot. loss of FC	
FC1-loss	Coolant activity
~~FC2-loss~~	8
~~FC3-loss~~	7
FC4-loss	Offgas radiation >2750 mR/hr
~~FC5-loss~~	Subsumed in "Judgment" EAL.
~~FC2-pot. loss~~	8
~~FC4-pot. loss~~	Condition not supported in PEG.
~~FC5-pot. loss~~	Subsumed in "Judgment" EAL.
Loss or pot. loss of RCS	
~~RCS1a-loss~~	Condition not supported in PEG.
RCS2-loss	Drywell pressure cannot be maintained < scram setpoint.
RCS3-loss	Drywell radiation monitor reading >300 R/hr.
~~RCS4-loss~~	8
~~RCS5-loss~~	Condition not supported in PEG.
~~RCS6-loss~~	Subsumed in "Judgment" EAL.
~~RCS1a-pot. loss~~	15
~~RCS1b-pot. loss~~	23
~~RCS5-pot. loss~~	Condition not supported in PEG.
~~RCS6-pot. loss~~	Subsumed in "Judgment" EAL.

Table C – BWR Fission Product Barrier

Site Area Emergencies

NESP-007		Remarks
Loss of FC and RCS		
~~FC1-loss~~	~~+ RCS1a-loss~~	Condition not supported in PEG.
~~FC1-loss~~	~~+ RCS2-loss~~	Coolant Activity + DW press > scram setpoint
~~FC1-loss~~	~~+ RCS3-loss~~	18
~~FC1-loss~~	~~+ RCS4-loss~~	8
~~FC1-loss~~	~~+ RCS5-loss~~	Condition not supported in PEG.
~~FC1-loss~~	~~+ RCS6-loss~~	Subsumed in "Judgment" EAL.
~~FC2-loss~~	~~+ RCS1a-loss~~	8, RPV water level <TAF.
~~FC2-loss~~	~~+ RCS2-loss~~	8
~~FC2-loss~~	~~+ RCS3-loss~~	8
~~FC2-loss~~	~~+ RCS4-loss~~	9
~~FC2-loss~~	~~+ RCS5-loss~~	Condition not supported in PEG.
~~FC2-loss~~	~~+ RCS6-loss~~	Subsumed in "Judgment" EAL.
~~FC3-loss~~	~~+ RCS1a-loss~~	19, drywell radiation.
~~FC3-loss~~	~~+ RCS2-loss~~	19
~~FC3-loss~~	~~+ RCS3-loss~~	10
~~FC3-loss~~	~~+ RCS4-loss~~	11
~~FC3-loss~~	~~+ RCS5-loss~~	Condition not supported in PEG.
~~FC3-loss~~	~~+ RCS6-loss~~	Subsumed in "Judgment" EAL.
~~FC4-loss~~	~~+ RCS1a-loss~~	Condition not supported in PEG.
~~FC4-loss~~	~~+ RCS2-loss~~	24
~~FC4-loss~~	~~+ RCS3-loss~~	24
~~FC4-loss~~	~~+ RCS4-loss~~	8
~~FC4-loss~~	~~+ RCS5-loss~~	Condition not supported in PEG.
~~FC4-loss~~	~~+ RCS6-loss~~	Subsumed in "Judgment" EAL.
~~FC5-loss~~	~~+ RCS1a-loss~~	Condition not supported in PEG.
~~FC5-loss~~	~~+ RCS2-loss~~	12
~~FC5-loss~~	~~+ RCS3-loss~~	12
~~FC5-loss~~	~~+ RCS4-loss~~	12
~~FC5-loss~~	~~+ RCS5-loss~~	Condition not supported in PEG.
~~FC5-loss~~	~~+ RCS6-loss~~	Subsumed in "Judgment" EAL.
Pot. loss of FC and RCS		
~~FC2-pot. loss~~	~~+ RCS1a-pot. loss~~	8
~~FC2-pot. loss~~	~~+ RCS1b-pot. loss~~	8

Table C – BWR Fission Product Barrier

Site Area Emergencies

NESP-007			Remarks
~~FC2-pot. loss~~	~~+~~	~~RCS5-pot. loss~~	Condition not supported in PEG.
~~FC2-pot. loss~~	~~+~~	~~RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC4-pot. loss~~	~~+~~	~~RCS1a-pot. loss~~	Condition not supported in PEG.
~~FC4-pot. loss~~	~~+~~	~~RCS1b-pot. loss~~	Condition not supported in PEG.
~~FC4-pot. loss~~	~~+~~	~~RCS5-pot. loss~~	Condition not supported in PEG.
~~FC4-pot. loss~~	~~+~~	~~RCS6-pot. loss~~	Condition not supported in PEG.
~~FC5-pot. loss~~	~~+~~	~~RCS1a-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC5-pot. loss~~	~~+~~	~~RCS1b-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC5-pot. loss~~	~~+~~	~~RCS5-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC5-pot. loss~~	~~+~~	~~RCS6-pot. loss~~	Subsumed in "Judgment" EAL.

Pot. loss of FC and loss of RCS

~~FC2-pot. loss~~	~~+~~	~~RCS1a-loss~~	Condition not supported in PEG.
~~FC2-pot. loss~~	~~+~~	~~RCS2-loss~~	8
~~FC2-pot. loss~~	~~+~~	~~RCS3-loss~~	8
~~FC2-pot. loss~~	~~+~~	~~RCS4-loss~~	8
~~FC2-pot. loss~~	~~+~~	~~RCS5-loss~~	Condition not supported in PEG.
~~FC2-pot. loss~~	~~+~~	~~RCS6-loss~~	Subsumed in "Judgment" EAL.
~~FC4-pot. loss~~	~~+~~	~~RCS1a-loss~~	Condition not supported in PEG.
~~FC4-pot. loss~~	~~+~~	~~RCS2-loss~~	Condition not supported in PEG.
~~FC4-pot. loss~~	~~+~~	~~RCS3-loss~~	Condition not supported in PEG.
~~FC4-pot. loss~~	~~+~~	~~RCS4-loss~~	Condition not supported in PEG.
~~FC4-pot. loss~~	~~+~~	~~RCS5-loss~~	Condition not supported in PEG.
~~FC4-pot. loss~~	~~+~~	~~RCS6-loss~~	Condition not supported in PEG.
~~FC5-pot. loss~~	~~+~~	~~RCS1a-loss~~	Condition not supported in PEG.
~~FC5-pot. loss~~	~~+~~	~~RCS2-loss~~	Subsumed in "Judgment" EAL.
~~FC5-pot. loss~~	~~+~~	~~RCS3-loss~~	Subsumed in "Judgment" EAL.
~~FC5-pot. loss~~	~~+~~	~~RCS4-loss~~	Subsumed in "Judgment" EAL.
~~FC5-pot. loss~~	~~+~~	~~RCS5-loss~~	Condition not supported in PEG.
~~FC5-pot. loss~~	~~+~~	~~RCS6-loss~~	Subsumed in "Judgment" EAL.

Pot. loss of FC and loss of PC

~~FC2-pot. loss~~	~~+~~	~~PC1a-loss~~	Condition not supported in PEG.
~~FC2-pot. loss~~	~~+~~	~~PC1b-loss~~	Condition not supported in PEG.
~~FC2-pot. loss~~	~~+~~	~~PC2a-loss~~	8

Table C – BWR Fission Product Barrier

Site Area Emergencies

NESP-007	Remarks
~~FC2-pot. loss + PC2b-loss~~	8
~~FC2-pot. loss + PC2c-loss~~	8
~~FC2-pot. loss + PC5-loss~~	Condition not supported in PEG.
~~FC2-pot. loss + PC6-loss~~	Subsumed in "Judgment" EAL.
~~FC4-pot. loss + PC1a-loss~~	Condition not supported in PEG.
~~FC4-pot. loss + PC1b-loss~~	Condition not supported in PEG.
~~FC4-pot. loss + PC2a-loss~~	Condition not supported in PEG.
~~FC4-pot. loss + PC2b-loss~~	Condition not supported in PEG.
~~FC4-pot. loss + PC2c-loss~~	Condition not supported in PEG.
~~FC4-pot. loss + PC5-loss~~	Condition not supported in PEG.
~~FC4-pot. loss + PC6-loss~~	Condition not supported in PEG.
~~FC5-pot. loss + PC1a-loss~~	Condition not supported in PEG.
~~FC5-pot. loss + PC1b-loss~~	Condition not supported in PEG.
~~FC5-pot. loss + PC2a-loss~~	Subsumed in "Judgment" EAL.
~~FC5-pot. loss + PC2b-loss~~	Subsumed in "Judgment" EAL.
~~FC5-pot. loss + PC2c-loss~~	Subsumed in "Judgment" EAL.
~~FC5-pot. loss + PC5-loss~~	Condition not supported in PEG.
~~FC5-pot. loss + PC6-loss~~	Subsumed in "Judgment" EAL.
Pot. loss of RCS and loss of FC	
~~RCS1a-pot. loss + FC1-loss~~	15
~~RCS1a-pot. loss + FC2-loss~~	8
~~RCS1a-pot. loss + FC3-loss~~	15
~~RCS1a-pot. loss + FC4-loss~~	20
~~RCS1a-pot. loss + FC5-loss~~	12
~~RCS1b-pot. loss + FC1-loss~~	23
~~RCS1b-pot. loss + FC2-loss~~	8
~~RCS1b-pot. loss + FC3-loss~~	19
~~RCS1b-pot. loss + FC4-loss~~	24
~~RCS1b-pot. loss + FC5-loss~~	12
~~RCS5-pot. loss + FC1-loss~~	Condition not supported in PEG.
~~RCS5-pot. loss + FC2-loss~~	Condition not supported in PEG.
~~RCS5-pot. loss + FC3-loss~~	Condition not supported in PEG.
~~RCS5-pot. loss + FC4-loss~~	Condition not supported in PEG.
~~RCS5-pot. loss + FC5-loss~~	Condition not supported in PEG.

Table C – BWR Fission Product Barrier

Site Area Emergencies

NESP-007	Remarks
~~RCS6-pot. loss + FC1-loss~~	Subsumed in "Judgment" EAL.
~~RCS6-pot. loss + FC2-loss~~	Subsumed in "Judgment" EAL.
~~RCS6-pot. loss + FC3-loss~~	Subsumed in "Judgment" EAL.
~~RCS6-pot. loss + FC4-loss~~	Subsumed in "Judgment" EAL.
~~RCS6-pot. loss + FC5-loss~~	Subsumed in "Judgment" EAL.
Pot. loss of RCS and loss of PC	
~~RCS1a-pot. loss + PC1a-loss~~	Condition not supported in PEG.
~~RCS1a-pot. loss + PC1b-loss~~	Condition not supported in PEG.
~~RCS1a-pot. loss + PC2a-loss~~	21, failure to isolate steamline.
~~RCS1a-pot. loss + PC2b-loss~~	22
~~RCS1a-pot. loss + PC2c-loss~~	23, primary system discharging outside containment.
~~RCS1a-pot. loss + PC5-loss~~	Condition not supported in PEG.
~~RCS1a-pot. loss + PC6-loss~~	Subsumed in "Judgment" EAL.
~~RCS1b-pot. loss + PC1a-loss~~	Condition not supported in PEG.
~~RCS1b-pot. loss + PC1b-loss~~	Condition not supported in PEG.
~~RCS1b-pot. loss + PC2a-loss~~	21
~~RCS1b-pot. loss + PC2b-loss~~	22
~~RCS1b-pot. loss + PC2c-loss~~	13
~~RCS1b-pot. loss + PC5-loss~~	Condition not supported in PEG.
~~RCS1b-pot. loss + PC6-loss~~	Subsumed in "Judgment" EAL.
~~RCS5-pot. loss + PC1a-loss~~	Condition not supported in PEG.
~~RCS5-pot. loss + PC1b-loss~~	Condition not supported in PEG.
~~RCS5-pot. loss + PC2a-loss~~	Condition not supported in PEG.
~~RCS5-pot. loss + PC2b-loss~~	Condition not supported in PEG.
~~RCS5-pot. loss + PC2c-loss~~	Condition not supported in PEG.
~~RCS5-pot. loss + PC5-loss~~	Condition not supported in PEG.
~~RCS5-pot. loss + PC6-loss~~	Condition not supported in PEG.
~~RCS6-pot. loss + PC1a-loss~~	Condition not supported in PEG.
~~RCS6-pot. loss + PC1b-loss~~	Condition not supported in PEG.
~~RCS6-pot. loss + PC2a-loss~~	Subsumed in "Judgment" EAL.
~~RCS6-pot. loss + PC2b-loss~~	Subsumed in "Judgment" EAL.
~~RCS6-pot. loss + PC2c-loss~~	Subsumed in "Judgment" EAL.
~~RCS6-pot. loss + PC5-loss~~	Condition not supported in PEG.
~~RCS6-pot. loss + PC6-loss~~	Subsumed in "Judgment" EAL.

Table D – BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
Loss of FC + loss of RCS + pot. loss of PC	
~~FC1-loss + RCS1a-loss + PC1a-pot. loss~~	25, containment pressure >DWPL.
~~FC1-loss + RCS1a-loss + PC1b-pot. loss~~	25, combustible gas limits exceeded.
~~FC1-loss + RCS1a-loss + PC3-pot. loss~~	26, drywell radiation.
~~FC1-loss + RCS1a-loss + PC4-pot. loss~~	27, Drywell Flooding required.
~~FC1-loss + RCS1a-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC1-loss + RCS1a-loss + PC6-pot. loss~~	Condition not supported in PEG.
~~FC1-loss + RCS2-loss + PC1a-pot. loss~~	25
~~FC1-loss + RCS2-loss + PC1b-pot. loss~~	25
~~FC1-loss + RCS2-loss + PC3-pot. loss~~	26
~~FC1-loss + RCS2-loss + PC4-pot. loss~~	27
~~FC1-loss + RCS2-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC1-loss + RCS2-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC1-loss + RCS3-loss + PC1a-pot. loss~~	25
~~FC1-loss + RCS3-loss + PC1b-pot. loss~~	25
~~FC1-loss + RCS3-loss + PC3-pot. loss~~	26
~~FC1-loss + RCS3-loss + PC4-pot. loss~~	27
~~FC1-loss + RCS3-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC1-loss + RCS3-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC1-loss + RCS4-loss + PC1a-pot. loss~~	25
~~FC1-loss + RCS4-loss + PC1b-pot. loss~~	25
~~FC1-loss + RCS4-loss + PC3-pot. loss~~	26
~~FC1-loss + RCS4-loss + PC4-pot. loss~~	27
~~FC1-loss + RCS4-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC1-loss + RCS4-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC1-loss + RCS5-loss + PC1a-pot. loss~~	Condition not supported in PEG.
~~FC1-loss + RCS5-loss + PC1b-pot. loss~~	Condition not supported in PEG.
~~FC1-loss + RCS5-loss + PC3-pot. loss~~	Condition not supported in PEG.
~~FC1-loss + RCS5-loss + PC4-pot. loss~~	Condition not supported in PEG.
~~FC1-loss + RCS5-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC1-loss + RCS5-loss + PC6-pot. loss~~	Condition not supported in PEG.
~~FC1-loss + RCS6-loss + PC1a-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC1-loss + RCS6-loss + PC1b-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC1-loss + RCS6-loss + PC3-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC1-loss + RCS6-loss + PC4-pot. loss~~	Subsumed in "Judgment" EAL.

Table D – BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~FC1-loss + RCS6-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC1-loss + RCS6-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC2-loss + RCS1a-loss + PC1a-pot. loss~~	Condition not supported in PEG.
~~FC2-loss + RCS1a-loss + PC1b-pot. loss~~	Condition not supported in PEG.
~~FC2-loss + RCS1a-loss + PC3-pot. loss~~	Condition not supported in PEG.
~~FC2-loss + RCS1a-loss + PC4-pot. loss~~	Condition not supported in PEG.
~~FC2-loss + RCS1a-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC2-loss + RCS1a-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC2-loss + RCS2-loss + PC1a-pot. loss~~	25
~~FC2-loss + RCS2-loss + PC1b-pot. loss~~	25
~~FC2-loss + RCS2-loss + PC3-pot. loss~~	26
~~FC2-loss + RCS2-loss + PC4-pot. loss~~	27
~~FC2-loss + RCS2-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC2-loss + RCS2-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC2-loss + RCS3-loss + PC1a-pot. loss~~	25
~~FC2-loss + RCS3-loss + PC1b-pot. loss~~	25
~~FC2-loss + RCS3-loss + PC3-pot. loss~~	26
~~FC2-loss + RCS3-loss + PC4-pot. loss~~	27
~~FC2-loss + RCS3-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC2-loss + RCS3-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC2-loss + RCS4-loss + PC1a-pot. loss~~	25
~~FC2-loss + RCS4-loss + PC1b-pot. loss~~	25
~~FC2-loss + RCS4-loss + PC3-pot. loss~~	26
~~FC2-loss + RCS4-loss + PC4-pot. loss~~	27
~~FC2-loss + RCS4-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC2-loss + RCS4-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC2-loss + RCS5-loss + PC1a-pot. loss~~	Condition not supported in PEG.
~~FC2-loss + RCS5-loss + PC1b-pot. loss~~	Condition not supported in PEG.
~~FC2-loss + RCS5-loss + PC3-pot. loss~~	Condition not supported in PEG.
~~FC2-loss + RCS5-loss + PC4-pot. loss~~	Condition not supported in PEG.
~~FC2-loss + RCS5-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC2-loss + RCS5-loss + PC6-pot. loss~~	Condition not supported in PEG.
~~FC2-loss + RCS6-loss + PC1a-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC2-loss + RCS6-loss + PC1b-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC2-loss + RCS6-loss + PC3-pot. loss~~	Subsumed in "Judgment" EAL.

Table D – BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~FC2-loss + RCS6-loss + PC4-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC2-loss + RCS6-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC2-loss + RCS6-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC3-loss + RCS1a-loss + PC1a-pot. loss~~	Condition not supported in PEG.
~~FC3-loss + RCS1a-loss + PC1b-pot. loss~~	Condition not supported in PEG.
~~FC3-loss + RCS1a-loss + PC3-pot. loss~~	Condition not supported in PEG.
~~FC3-loss + RCS1a-loss + PC4-pot. loss~~	Condition not supported in PEG.
~~FC3-loss + RCS1a-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC3-loss + RCS1a-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC3-loss + RCS2-loss + PC1a-pot. loss~~	25
~~FC3-loss + RCS2-loss + PC1b-pot. loss~~	25
~~FC3-loss + RCS2-loss + PC3-pot. loss~~	26
~~FC3-loss + RCS2-loss + PC4-pot. loss~~	27
~~FC3-loss + RCS2-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC3-loss + RCS2-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC3-loss + RCS3-loss + PC1a-pot. loss~~	25
~~FC3-loss + RCS3-loss + PC1b-pot. loss~~	25
~~FC3-loss + RCS3-loss + PC3-pot. loss~~	26
~~FC3-loss + RCS3-loss + PC4-pot. loss~~	27
~~FC3-loss + RCS3-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC3-loss + RCS3-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC3-loss + RCS4-loss + PC1a-pot. loss~~	25
~~FC3-loss + RCS4-loss + PC1b-pot. loss~~	25
~~FC3-loss + RCS4-loss + PC3-pot. loss~~	26
~~FC3-loss + RCS4-loss + PC4-pot. loss~~	27
~~FC3-loss + RCS4-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC3-loss + RCS4-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC3-loss + RCS5-loss + PC1a-pot. loss~~	Condition not supported in PEG.
~~FC3-loss + RCS5-loss + PC1b-pot. loss~~	Condition not supported in PEG.
~~FC3-loss + RCS5-loss + PC3-pot. loss~~	Condition not supported in PEG.
~~FC3-loss + RCS5-loss + PC4-pot. loss~~	Condition not supported in PEG.
~~FC3-loss + RCS5-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC3-loss + RCS5-loss + PC6-pot. loss~~	Condition not supported in PEG.
~~FC3-loss + RCS6-loss + PC1a-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC3-loss + RCS6-loss + PC1b-pot. loss~~	Subsumed in "Judgment" EAL.

Table D – BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~FC3-loss + RCS6-loss + PC3-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC3-loss + RCS6-loss + PC4-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC3-loss + RCS6-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC3-loss + RCS6-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC4-loss + RCS1a-loss + PC1a-pot. loss~~	Condition not supported in PEG.
~~FC4-loss + RCS1a-loss + PC1b-pot. loss~~	Condition not supported in PEG.
~~FC4-loss + RCS1a-loss + PC3-pot. loss~~	Condition not supported in PEG.
~~FC4-loss + RCS1a-loss + PC4-pot. loss~~	Condition not supported in PEG.
~~FC4-loss + RCS1a-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC4-loss + RCS1a-loss + PC6-pot. loss~~	Condition not supported in PEG.
~~FC4-loss + RCS2-loss + PC1a-pot. loss~~	25
~~FC4-loss + RCS2-loss + PC1b-pot. loss~~	25
~~FC4-loss + RCS2-loss + PC3-pot. loss~~	26
~~FC4-loss + RCS2-loss + PC4-pot. loss~~	27
~~FC4-loss + RCS2-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC4-loss + RCS2-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC4-loss + RCS3-loss + PC1a-pot. loss~~	25
~~FC4-loss + RCS3-loss + PC1b-pot. loss~~	25
~~FC4-loss + RCS3-loss + PC3-pot. loss~~	26
~~FC4-loss + RCS3-loss + PC4-pot. loss~~	27
~~FC4-loss + RCS3-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC4-loss + RCS3-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC4-loss + RCS4-loss + PC1a-pot. loss~~	25
~~FC4-loss + RCS4-loss + PC1b-pot. loss~~	25
~~FC4-loss + RCS4-loss + PC3-pot. loss~~	26
~~FC4-loss + RCS4-loss + PC4-pot. loss~~	27
~~FC4-loss + RCS4-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC4-loss + RCS4-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC4-loss + RCS5-loss + PC1a-pot. loss~~	Condition not supported in PEG.
~~FC4-loss + RCS5-loss + PC1b-pot. loss~~	Condition not supported in PEG.
~~FC4-loss + RCS5-loss + PC3-pot. loss~~	Condition not supported in PEG.
~~FC4-loss + RCS5-loss + PC4-pot. loss~~	Condition not supported in PEG.
~~FC4-loss + RCS5-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC4-loss + RCS5-loss + PC6-pot. loss~~	Condition not supported in PEG.
~~FC4-loss + RCS6-loss + PC1a-pot. loss~~	Subsumed in "Judgment" EAL.

Table D – BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~FC4-loss + RCS6-loss + PC1b-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC4-loss + RCS6-loss + PC3-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC4-loss + RCS6-loss + PC4-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC4-loss + RCS6-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC4-loss + RCS6-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC5-loss + RCS1a-loss + PC1a-pot. loss~~	Condition not supported in PEG.
~~FC5-loss + RCS1a-loss + PC1b-pot. loss~~	Condition not supported in PEG.
~~FC5-loss + RCS1a-loss + PC3-pot. loss~~	Condition not supported in PEG.
~~FC5-loss + RCS1a-loss + PC4-pot. loss~~	Condition not supported in PEG.
~~FC5-loss + RCS1a-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC5-loss + RCS1a-loss + PC6-pot. loss~~	Condition not supported in PEG.
~~FC5-loss + RCS2-loss + PC1a-pot. loss~~	12
~~FC5-loss + RCS2-loss + PC1b-pot. loss~~	12
~~FC5-loss + RCS2-loss + PC3-pot. loss~~	12
~~FC5-loss + RCS2-loss + PC4-pot. loss~~	12
~~FC5-loss + RCS2-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC5-loss + RCS2-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC5-loss + RCS3-loss + PC1a-pot. loss~~	12
~~FC5-loss + RCS3-loss + PC1b-pot. loss~~	25
~~FC5-loss + RCS3-loss + PC3-pot. loss~~	26
~~FC5-loss + RCS3-loss + PC4-pot. loss~~	27
~~FC5-loss + RCS3-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC5-loss + RCS3-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC5-loss + RCS4-loss + PC1a-pot. loss~~	25
~~FC5-loss + RCS4-loss + PC1b-pot. loss~~	12
~~FC5-loss + RCS4-loss + PC3-pot. loss~~	12
~~FC5-loss + RCS4-loss + PC4-pot. loss~~	12
~~FC5-loss + RCS4-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC5-loss + RCS4-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC5-loss + RCS5-loss + PC1a-pot. loss~~	Condition not supported in PEG.
~~FC5-loss + RCS5-loss + PC1b-pot. loss~~	Condition not supported in PEG.
~~FC5-loss + RCS5-loss + PC3-pot. loss~~	Condition not supported in PEG.
~~FC5-loss + RCS5-loss + PC4-pot. loss~~	Condition not supported in PEG.
~~FC5-loss + RCS5-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC5-loss + RCS5-loss + PC6-pot. loss~~	Condition not supported in PEG.

Table D – BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~FC5-loss + RCS6-loss + PC1a-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC5-loss + RCS6-loss + PC1b-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC5-loss + RCS6-loss + PC3-pot. loss~~	Subsumed in "Judgment" EAL.
~~FC5-loss + RCS6-loss + PC4-pot. loss~~	Subsumed in "Judgment" EAL.
~~[illegible] + RCS6-loss + PC5-pot. loss~~	Condition not supported in PEG.
~~FC5-loss + RCS6-loss + PC6-pot. loss~~	Subsumed in "Judgment" EAL.
Loss of RCS + loss of PC + pot. loss of FC	
~~RCS1a-loss + PC1a-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC1a-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC1a-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC1b-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC1b-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC1b-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC2a-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC2a-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC2a-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC2b-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC2b-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC2b-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC2c-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC2c-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC2c-loss + FC5-pot. loss~~	Condition not supported in PEG..
~~RCS1a-loss + PC5-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC5-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC5-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC6-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC6-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS1a-loss + PC6-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS2-loss + PC1a-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS2-loss + PC1a-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS2-loss + PC1a-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS2-loss + PC1b-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS2-loss + PC1b-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS2-loss + PC1b-loss + FC5-pot. loss~~	Condition not supported in PEG.

Table D - BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~RCS2-loss + PC2a-loss + FC2-pot. loss~~	28
~~RCS2-loss + PC2a-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS2-loss + PC2a-loss + FC5-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS2-loss + PC2b-loss + FC2-pot. loss~~	28
~~RCS2-loss + PC2b-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS2-loss + PC2b-loss + FC5-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS2-loss + PC2c-loss + FC2-pot. loss~~	25
~~RCS2-loss + PC2c-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS2-loss + PC2c-loss + FC5-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS2-loss + PC5-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS2-loss + PC5-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS2-loss + PC5-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS2-loss + PC6-loss + FC2-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS2-loss + PC6-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS2-loss + PC6-loss + FC5-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS3-loss + PC1a-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS3-loss + PC1a-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS3-loss + PC1a-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS3-loss + PC1b-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS3-loss + PC1b-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS3-loss + PC1b-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS3-loss + PC2a-loss + FC2-pot. loss~~	28
~~RCS3-loss + PC2a-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS3-loss + PC2a-loss + FC5-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS3-loss + PC2b-loss + FC2-pot. loss~~	28
~~RCS3-loss + PC2b-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS3-loss + PC2b-loss + FC5-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS3-loss + PC2c-loss + FC2-pot. loss~~	25
~~RCS3-loss + PC2c-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS3-loss + PC2c-loss + FC5-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS3-loss + PC5-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS3-loss + PC5-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS3-loss + PC5-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS3-loss + PC6-loss + FC2-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS3-loss + PC6-loss + FC4-pot. loss~~	Condition not supported in PEG.

Table D - BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~RCS3-loss + PC6-loss + FC5-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS4-loss + PC1a-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS4-loss + PC1a-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS4-loss + PC1a-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS4-loss + PC1b-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS4-loss + PC1b-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS4-loss + PC1b-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS4-loss + PC2a-loss + FC2-pot. loss~~	28
~~RCS4-loss + PC2a-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS4-loss + PC2a-loss + FC5-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS4-loss + PC2b-loss + FC2-pot. loss~~	28
~~RCS4-loss + PC2b-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS4-loss + PC2b-loss + FC5-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS4-loss + PC2c-loss + FC2-pot. loss~~	25
~~RCS4-loss + PC2c-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS4-loss + PC2c-loss + FC5-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS4-loss + PC5-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS4-loss + PC5-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS4-loss + PC5-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS4-loss + PC6-loss + FC2-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS4-loss + PC6-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS4-loss + PC6-loss + FC5-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS5-loss + PC1a-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC1a-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC1a-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC1b-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC1b-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC1b-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC2a-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC2a-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC2a-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC2b-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC2b-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC2b-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC2c-loss + FC2-pot. loss~~	Condition not supported in PEG.

Table D – BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~RCS5-loss + PC2c-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC2c-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC5-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC5-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC5-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC6-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC6-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS5-loss + PC6-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS6-loss + PC1a-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS6-loss + PC1a-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS6-loss + PC1a-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS6-loss + PC1b-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS6-loss + PC1b-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS6-loss + PC1b-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS6-loss + PC2a-loss + FC2-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS6-loss + PC2a-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS6-loss + PC2a-loss + FC5-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS6-loss + PC2b-loss + FC2-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS6-loss + PC2b-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS6-loss + PC2b-loss + FC5-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS6-loss + PC2c-loss + FC2-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS6-loss + PC2c-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS6-loss + PC2c-loss + FC5-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS6-loss + PC5-loss + FC2-pot. loss~~	Condition not supported in PEG.
~~RCS6-loss + PC5-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS6-loss + PC5-loss + FC5-pot. loss~~	Condition not supported in PEG.
~~RCS6-loss + PC6-loss + FC2-pot. loss~~	Subsumed in "Judgment" EAL.
~~RCS6-loss + PC6-loss + FC4-pot. loss~~	Condition not supported in PEG.
~~RCS6-loss + PC6-loss + FC5-pot. loss~~	Subsumed in "Judgment" EAL.

Loss of PC + loss of FC + pot. loss of RCS

~~PC1a-loss + FC1-loss + RCS1a-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC1-loss + RCS1b-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC1-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC1-loss + RCS6-pot. loss~~	Condition not supported in PEG.

Table D – BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~PC1a-loss + FC2-loss + RCS1a-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC2-loss + RCS1b-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC2-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC2-loss + RCS6-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC3-loss + RCS1a-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC3-loss + RCS1b-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC3-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC3-loss + RCS6-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC4-loss + RCS1a-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC4-loss + RCS1b-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC4-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC4-loss + RCS6-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC5-loss + RCS1a-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC5-loss + RCS1b-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC5-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC1a-loss + FC5-loss + RCS6-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC1-loss + RCS1a-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC1-loss + RCS1b-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC1-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC1-loss + RCS6-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC2-loss + RCS1a-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC2-loss + RCS1b-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC2-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC2-loss + RCS6-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC3-loss + RCS1a-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC3-loss + RCS1b-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC3-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC3-loss + RCS6-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC4-loss + RCS1a-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC4-loss + RCS1b-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC4-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC4-loss + RCS6-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC5-loss + RCS1a-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC5-loss + RCS1b-pot. loss~~	Condition not supported in PEG.
~~PC1b-loss + FC5-loss + RCS5-pot. loss~~	Condition not supported in PEG.

Table D - BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~PC1b-loss + FC5-loss + RCS6-pot. loss~~	Condition not supported in PEG.
~~PC2a-loss + FC1-loss + RCS1a-pot. loss~~	28, fail. to isol. steamline and high cool. act.
~~PC2a-loss + FC1-loss + RCS1b-pot. loss~~	29
~~PC2a-loss + FC1-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC2a-loss + FC1-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC2a-loss + FC2-loss + RCS1a-pot. loss~~	28, fail. to isol. steamline and WLrpv<TAF.
~~PC2a-loss + FC2-loss + RCS1b-pot. loss~~	30
~~PC2a-loss + FC2-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC2a-loss + FC2-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC2a-loss + FC3-loss + RCS1a-pot. loss~~	28, fail. to isol. steamline and hi dw rad.
~~PC2a-loss + FC3-loss + RCS1b-pot. loss~~	31
~~PC2a-loss + FC3-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC2a-loss + FC3-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC2a-loss + FC4-loss + RCS1a-pot. loss~~	24, 28
~~PC2a-loss + FC4-loss + RCS1b-pot. loss~~	24, 28
~~PC2a-loss + FC4-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC2a-loss + FC4-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC2a-loss + FC5-loss + RCS1a-pot. loss~~	12
~~PC2a-loss + FC5-loss + RCS1b-pot. loss~~	12
~~PC2a-loss + FC5-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC2a-loss + FC5-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC2b-loss + FC1-loss + RCS1a-pot. loss~~	22,
~~PC2b-loss + FC1-loss + RCS1b-pot. loss~~	22
~~PC2b-loss + FC1-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC2b-loss + FC1-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC2b-loss + FC2-loss + RCS1a-pot. loss~~	22
~~PC2b-loss + FC2-loss + RCS1b-pot. loss~~	22
~~PC2b-loss + FC2-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC2b-loss + FC2-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC2b-loss + FC3-loss + RCS1a-pot. loss~~	22
~~PC2b-loss + FC3-loss + RCS1b-pot. loss~~	22
~~PC2b-loss + FC3-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC2b-loss + FC3-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC2b-loss + FC4-loss + RCS1a-pot. loss~~	22,
~~PC2b-loss + FC4-loss + RCS1b-pot. loss~~	22

Table D – BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~PC2b-loss + FC4-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC2b-loss + FC4-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC2b-loss + FC5-loss + RCS1a-pot. loss~~	12
~~PC2b-loss + FC5-loss + RCS1b-pot. loss~~	12
~~PC2b-loss + FC5-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC2b-loss + FC5-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
PC2c-loss + FC1-loss ~~+ RCS1a-pot. loss~~	33, pri sys disch and hi cool act.
~~PC2c-loss + FC1-loss + RCS1b-pot. loss~~	33
~~PC2c-loss + FC1-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC2c-loss + FC1-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
PC2c-loss + FC2-loss ~~+ RCS1a-pot. loss~~	32, pri sys disch and WLrpv<TAF.
~~PC2c-loss + FC2-loss + RCS1b-pot. loss~~	32
~~PC2c-loss + FC2-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC2c-loss + FC2-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
PC2c-loss + FC3-loss ~~+ RCS1a-pot. loss~~	34, pri sys disch and hi dw rad.
~~PC2c-loss + FC3-loss + RCS1b-pot. loss~~	34
~~PC2c-loss + FC3-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC2c-loss + FC3-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC2c-loss + FC4-loss + RCS1a-pot. loss~~	24
~~PC2c-loss + FC4-loss + RCS1b-pot. loss~~	24
~~PC2c-loss + FC4-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC2c-loss + FC4-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC2c-loss + FC5-loss + RCS1a-pot. loss~~	12
~~PC2c-loss + FC5-loss + RCS1b-pot. loss~~	12
~~PC2c-loss + FC5-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC2c-loss + FC5-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC5-loss + FC1-loss + RCS1a-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC1-loss + RCS1b-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC1-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC1-loss + RCS6-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC2-loss + RCS1a-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC2-loss + RCS1b-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC2-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC2-loss + RCS6-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC3-loss + RCS1a-pot. loss~~	Condition not supported in PEG.

Table D – BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~PC5-loss + FC3-loss + RCS1b-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC3-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC3-loss + RCS6-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC4-loss + RCS1a-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC4-loss + RCS1b-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC4-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC4-loss + RCS6-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC5-loss + RCS1a-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC5-loss + RCS1b-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC5-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC5-loss + FC5-loss + RCS6-pot. loss~~	Condition not supported in PEG.
~~PC6-loss + FC1-loss + RCS1a-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC1-loss + RCS1b-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC1-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC6-loss + FC1-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC2-loss + RCS1a-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC2-loss + RCS1b-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC2-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC6-loss + FC2-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC3-loss + RCS1a-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC3-loss + RCS1b-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC3-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC6-loss + FC3-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC4-loss + RCS1a-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC4-loss + RCS1b-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC4-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC6-loss + FC4-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC5-loss + RCS1a-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC5-loss + RCS1b-pot. loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC5-loss + RCS5-pot. loss~~	Condition not supported in PEG.
~~PC6-loss + FC5-loss + RCS6-pot. loss~~	Subsumed in "Judgment" EAL.
Loss of PC + loss of FC + loss of RCS	
~~PC1a-loss + FC1-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC1-loss + RCS2-loss~~	Condition not supported in PEG.

Table D – BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~PC1a-loss + FC1-loss + RCS3-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC1-loss + RCS4-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC1-loss + RCS5-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC1-loss + RCS6-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC2-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC2-loss + RCS2-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC2-loss + RCS3-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC2-loss + RCS4-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC2-loss + RCS5-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC2-loss + RCS6-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC3-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC3-loss + RCS2-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC3-loss + RCS3-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC3-loss + RCS4-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC3-loss + RCS5-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC3-loss + RCS6-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC4-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC4-loss + RCS2-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC4-loss + RCS3-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC4-loss + RCS4-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC4-loss + RCS5-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC4-loss + RCS6-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC5-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC5-loss + RCS2-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC5-loss + RCS3-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC5-loss + RCS4-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC5-loss + RCS5-loss~~	Condition not supported in PEG.
~~PC1a-loss + FC5-loss + RCS6-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC1-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC1-loss + RCS2-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC1-loss + RCS3-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC1-loss + RCS4-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC1-loss + RCS5-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC1-loss + RCS6-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC2-loss + RCS1a-loss~~	Condition not supported in PEG.

Table D – BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~PC1b-loss + FC2-loss + RCS2-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC2-loss + RCS3-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC2-loss + RCS4-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC2-loss + RCS5-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC2-loss + RCS6-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC3-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC3-loss + RCS2-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC3-loss + RCS3-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC3-loss + RCS4-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC3-loss + RCS5-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC3-loss + RCS6-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC4-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC4-loss + RCS2-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC4-loss + RCS3-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC4-loss + RCS4-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC4-loss + RCS5-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC4-loss + RCS6-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC5-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC5-loss + RCS2-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC5-loss + RCS3-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC5-loss + RCS4-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC5-loss + RCS5-loss~~	Condition not supported in PEG.
~~PC1b-loss + FC5-loss + RCS6-loss~~	Condition not supported in PEG.
~~PC2a-loss + FC1-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC2a-loss + FC1-loss + RCS2-loss~~	35
~~PC2a-loss + FC1-loss + RCS3-loss~~	35
~~PC2a-loss + FC1-loss + RCS4-loss~~	35
~~PC2a-loss + FC1-loss + RCS5-loss~~	35
~~PC2a-loss + FC1-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.
~~PC2a-loss + FC2-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC2a-loss + FC2-loss + RCS2-loss~~	35
~~PC2a-loss + FC2-loss + RCS3-loss~~	35
~~PC2a-loss + FC2-loss + RCS4-loss~~	35
~~PC2a-loss + FC2-loss + RCS5-loss~~	35
~~PC2a-loss + FC2-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.

Table D – BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~PC2a-loss + FC3-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC2a-loss + FC3-loss + RCS2-loss~~	35
~~PC2a-loss + FC3-loss + RCS3-loss~~	35
~~PC2a-loss + FC3-loss + RCS4-loss~~	35
~~PC2a-loss + FC3-loss + RCS5-loss~~	35
~~PC2a-loss + FC3-loss + RCS6-loss~~	35
~~PC2a-loss + FC4-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC2a-loss + FC4-loss + RCS2-loss~~	24, 28
~~PC2a-loss + FC4-loss + RCS3-loss~~	24, 28
~~PC2a-loss + FC4-loss + RCS4-loss~~	24, 28
~~PC2a-loss + FC4-loss + RCS5-loss~~	24, 28
~~PC2a-loss + FC4-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.
~~PC2a-loss + FC5-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC2a-loss + FC5-loss + RCS2-loss~~	35
~~PC2a-loss + FC5-loss + RCS3-loss~~	35
~~PC2a-loss + FC5-loss + RCS4-loss~~	35
~~PC2a-loss + FC5-loss + RCS5-loss~~	35
~~PC2a-loss + FC5-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.
~~PC2b-loss + FC1-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC2b-loss + FC1-loss + RCS2-loss~~	25
~~PC2b-loss + FC1-loss + RCS3-loss~~	25
~~PC2b-loss + FC1-loss + RCS4-loss~~	25
~~PC2b-loss + FC1-loss + RCS5-loss~~	25
~~PC2b-loss + FC1-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.
~~PC2b-loss + FC2-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC2b-loss + FC2-loss + RCS2-loss~~	25
~~PC2b-loss + FC2-loss + RCS3-loss~~	25
~~PC2b-loss + FC2-loss + RCS4-loss~~	25
~~PC2b-loss + FC2-loss + RCS5-loss~~	25
~~PC2b-loss + FC2-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.
~~PC2b-loss + FC3-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC2b-loss + FC3-loss + RCS2-loss~~	25
~~PC2b-loss + FC3-loss + RCS3-loss~~	25
~~PC2b-loss + FC3-loss + RCS4-loss~~	25
~~PC2b-loss + FC3-loss + RCS5-loss~~	25

Table D – BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~PC2b-loss + FC3-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.
~~PC2b-loss + FC4-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC2b-loss + FC4-loss + RCS2-loss~~	25
~~PC2b-loss + FC4-loss + RCS3-loss~~	25
~~PC2b-loss + FC4-loss + RCS4-loss~~	25
~~PC2b-loss + FC4-loss + RCS5-loss~~	25
~~PC2b-loss + FC4-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.
~~PC2b-loss + FC5-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC2b-loss + FC5-loss + RCS2-loss~~	25
~~PC2b-loss + FC5-loss + RCS3-loss~~	25
~~PC2b-loss + FC5-loss + RCS4-loss~~	25
~~PC2b-loss + FC5-loss + RCS5-loss~~	25
~~PC2b-loss + FC5-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.
~~PC2c-loss + FC1-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC2c-loss + FC1-loss + RCS2-loss~~	35
~~PC2c-loss + FC1-loss + RCS3-loss~~	35
~~PC2c-loss + FC1-loss + RCS4-loss~~	35
~~PC2c-loss + FC1-loss + RCS5-loss~~	35
~~PC2c-loss + FC1-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.
~~PC2c-loss + FC2-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC2c-loss + FC2-loss + RCS2-loss~~	35
~~PC2c-loss + FC2-loss + RCS3-loss~~	35
~~PC2c-loss + FC2-loss + RCS4-loss~~	35
~~PC2c-loss + FC2-loss + RCS5-loss~~	35
~~PC2c-loss + FC2-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.
~~PC2c-loss + FC3-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC2c-loss + FC3-loss + RCS2-loss~~	35
~~PC2c-loss + FC3-loss + RCS3-loss~~	35
~~PC2c-loss + FC3-loss + RCS4-loss~~	35
~~PC2c-loss + FC3-loss + RCS5-loss~~	35
~~PC2c-loss + FC3-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.
~~PC2c-loss + FC4-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC2c-loss + FC4-loss + RCS2-loss~~	24, 28
~~PC2c-loss + FC4-loss + RCS3-loss~~	24, 28
~~PC2c-loss + FC4-loss + RCS4-loss~~	24, 28

Table D – BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~PC2c-loss + FC4-loss + RCS5-loss~~	24, 28
~~PC2c-loss + FC4-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.
~~PC2c-loss + FC5-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC2c-loss + FC5-loss + RCS2-loss~~	35
~~PC2c-loss + FC5-loss + RCS3-loss~~	35
~~PC2c-loss + FC5-loss + RCS4-loss~~	35
~~PC2c-loss + FC5-loss + RCS5-loss~~	35
~~PC2c-loss + FC5-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.
~~PC5-loss + FC1-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC5-loss + FC1-loss + RCS2-loss~~	Condition not supported in PEG.
~~PC5-loss + FC1-loss + RCS3-loss~~	Condition not supported in PEG.
~~PC5-loss + FC1-loss + RCS4-loss~~	Condition not supported in PEG.
~~PC5-loss + FC1-loss + RCS5-loss~~	Condition not supported in PEG.
~~PC5-loss + FC1-loss + RCS6-loss~~	Condition not supported in PEG.
~~PC5-loss + FC2-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC5-loss + FC2-loss + RCS2-loss~~	Condition not supported in PEG.
~~PC5-loss + FC2-loss + RCS3-loss~~	Condition not supported in PEG.
~~PC5-loss + FC2-loss + RCS4-loss~~	Condition not supported in PEG.
~~PC5-loss + FC2-loss + RCS5-loss~~	Condition not supported in PEG.
~~PC5-loss + FC2-loss + RCS6-loss~~	Condition not supported in PEG.
~~PC5-loss + FC3-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC5-loss + FC3-loss + RCS2-loss~~	Condition not supported in PEG.
~~PC5-loss + FC3-loss + RCS3-loss~~	Condition not supported in PEG.
~~PC5-loss + FC3-loss + RCS4-loss~~	Condition not supported in PEG.
~~PC5-loss + FC3-loss + RCS5-loss~~	Condition not supported in PEG.
~~PC5-loss + FC3-loss + RCS6-loss~~	Condition not supported in PEG.
~~PC5-loss + FC4-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC5-loss + FC4-loss + RCS2-loss~~	Condition not supported in PEG.
~~PC5-loss + FC4-loss + RCS3-loss~~	Condition not supported in PEG.
~~PC5-loss + FC4-loss + RCS4-loss~~	Condition not supported in PEG.
~~PC5-loss + FC4-loss + RCS5-loss~~	Condition not supported in PEG.
~~PC5-loss + FC4-loss + RCS6-loss~~	Condition not supported in PEG.
~~PC5-loss + FC5-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC5-loss + FC5-loss + RCS2-loss~~	Condition not supported in PEG.
~~PC5-loss + FC5-loss + RCS3-loss~~	Condition not supported in PEG.

Table D – BWR Fission Product Barrier

General Emergencies

NESP-007	Remarks
~~PC5-loss + FC5-loss + RCS4-loss~~	Condition not supported in PEG.
~~PC5-loss + FC5-loss + RCS5-loss~~	Condition not supported in PEG.
~~PC5-loss + FC5-loss + RCS6-loss~~	Condition not supported in PEG.
~~PC6-loss + FC1-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC6-loss + FC1-loss + RCS2-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC1-loss + RCS3-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC1-loss + RCS4-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC1-loss + RCS5-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC1-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC2-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC6-loss + FC2-loss + RCS2-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC2-loss + RCS3-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC2-loss + RCS4-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC2-loss + RCS5-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC2-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC3-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC6-loss + FC3-loss + RCS2-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC3-loss + RCS3-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC3-loss + RCS4-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC3-loss + RCS5-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC3-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC4-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC6-loss + FC4-loss + RCS2-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC4-loss + RCS3-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC4-loss + RCS4-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC4-loss + RCS5-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC4-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC5-loss + RCS1a-loss~~	Condition not supported in PEG.
~~PC6-loss + FC5-loss + RCS2-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC5-loss + RCS3-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC5-loss + RCS4-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC5-loss + RCS5-loss~~	Subsumed in "Judgment" EAL.
~~PC6-loss + FC5-loss + RCS6-loss~~	Subsumed in "Judgment" EAL.

Appendix 1 – Fission Product Barrier Remarks

1. Although intentional venting per the EOPs in EAL# PC2.2 is a voluntary loss of the primary containment boundary, declaration of an Unusual Event at the Primary Containment Pressure Limit (PCPL) or combustible gas concentrations requires an emergency response beyond the Unusual Event requirements. Drywell pressure above the scram setpoint is an indication of a loss of the RCS barrier (EAL# RCS2.1). Loss of the RCS barrier is always an Alert declaration. It is reasonable to assume that the PCPL and combustible gas concentrations will always be reached with drywell pressure above 2.7 psig. Since the RCS2.1 will always be reached before PC2.2, EAL# PC2.2 is unnecessary and can be deleted.

2. Although unisolable primary system leakage outside the drywell as indicated by secondary containment radiation levels at the maximum safe operating level in EAL# PC2.3 is a loss of the primary containment, EAL# RCS1.3 requires an Alert declaration at the maximum normal operating radiation level. Since RCS1.3 will always be reached before PC2.3, EAL# PC2.3 is unnecessary and can be deleted.

3. Although drywell pressure above the PCPL and the presence of combustible gas concentrations is an indication of a potential loss of the primary containment boundary, emergency classification at these limits requires an emergency response beyond the Unusual Event. Drywell pressure above the scram setpoint is an indication of a loss of the RCS barrier (EAL# RCS2.1). Loss of the RCS barrier is always an Alert declaration. It is reasonable to assume that the drywell pressure at the PCPL and combustible gas concentrations will always be reached with drywell pressure above the scram setpoint. Since the RCS2.1 will always be reached before PC1.3 and PC1.4, EAL#s PC1.3 and PC1.4 are unnecessary and can be deleted.

4. EAL# PC3.1 would require an Unusual Event declaration at a containment radiation level which is well in excess of that required for the loss of RCS. Since loss of RCS is an Alert classification, EAL# PC3.1 is unnecessary and can be deleted.

5. Entry to the Drywell Flooding EOP is identified in EAL# PC4.1 as a condition representing an imminent melt sequence where RPV water level cannot be restored above the top of active fuel. This potential loss EAL requires an Unusual Event declaration. However, EAL# FC2.1 requires an Alert declaration when RPV water level is less than the top

Appendix 1 – Fission Product Barrier Remarks

15. Past plant operating history has shown that primary sys the drywell of 50 gpm under hot conditions would resul pressure isolation, thereby precluding quantification o condition is addressed under EAL# RCS2.1. Ther is unnecessary and can be deleted.

16. Deleted

17. N/A

18. The drywell radiation level given in EAL# RC drywell radiation level associated with the c FC1.1. EAL# FC1.1 coolant activity combin adequately addressed by EAL# FC3.1.

19. EAL# FC3.1 is based on all of the coolant deposited into the primary containment from the loss of the fuel clad and RCS RCS1.1 is unnecessary for the Site Ar be deleted.

20. RCS1a.pot. loss is > 50 gpm drywell offgas activity. High offgas activity to the main condenser is ongoing (indicative of a MSL failure to isola environment. This condition req Emergency under EAL PC2.1. T conditions is unnecessary and c

21. Failure of a steamline to isolat can only occur with the loss o the loss of the RCS boundary conditions by itself requires Therefore, declaration of the Site Area Emergency comb

22. To intentionally vent the primary EOPs, two fission product barriers must barrier is about to be lost due to venting. combination of losses warrants declaration of a Gene

23. The combination of a primary system discharging into secondary containment and secondary containment parameters at the maximum

Appendix 1 -- Fission Product Barrier Remarks

of active fuel. Since FC2.1 will always be reached before PC4.1, EAL# PC4.1 is unnecessary and can be deleted.

6. Deleted

7. EAL# FC3.1 and EAL# RCS3.1 identify drywell radiation monitor readings requiring an Alert classification. Since the monitor reading in EAL# FC3.1 is always greater than that used in EAL# RCS3.1, EAL# FC3.1 is unnecessary and can be deleted.

8. RPV water level less than TAF is a Site Area Emergency based on EAL# SS5.1. Therefore, this portion of the EAL is unnecessary and can be deleted.

9. EAL# FC2.1 and EAL# RCS4.1 identify RPV water level less than TAF as a condition requiring an emergency classification. Since they are the same condition, the appropriate classification is provided at the Alert level under EAL# FC2.1. Therefore, this combination of conditions as a Site Area Emergency classification is unnecessary and can be deleted.

10. EAL# FC3.1 and EAL# RCS3.1 identify drywell radiation as a condition requiring an emergency classification. since they are the same condition, the appropriate classification is provided at the Alert level under RCS3.1. Therefore, this combination of conditions as a Site Area Emergency classification is unnecessary and can be deleted.

11. FC3-loss + RCS4-loss is identical to FC2-loss + RCS3-loss. Since these Site Area Emergency conditions are redundant, FC3-loss + RCS4-loss can be deleted.

12. The emergency director has the latitude to declare an emergency classification at any level based on his assessment of combinations of plant conditions. Therefore, any judgement decision involving FC5-loss and another condition is the same as the judgement made for FC5-loss alone and can be deleted.

13. EAL# PC2.3 and EAL# RCS1.3 (which addresses area temperatures and radiation levels at the maximum safe operating level) are redundant. Since either condition warrants declaration of a Site Area Emergency by themselves, this EAL combination can be deleted.

14. N/A

Appendix 1 – Fission Product Barrier Remarks

15. Past plant operating history has shown that primary system leakage inside the drywell of 50 gpm under hot conditions would result in a high drywell pressure isolation, thereby precluding quantification of the leak rate. This condition is addressed under EAL# RCS2.1. Therefore, this condition is unnecessary and can be deleted.

16. Deleted

17. N/A

18. The drywell radiation level given in EAL# RCS3.1 is less than the drywell radiation level associated with the coolant activity of EAL# FC1.1. EAL# FC1.1 coolant activity combined with EAL# RCS3.1 is adequately addressed by EAL# FC3.1.

19. EAL# FC3.1 is based on all of the coolant activity of EAL# FC1.1 deposited into the primary containment. Such a condition must result from the loss of the fuel clad and RCS barriers. Therefore, EAL# RCS1.1 is unnecessary for the Site Area Emergency condition and can be deleted.

20. RCS1a.pot. loss is > 50 gpm drywell leakage. FC4 loss is very high offgas activity. High offgas activity under conditions where steam flow to the main condenser is ongoing (i.e. off gas readings valid) alone is indicative of a MSL failure to isolate with downstream pathway to the environment. This condition requires declaration of a Site Area Emergency under EAL PC2.1. Therefore, this combination of conditions is unnecessary and can be deleted.

21. Failure of a steamline to isolate with a direct path to the environment can only occur with the loss of the Primary Containment boundary and the loss of the RCS boundary. By definition, this combination of conditions by itself requires declaration of a Site Area Emergency. Therefore, declaration of the Unusual Event is unnecessary and any Site Area Emergency combination of this condition can be deleted.

22. To intentionally vent the primary containment in accordance with the EOPs, two fission product barriers must have been lost and a third barrier is about to be lost due to venting. By definition, this combination of losses warrants declaration of a General Emergency.

23. The combination of a primary system discharging into secondary containment and secondary containment parameters at the maximum

Appendix 1 - Fission Product Barrier Remarks

safe operating levels is a loss of two barriers. By definition, this requires a Site Area Emergency declaration. EAL# PC2.1 is equivalent to this combination of conditions.

24. Offgas monitors are not a reliable indicator of fuel failure under severely degraded conditions in that the system would be isolated and process monitors would not be monitoring an unisolated process stream. High offgas activity under conditions where steam flow to the main condenser is ongoing (i.e. off gas readings valid) alone is indicative of a MSL failure to isolate with downstream pathway to the environment. Therefore, this condition requires declaration of a Site Area Emergency under EAL# PC2.1.

25. Primary containment pressure at or above design or the presence of combustible gas concentrations each requires venting of the primary containment in accordance with the EOPs. Loss of two fission product barriers must have occurred and it must be assumed that the fuel clad barrier is lost or about to be lost. Therefore, EAL# PC1.3, EAL# PC1.4 or EAL # PC2.2 alone warrants declaration of a General Emergency.

26. According to the NUMARC guidance given in the basis for IC# PC3, the level of activity deposited in the primary containment as a result of the condition of EAL# PC3.1 warrants declaration of a General Emergency.

27. Drywell Flooding is required when means of restoring and maintaining adequate core cooling cannot be established. This condition is a direct precursor to core melt which warrants declaration of a General Emergency.

28. EAL# PC2.1 or EAL PC2.3 is a loss of the RCS and primary containment. EAL# FC1.1, FC2.1 and FC3.1 are each losses of the fuel clad. These conditions alone meet the definition of a General Emergency. Therefore, any combinations of these EALs are redundant and can be deleted.

29. This combination of conditions is a subset of the previously listed combination (EAL# PC2.1 and EAL# FC1.1) and can, therefore, be deleted.

30. This combination of conditions is a subset of the previously listed combination (EAL# PC2.1 and EAL# FC2.1) and can, therefore, be deleted.

Appendix 1 – Fission Product Barrier Remarks

31. This combination of conditions is a subset of the previously listed combination (EAL# PC2.1 and EAL# FC3.1) and can, therefore, be deleted.

32. The combination of a primary system discharging into secondary containment and secondary containment parameters at the maximum safe operating levels is a loss of two barriers. RPV water level less than the top of active fuel is a potential loss of a third barrier. By definition, this requires a General Emergency declaration.

33. The combination of a primary system discharging into secondary containment and secondary containment parameters at the maximum safe operating levels is a loss of two barriers. Elevated coolant activity is a potential loss of a third barrier. By definition, this requires a General Emergency declaration.

34. The combination of a primary system discharging into secondary containment and secondary containment parameters at the maximum safe operating levels is a loss of two barriers. Elevated primary containment radiation is a potential loss of a third barrier. By definition, this requires a General Emergency declaration.

35. EAL #PC2.1 or EAL #PC2.3 in combination with any of EALs FC1.1, FC2.1 or FC3.1 has previously been evaluated as justification of General Emergency. Therefore this combination of conditions is redundant and can be deleted.

Appendix 2 – Summary of Fission Product Barrier Evaluation

The following summarizes the EALs which resulted from the analysis performed of the fissi-n product barrier methodology of NUMARC-007 for JAFNPP:

<u>Unusual Event</u>

- Emergency Director Judgement

<u>Alert</u>

- FC1.1-loss
- FC4.1-loss
- RCS2.1-loss
- RCS3.1-loss
- Emergency Director Judgement

<u>Site Area Emergency:</u>

- FC2.1-loss
- FC3.1-loss
- RCS2.1-loss + FC1.1-loss
- PC2.1-loss
- PC2.3-loss
- Emergency Director Judgement

Appendix 2 - Summary of Fission Product Barrier Evaluation

General Emergency:

- PC1.3-pot. loss
- PC1.4-pot. loss
- PC3.1-pot. loss
- PC4.1-pot. loss
- PC2.1-loss + FC1.1-loss, FC2.1-loss or FC3.1-loss
- PC2.3-loss + FC1.1-loss, FC2.1-loss or FC3.1-loss
- Emergency Director Judgement

Attachment V to JPN-95-026

EAL Upgrade Project, Plant Specific EAL Guideline (PEG)
James A. FitzPatrick Nuclear Power Plant, Revision 1

New York Power Authority
Docket No. 50-333

EAL Upgrade Project

Plant Specific
EAL
Guideline
(PEG)

J. A. FitzPatrick

2/25/95

Rev. 1

Operations Support Services, Inc.
233 Water Street 2nd Floor   Plymouth, MA 02360

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: AU1 **Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds two times the radiological Technical Specifications for 60 minutes or longer.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

AU1.1

A valid reading on one or more of the following monitors that exceeds the "value shown" ~~(site-specific monitors)~~ which indicates that the release may have exceeded the above criterion and indicates the need to assess the release with ~~(site-specific procedure)~~ PSP-5, Gaseous Effluent Sampling and Analysis, Revision 14, 9/4/92 and there has been a failure to isolate.

Monitors	"Value Shown"
17RM-350 Radwaste Effluent Radiation Monitor	2 x hi-hi alarm setpoint
17RM-351 Service Water Radiation Monotor	400 cps
17RM-431 Turbine Bldg. Exhaust Radiation Monitor	5E4 cpm
17RM-432 Turbine Bldg. Exhaust Radiation Monitor	5E4 cpm
17RM-452A/B Reactor Bldg. Vent Radiation Monitors	2E4 cpm
17RM-456A/B Refuel Floor Vent Duct Radiation Monitors	2E4 cpm
17RM-458A/B RadWaste Bldg. Vent Exhaust Radiation Mon itors	2E4 cpm
17RM-50A/B Stack Gas Radiation Monitors	5E5 cps

AU1.2

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)~~.

Liquid Releases:
Two times 10CFR20, Appendix B, Table II, Column 2
4E-4 uCi/ml for dissolved or entrained noble gases

Gaseous Releases:
Š 1000 mrem/yr whole body and Š 6000 mrem/yr skin dose from noble gases
Š 3000 mrem/yr any organ from I-131, I-133, tritium and particulates with ≤ 8 day half lives

Air Dose, Noble Gases:
Š10/qtr mrad gamma / Š20/qtr mrad beta
or
Š 20 mrad/yr gamma / Š40 mrad/yr beta
These are determined via methods in ODCM

~~**AU1.3**~~

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

~~**AU1.4**~~

~~Valid indication on automatic real-time dose assessment capability greater than (site-specific values) for 60 minutes or longer [for sites having such capability].~~

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

The term "Unplanned", as used in this context, includes any release for which a radioactive discharge permit was not prepared, or a release that exceeds the conditions (e. g., minimum dilution flow, maximum discharge flow, alarm setpoints, etc.) on the applicable permit. Valid means that a radiation monitor reading has been confirmed by the operators to be correct.

Unplanned releases in excess of two times the site technical specifications that continue for 60 minutes or longer represent an uncontrolled situation and hence, a potential degradation in the level of safety. The final integrated dose (which is very low in the Unusual Event emergency class) is not the primary concern here; it is the degradation in plant control implied by the fact that the release was not isolated within 60 minutes. Therefore, it is not intended that the release be averaged over 60 minutes. For example, a release of 4 times T/S for 30 minutes does not exceed this initiating condition. Further, the Emergency 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.

~~For sites that have eliminated effluent technical specifications as provided in NRC Generic Letter 89-01, the corresponding maximum limit from the site's Offsite Dose Calculation Manual should be used as the numeric basis of EAL. 10CFR50.72 requires a non-emergency four hour report for release that exceeds 2 times maximum permissible concentration (MPC) in unrestricted areas averaged over a period of one hour. There is generally more than one applicable technical specification (e. g., air dose rate, organ dose rate, organ doses, release rate, etc.). Often, effluent monitor alarms are based on instantaneous release rate. Depending on the source term, other technical specifications may be more applicable specifications.~~

Monitor indications are ~~should be~~ calculated on the basis of the methodology of the site Offsite Dose Calculation Manual (ODCM)~~, or other site procedures that are used~~ to demonstrate compliance with 10CFR20 and~~/or~~ 10CFR50 Appendix I requirements. Annual average meteorology ~~should be~~ is used ~~where allowed~~.
~~In EAL 3, the 0.10 mR/hr value is based on a proration of two times the 500 mR/yr basis of the 10CFR20 non-occupational MPC limits, rounded down to 0.10 mR/hr. If other site-specific values are applicable, these should be used.~~
~~Some sites may find it advantageous to address gaseous and liquid releases with separate initiating conditions and EALs.~~

The alarm setpoints for the listed monitors are conservatively set to ensure Technical Specification radioactivity release limits are not exceeded. The "value shown" for each monitor is two times the nominal alarm setpoint for the Service Water effluent monitor, and two times the high-high nominal alarm setpoints for the main stack and building vent normal range monitors. The Radwaste liquid effluent monitor hi-hi alarm setpoint is adjusted on a per discharge basis.

RBCLC process monitors are not included in this EAL. These monitors detect radiation in the closed cooling water loop. Any leaks into Service Water via heat exchangers would be detected by the Service Water monitors. Therefore, the Service Water radiation monitor adequately detects offsite radioactivity releases from this system.

The values assigned to EAL AU1-2 are based on two times the Technical Specification values given in: Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications, Sections 2.3, 3.2, and 3.3

JAF design does not utilize telemetered perimeter monitors or automatic real-time dose assessment.

References:

1. OP-31 Process Radiation Monitoring Systems
2. ODP-15 Offsite Dose Calculation Manual
3. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: AU2 **Unexpected increase in plant radiation or airborne concentration.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

AU2.1

(Site-specific) Spent fuel pool/ reactor cavity water level cannot be restored and maintained above the spent fuel pool low water level alarm setpoint ~~indication of uncontrolled water level decrease in the reactor refueling cavity with all irradiated fuel assemblies remaining covered by water.~~

~~AU2.2~~

~~Uncontrolled water level decrease in the spent fuel pool and fuel transfer canal with all irradiated fuel assemblies remaining covered by water.~~

~~AU2.3~~

(Site-specific) ~~radiation reading for irradiated spent fuel in dry storage.~~

AU2.4

~~Valid~~ Any sustained direct area radiation monitor readings ≥ 100 times the alarm setpoint or offscale high resulting from an uncontrolled process ~~increase 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.~~

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

Valid means that a radiation monitor reading has been confirmed by the operators to be correct.

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

In light of Reactor Cavity Seal failure, incidents at two different PWRs and loss of water in the Spent Fuel Pit/Fuel Transfer Canal at a BWR all occurring since 1984, explicit coverage of these types of events via EALs #1 and #2 is appropriate given their potential for increased doses to plant staff. Classification as an Unusual Event is warranted as a precursor to a more serious event.

For EAL AU2.1, the spent fuel pool low water level alarm setpoint is actuated by 19-LS-60. The definition of "... cannot be restored and maintained above ..." allows the operator to visually observe the low water level condition, if possible, and to attempt water level restoration instructions as long as water level remains above the top of irradiated fuel. Water level restoration instructions are performed in accordance with AOP-53. The words "with all irradiated fuel assemblies remaining covered by water" were deleted as it is unecessary. AA2.2 requires declaration of an Alert if the fuel becomes uncovered.

For the BWR Mark I/II containment designs, the fuel transfer canal is directly connected to the spent fuel pool and reactor cavity when there could exist the possibility of uncovering irradiated fuel in the fuel transfer canal. Therefore, EAL AU2-1 addresses the conditions for which this EAL is applicable.

EAL ~~#3~~ AU2.3 applies to plants with licensed dry storage of older irradiated spent fuel to address degradation of this spent fuel. ~~One utility uses values of 2 R/hr at the face of any dry storage module or 1 R/hr one foot away from a damaged module.~~ JAF design does not utilize dry storage for spent fuel.

EAL ~~#4~~ AU2.4 addresses unplanned increases in in-plant radiation levels that represent a degradation in the control of radioactive material, and represent a potential degradation in the level of safety of the plant. Indication of area radiation levels increasing to ≥ 100 times the alarm setpoints has been selected because these values are more readily identifiable than a multiple of "normal" levels. Since ARM setpoints are nominally set one decade over normal levels, 100 times the alarm setpoint provides an equivalent threshold. This EAL escalates to an Alert per IC AA3, if the increases impair the level of safe operation. Only prolonged ARM readings are considered in this EAL to avoid unnecessary emergency declaration due to momentary and temporary radiation levels that briefly exceed 100 times the alarm setpoint.

References:

1. EOP-5 Secondary Containment Control
2. AOP-53 Loss of Spent Fuel Pool, Reactor Cavity or Equipment Storage Pit Water Level

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: AA1 — **Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds 200 times radiological Technical Specifications for 15 minutes or longer.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

AA1.1

A valid reading on one or more of the following operable monitors that exceeds the "value shown" ~~(site-specific monitors)~~ which indicates that the release may have exceeded the above criterion and indicates the need to assess the release with ~~(site-specific procedure)~~ PSP-5, Gaseous Effluent Sampling and Analysis, Revision 14, 9/4/92 and there has been a failure to isolate.

Monitors	"Value Shown"
17RM-351 Service Water Radiation Monoto r	40,000 cps
17RM-350 Radwaste Effluent Radiation Monitor	200 x hi-hi alarm setpoint
17RM-431/432 Turbine Bldg. Exhaust Radiation Monitors	9.9E5 cpm
17RM-452A/B Reactor Bldg. Vent Radiation Monitors	9.9E5 cpm
17RM-456A/B Refuel Floor Vent Duct Radiation Monitors	9.9E5 cpm
17RM-458A/B RadWaste Bldg. Vent Exhaust Radiation Mon itors	9.9E5 cpm
17RM-53A/B Stack High Range Effluent Radiation Monitors	116 mR/hr

Note: If the monitor readings ~~is~~ are sustained for longer than 15 minutes and the required

AA1.2

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 x site-specific technical specifications) for 15 minutes or longer~~:

Liquid Releases:
200 times 10CFR20, Appendix B, Table II, Column 2
4E-2 μCi/ml for dissolved or entrained noble gases

Gaseous Releases:
Š 100 rem/yr whole body and Š 600 rem/yr skin dose from noble gases
Š 300 rem/yr any organ from I-131, I-133, tritium and particulates with ≤ 8 day half lives

Air Dose, Noble Gases:
Š1000/qtr mrad gamma
Š2000/qtr mrad beta
or
Š 2000 mrad/yr gamma
Š4000 mrad/yr beta
These are determined via methods in ODCM

AA1.3

~~Valid reading on perimeter radiation monitoring system greater than 10.0 mR/hr sustained for 15 minutes or longer. [for sites having telemetered perimeter monitors]~~

AA1.4

~~Valid indication on automatic real-time dose assessment capability greater than (200 x site-specific technical specifications) for 15 minutes or longer. [for sites having such capability]~~

Bases

Valid means that a radiation monitor reading has been confirmed by the operators to be correct.

This event escalates from the Unusual Event by escalating the magnitude of the release by a factor of 100. Prorating the 500 mR/yr criterion for both time (8766 hr/yr and the 200 multiplier, the associated site boundary dose rate would be 10 mR/hr. The required release duration was reduced to 15 minutes in recognition of the increased severity.

~~For sites that have eliminated effluent technical specifications as provided in NRC Generic Letter 89-031, the corresponding maximum limit from the site's Offsite Dose Calculation Manual, multiplied by 200, should be used as the numeric basis for this EAL.~~

Monitor indications ~~should be~~ are calculated on the basis of the methodology of the site Offsite Dose Calculation Manual (ODCM)~~, or other site procedures that are used to demonstrate compliance with 10CFR20 and/or 10CFR50 Appendix I requirements~~ -- adjusted upwards by a factor of 200. Annual average meteorology ~~should be~~ is used ~~where allowed~~.

~~In EAL #3, the 10 mR/hr value is based on a proration of 200 times the 500 mR/yr basis of the 10CFR20 non-occupational MPC limits, rounded down to 10 mR/hr. If other site-specific values are applicable, those should be used.~~

The alarm setpoint for the effluent mon itors are conservatively set to ensure Technical Specification radioactivity release limits are not exceeded. The "value shown" for the Service Water effluent monitor is 200 times the high nominal alarm setpoint.

The values for the gaseuos effluent radiation monitors are based upon not exceeding 10 mR/hr at the site boundary as a result of the release. The values are derived from JAF-CALC-MULTI-01162. Since the calculated monitor readings for the Reactor, Turbine and Radwaste Building normal range monitors are in excess of the instruments upper range (1E6) but at the very bottom of the corresponding high range instrument, an indication of 9.9E5 cpm on the normal range has been conservatively utilized.

The Radwaste liquid effluent monitor alarm setpoint is adjusted on a per discharge basis.

RBCLC process monitors are not included in this EAL. These monitors detect radiation in the closed cooling water loop. Any leaks into Service Water via heat exchangers would be detected by the Service Water monitors. Therefore, the Service Water radiation monitor adequately detects offsite radioactivity releases from this system.

JAF design does not utilize telemetered perimeter monitors or automatic real-time dose assessment.

References:

1. OP-31 Process Radiation Monitoring Systems
2. ODP-15 Offsite Dose Calculation Manual
3. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications
4. JAF-CALC-MULTI-01162

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: AA2 **Major damage to irradiated fuel or loss of water level that has or will result in the uncovering of irradiated fuel outside the reactor vessel.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

AA2.1

~~A (site-specific setpoint) alarm on one or more of the following radiation monitors: (site-specific monitors)~~

~~Refuel Floor Area Radiation Monitor~~
~~Fuel Handling Building Ventilation Monitor~~
~~Fuel Bridge Area Radiation Monitor~~

Sustained Refuel Floor Exhaust Radiation Monitors 17RM-456A or B at or above Hi-Hi Alarm (1E6 cpm)
OR
any sustained refuel floor area radiation monitors reading above its Maximum Safe Operating Value as specified in EOP -5 Secondary Containment Control:

- 18RM-021-12 Spent Fuel Pool (EPIC Pt. A-1229) - 1000 mr/hr
- 18RM-021-14 New Fuel Vault (EPIC Pt. A-1231) - 1000 mr/hr
- 18RM-021-30 South Fuel Floor (EPIC Pt. A-1247) - 20,000 mr/hr

AA2.2

Report of visual observation of irradiated fuel uncovered.

~~**AA2.3**~~

~~(site-specific) feet for the reactor refueling cavity that will result in irradiated fuel uncovering.~~

AA2.4

~~Water level less than (site-specific) feet for the spent fuel pool and fuel transfer canal that will result in irradiated fuel uncovering.~~

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

This IC applies to spent fuel requiring water coverage and is not intended to address spent fuel which is licensed for dry storage, which is discussed in NUMARC IC AU2, "Unexpected Increase in Plant Radiation or Airborne Concentration." NUREG-0818, "Emergency Action Levels for Light Water Reactors," forms the basis for these EALs. ~~Each site should also define its~~ The above EALs are defined by the specific area where irradiated fuel is located such as reactor cavity, reactor vessel, or spent fuel pool.

There is time available to take corrective actions, and there is little potential for substantial fuel damage. In addition, NUREG/CR-4982, "Severe Accident in Spent Fuel Pools in Support of Generic Safety Issue 82," July 1987, indicates that even if corrective actions are not taken, no prompt fatalities are predicted, and that risk of injury is low. In addition, NRC Information Notice No. 90-08, "KR-85 Hazards from Decayed Fuel" presents the following it its discussion:

"In the event of a serious accident involving decayed spent fuel, protective actions would be needed for personnel on site, while offsite doses (assuming an exclusion area radius of one mile from the plant site) would be well below the Environmental Protection Agency's Protective Action Guides. Accordingly, it is important to be able to properly survey and monitor for Kr-85 in the event of an accident with decayed spent fuel.

~~Licensees may wish to reevaluate whether Emergency Action Levels specified in the emergency plan and procedures governing decayed fuel handling activities appropriately focus on concern for onsite workers and Kr-85 releases in areas where decayed spent fuel accidents could occur, for example, the spent fuel pool working floor. Furthermore, licensees may wish to determine if emergency plans and corresponding implementing procedures address the means for limiting radiological exposures of onsite personnel who are in other areas of the plant. Among other things, moving onsite personnel away from the plume and shutting of building air intakes downwind from the source may be appropriate."~~

Thus, an Alert Classification for this event is appropriate. Escalation, if appropriate, would occur via Abnormal Rad level/Radiological Effluent or Emergency Director judgement.

The basis for the refueling floor ventilation monitor setpoint is a spent fuel handling accident and is, therefore, appropriate for this EAL.

Area radiation levels on the refuel floor at or above the Maximum Safe Operating value are indicative of radiation fields which may limit personnel access. Access to the refuel floor is required in order to visually observe water level in the spent fuel pool. Without access to the refuel floor, it would not be possible to determine the applicability of EAL AA2-2. Area radiation levels on the refuel floor at or above the Maximum Safe Operating value also adversely affect equipment whose operation may be needed to assure adequate core cooling or shutdown the reactor.

AOP-53 Loss of Spent Fuel Pool, Reactor Cavity or Equipment Storage Pit Water Level provides appropriate instructions to report a visual observation of irradiated fuel uncovery. For the BWR Mark I/II containment designs, the fuel transfer canal is directly connected to the spent fuel pool and reactor cavity when there could exist the possibility of uncovering irradiated fuel in the fuel transfer canal. Therefore, EAL AA2-2 address the conditions for which this EAL is applicable. Since no level indication exists for the vessel cavity or spent fuel pool, EAL AA2.2 adequately covers all conditions indicative of uncovery of irradited fuel other than AA2.1 based on area radiation readings. AA2.3 has been deleted both for the this reason as well as the fact that SS5 requires declaration of a Site Area Emergency for reactor water levels below top of active fuel.

References:

1. EOP 5 Secondary Containment Control
2. AOP-53 Loss of Spent Fuel Pool, Reactor Cavity or Equipment Storage Pit Water Level
3. ARP-09-1-15
4. OP-32 Area Radiation Monitoring
5. JAFNPP PSTG Rev. 4

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: AA3 **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.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

AA3.1

Valid radiation monitor reading greater than 15 mR/hr in the:

Control Room

OR

Central Alarm Station (CAS) AND Security Building (SAS). ~~areas requiring continuous~~ occupancy to ~~maintain plant safety functions:~~

~~-(Site-specific) list.~~

AA3.2

One or more sustained abnormal ~~valid (site-specific)~~ radiation monitor readings greater than ~~(site-specific)~~ 8 R/hr values in areas requiring infrequent access to maintain plant safety functions.

~~-(Site-specific) list.~~

- Reactor Building
- Turbine Building
- Screenwell/Pumphouse
- Diesel Generator Building
- Administration Building

Plant Specific EAL Guideiine (A,H,S)

J. A. FitzPatrick

Bases

Valid means that a radiation monitor reading has been confirmed by the operators to be correct. Only prolonged ARM readings are considered in this EAL to avoid unnecessary emergency declaration due to momentary and temporary radiation levels that briefly 8 R/hr.

This IC addresses increased radiation levels that impede necessary access to operating stations, or other areas containing equipment that must be operated manually, 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 increase in radiation levels is not a concern of this IC. The Emergency Director must consider the source or cause of the increased radiation levels and determine if any other IC may be involved. For example, a dose rate of 15 mR/hr in the control room may be a problem in itself. However, the increase 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 ICs.

~~At multiple unit sites, the example~~ These EALs could result in declaration of an Alert at ~~one unit~~ JAF due to a radioactivity release or radiation shine resulting from a major accident at ~~the other unit~~ NMP-1 or NMP-2. This is appropriate if the increase impairs operations at the operating unit.

This IC is not meant to apply to increases in the containment ~~dome~~ radiation monitors as these are events which are addressed in the fission product barrier matrix ICs. Nor is it intended to apply to anticipated temporary increases due to planned events (e. g., incore detector movement, radwaste container movement, deplete resin transfers, etc.)

~~Emergency planners developing the (site specific) lists may refer to the site's~~ JAF abnormal operating procedures, emergency operating procedures, the 10CFR50 Appendix R analysis, and~~/or~~, the analyses performed in response to Section 2.1.6b or NUREG-0578, "TMI--2 Lessons Learned Task Force Status Report and Short-term Recommendations" were considered when identifying areas containing safe shutdown equipment. ~~With regard to the NUREG-0578 analyses, do not use the dose rates postulated therein as a basis for the radiation monitor reading for this IC, as the NUREG-0578 analyses address general emergency conditions.~~

Areas requiring continuous occupancy at JAF include the control room and~~, as appropriate to the site, any other control stations that are manned continuously, such as a radwaste control room or a~~ central and secondary security alarm station. The value of 15 mR/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 other areas ~~requiring infrequent access~~, the radiation level is ~~(site-specific) value(s) should be~~ based on abnormal radiation levels which result in exposure control measures intended to maintain doses within normal occupational exposure guidelines and limits (i. e., 10CFR20), and in doing so, will impede necessary access. ~~For many areas, it may be possible to establish a single generic EAL that represents a multiple of the normal radiation levels (e. g., 1000 times normal). However, areas that have normally high dose rates may require a lower multiple (e. g., 10 times normal).~~

Area radiation levels at or above 8 R/hr are indicative of radiation fields which may limit personnel access or adversely affect equipment whose operation may be needed to assure adequate core cooling or shutdown the reactor. This basis of the 8 R/hr is described in a Niagara Mohawk Power Corp. memo dated 3/18/93 File Code NMP31027 "Exposure Guidelines For Unusual/Accident Conditions, Rev 1." The areas selected are consistent with those listed in HA3.1 and represent those structures which house systems and equipment necessary for the safe operation and shutdown of the plant.

References:

1. Niagara Mohawk Power Corp. memo 3/18/93 File Code NMP31027 "Exposure Guidelines For Unusual/Accident Conditions, Rev 1."

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: AS1 — **Boundary dose resulting from an actual or imminent release of gaseous radioactivity exceeds 100 mR Whole Body or 500 mR Child Thyroid for the actual or projected duration of the release.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

AS1.1

A valid reading on one or more of the following monitors that exceeds or is expected to exceed the value ~~shown indicates that the release may have exceeded~~ the above criterion and indicates the need to assess the release with ~~(site-specific procedure)~~ EAP-4 Dose Assessment Calculations:

Monitors

"Value Shown"

17RM-434A/B Turbine Bldg. Vent Hi Range Radiation Monitors
1.2 mR/hr
and its corresponding normal range monitors are upscale (17RM-431 and 17RM-432)
17RM-463A/B RadWaste Bldg. High Range Effluent Radiation Monitors 3.3 mR/hr
and it's corresponding normal range monitors are upscale (17RM-458 A/B)
17RM-53A/B Stack High Range Effluent Radiation Monitors
1160 mR/hr

Note: If the monitor reading(s) is sustained for longer than 15 minutes and the required assessments cannot be completed within this period, then the declaration must be made

~~AS1.2~~

~~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]~~

AS1.3

Valid dose assessment capability indicates dose consequences greater than 100 mR TEDE ~~whole body~~ or 500 mR ~~child~~ CDE thyroid.

AS1.4

Field survey results indicate site boundary dose rates exceeding 100 mR/hr TEDE expected to continue for more than one hour; or analyses of field survey samples indicate ~~child~~ CDE thyroid dose commitment of 500 mR for one hour of inhalation.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

Valid means that a radiation monitor reading has been confirmed by the operators to be correct.

The 100 mR TEDE integrated dose in this initiating condition is based on the proposed 10CFR20 annual average population exposure. This value also provides a desirable gradient (one order of magnitude) between the Alert, Site Area Emergency, and General Emergency classes. It is deemed that exposures less than this limit are not consistent with the Site Area Emergency class description. The 500 mR integrated ~~child thyroid~~ CDE thyroid dose was established in consideration of the 1:5 ratio of the EPA Protective Action Guidelines for TEDE ~~whole body~~ and CDE thyroid.

~~Integrated doses are generally not monitored in real time.~~ In establishing the emergency action levels, ~~it is suggested that~~ a duration of one hour ~~be~~ is assumed, ~~and that the EALs be~~ based on a site boundary dose of 100 mR/hour ~~whole body~~ TEDE or 500 mR/hour CDE Thyroid ~~child thyroid~~, whichever is more limiting (depends on source term assumptions). ~~If individual site analyses indicate a longer or shorter duration for the period in which the substantial portion of the activity is released, these dose rates should be adjusted.~~

The values specified in this EAL were derived from JAF-CALC-MULTI-01162. Because of the proximity of the calculated values to the monitor's bottom range, the Turbine Building and Radwaste Building values also specify that the corresponding normal range monitors indicate upscale to preclude declaration based upon signal noise.

The FSAR source terms applicable to each monitored pathway should be used in conjunction with annual average meteorology in determining indications for the monitors on that pathway.

JAF design does not utilize telemetered perimeter monitors.

References:

1. OP-31 Process Radiation Monitoring System
2. EAP- 4 Dose Assessment Calculations
3. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications
4. JAF-CALC-MULTI-01162

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: AG1 **Boundary dose resulting from an actual or imminent release of gaseous radioactivity exceeds 1000 mR Whole Body or 5000 mR Child Thyroid for the actual or projected duration of the release.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

AG1.1

A valid reading on one or more of the following monitors that exceeds or is expected to exceed the value ~~shown indicates that the release may have exceeded~~ the above criterion and indicates the need to assess the release with ~~(site-specific procedure)~~ EAP-4 Dose Assessment Calculations:

Monitors

"Value Shown"

17RM-434A/B Turbine Bldg. Vent Hi Range Radiation Monitors
12 mR/hr
and it's corresponding normal range monitors are upscale (17RM-431 and 17RM-432)
17RM-463A/B RadWaste Bldg. High Range Effluent Radiation Monitors
33 mR/hr
and it's corresponding normal range monitors are upscale (17RM-458 A/B)
17RM-53A/B Stack High Range Effluent Radiation Monitors
11,600 mR/hr

Note: If the monitor reading(s) is sustained for longer than 15 minutes and the required assessments cannot be completed within this period, then the declaration must be made based on the valid reading.

~~**AG1.2**~~

~~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]~~.

AG1.3

Valid dose assessment capability indicates dose consequences greater than 1000 mR TEDE whole body or 5000 mR CDE ~~child~~ thyroid.

AG1.4

Field survey results indicate site boundary dose rates exceeding 1000 mR/hr TEDE expected to continue for more than one hour; or analyses of field survey samples indicate ~~child~~ CDE thyroid dose commitment of 5000 mR for one hour of inhalation.

Bases

Valid means that a radiation monitor reading has been confirmed by the operators to be correct.

The 1000 mR TEDE ~~whole body~~ and the 5000 mR CDE ~~child~~ thyroid integrated dose are based on the EPA protective action guidance which indicates that public protective actions are indicated if the dose exceeds 1 rem TEDE ~~whole body~~ or 5 rem CDE ~~child~~ thyroid. This is consistent with the emergency class description for a General Emergency. This level constitutes the upper level of the desirable gradient for the Site Area Emergency. Actual meteorology is specifically identified in the initiating condition since it gives the most accurate dose assessment. Actual meteorology (including forecasts) should be used whenever possible.

~~Integrated doses are generally not monitored in real time.~~ In establishing the dose rate emergency action levels, ~~it is suggested that~~ a duration of one hour ~~be~~ is assumed~~, and that the EALs be~~ based on site boundary doses for either ~~whole body~~ TEDE or ~~child thyroid~~ CDE thyroid, whichever is more limiting (depends on source term assumptions(s). ~~If individual site analyses indicate a longer or shorter duration for the period in which the substantial portion of the activity is released, those dose rates should be adjusted.~~

The values specified in this EAL were derived from JAF-CALC-MULTI-01162. Because of the proximity of the calculated values to the monitor's bottom range, the Turbine Building and Radwaste Building values also specify that the corresponding normal range monitors indicate upscale to preclude declaration based upon signal noise.

The FSAR source terms applicable to each monitored pathway should be used in conjunction with annual average meteorology in determining indications for the monitors on that pathway.

JAF design does not utilize telemetered perimeter monitors.

References:

1. OP-31 Process Radiation Monitoring System
2. EAP- 4 Dose Assessment Calculations
3. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications
4. JAF-CALC-MULTI-01162

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: HU1 **Natural and destructive phenomena affecting the protected area.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

HU1.1

(Site-specific) ~~method indicates felt earthquake.~~
Earthquake felt in plant based upon a concensus of Control Room operators on duty and either:

JAF seismic activity alarm (EPIC A124)
OR
confirmation of earthquake recieved on either NMP-1 or NMP-2 seismic instrumentation

HU1.2

Report by plant personnel of tornado ~~striking~~ within plant protected area boundary.

HU1.3

Assessment by ~~the control room that an event has occurred.~~

HU1.4

Vehicle crash into or projectile which impacts plant structures or systems within protected area boundary.

HU1.5

Report by plant personnel of an unanticipated explosion within protected area boundary resulting in visible damage to permanent structure or equipment.

HU1.6

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

HU1.7

(Site-specific) ~~occurrences.~~ Lake water level above 248 ft or ESW intake bay level below 237 ft.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

The protected area boundary is ~~typically~~ that part within the security isolation zone and is defined in the site security plan. The JAF protected area boundary is defined in the Site Security Plan

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be factor in escalating the emergency class.~~

For EAL #HU1.1 ~~should be developed on site-specific basis.~~ . JAF seismic instrumentation actuates at 0.01 g. Damage may be caused to some portions of the site, but should not affect ability of safety functions to operate. Method of detection ~~can be~~ is based on instrumentation, validated by a reliable source, or operator assessment. Confirmation of an earthquake from NMP-1/2 seismic instrumentation and recognition by plant operations personnel is included in this EAL to ensure that event declaration does not result from a spurious seismic alarm. 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 inventory ground motion is felt at the nuclear plant site and recognized as an earthquake based on a consensus of control room operators on duty at the time, and (b) for plants with operable seismic instrumentation, the seismic switches of the plant are activated. For most plants with seismic instrumentation, the seismic switches are set at an acceleration of about 0.01 g."

EAL #HU1.2 is based on the assumption that a tornado striking (touching down) within the protected boundary may have potentially damaged plant structures containing functions or systems required for safe shutdown of the plant. If such damage is confirmed visually or by other in plant indications, the event may be escalated to Alert.

EAL #HU1.3 allows for the control room to determine that an event has occurred and take appropriate action based on personal assessment as opposed to verification (i. e., an earthquake is felt but does not register on any plant-specific instrumentation, etc.). Since this EAL provides no specific guidance beyond that which the IC provides, this EAL is subsumed into the judgement IC HU5.1.

EAL #HU1.4 is intended to address such items as plane or helicopter crash, ~~or on some sites~~, train crash, ~~or~~ barge crash, or impacts of other projectiles that may potentially damage 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 #HU1.5, only those explosions of sufficient force to damage permanent structures or equipment within the protected area should be considered. As used here, an explosion is a rapid, violent, unconfined combustion, or a catastrophic failure of pressurized equipment, that potentially imparts significant energy to near by structures and materials. 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 (e. g., deformation, scorching) is sufficient for declaration. The Emergency Director also needs to consider any security aspects of the explosion, if applicable.

EAL #HU1.6 is intended to address 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 HU2 and HU3. This EAL is consistent with the definition of an Unusual Event 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 by the radiological releases ~~for a BWR, or in conjunction with a steam generator tube rupture, for a PWR~~. These latter events would be classified by the radiological ICs or fission product barrier ICs. For EAL #HU1.6, operating mode applicability is limited to Power Operations only since other modes of operation require that the turbine generator be secured or isolated from the vessel.

EAL #HU1.7 covers high and low lake water level conditions that could ~~other (site-specific phenomena such as hurricane, flood, or seiche). These EALs can also~~ be precursors of more serious events. ~~In particular, sites subject to severe weather as defined in the NUMARC station blackout initiatives, should include and EAL based on activation of the severe weather mitigation procedures (e. g., precautionary shutdowns, diesel testing, staff call-outs, etc.).~~ The high lake level is based upon the maximum attainable uncontrolled lake water level as specified in FSAR Section 2.4.3.5. The low level is based on ESW intake bay level and corresponds to the design minimum lake level.

References:

1. AOP-14 Earthquake
2. Technical Specifications Section 5.6
3. FSAR Section 13.4.6.1

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: HU2 **Fire within protected area boundary not extinguished within 15 minutes of detection.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

HU2.1

Confirmed 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~~

- Reactor Building
- Control Room/Relay Room
- Turbine Building
- Screenwell/Pumphouse
- Diesel Generator Building
- Radwaste Building/Track Bay
- Reactor Track Bay
- Boiler House
- Security Building
- CAS Building
- #2 Oil Storage Shack
- CAD N2 Storage Tank Building
- H2 Storage Facility

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

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. This excludes such items as fires within administration buildings, waste-basket fires, and other small fires of no safety consequence. This IC applies to buildings and areas that are not contiguous or immediately adjacent to plant vital areas. ~~Verification of the alarm in this context means those actions taken in the control room to determine that the control room alarm is not spurious.~~

Escalation to a higher emergency class is by IC HA2, "Fire Affecting the Operability of Plant Safety Systems Required for the Current Operating Mode".

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in escalating the emergency class.~~

References:

1. FSAR Section 12.3

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: HU3 **Release of toxic or flammable gases deemed detrimental to safe operation of the plant.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

HU3.1	**HU3.2**
Report or detection of toxic or flammable gases that could enter or have entered within the site protected area boundary in amounts that could affect the health of plant personnel or safe operation of the plant ~~can affect normal operation of the plant.~~	Report by local, county or state officials, or NMP-1 or NMP-2 for potential evacuation of site personnel based on offsite event.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

This IC is based on releases in concentrations within the ~~site~~ protected area boundary that will affect the health of plant personnel or affecting the safe operation of the plant with the plant being within the evacuation area of an offsite event (i. e., tanker truck accident releasing toxic gases, etc.). The evacuation area is as determined from the DOT Evacuation Tables for Selected Hazardous Materials, in the DOT Emergency Response Guide for Hazardous Materials.

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in escalating the emergency class.~~ NMP-1, NMP-2 and JAFNPP share no common safety systems, but their respective protected area boundaries share common borders in some places. Therefore it is possible that a toxic or flammable gas incident happening on one site could affect the other site.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: HU4 **Confirmed security event which indicates a potential degradation in the level of safety of the plant.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

HU4.1

Bomb device discovered within plant protected area but ~~and~~ outside the following plant vital areas:

- RHRSW/ESW Pump Room
- Cable Tunnels
- Battery Room
- Cable Spreading Room
- Electrical Switchgear Room
- Diesel Generator Rooms
- Relay Room
- Control Room
- Remote Safe Shutdown Panel for ADS/MSIV No. ASP-4.5
- Reactor Building
- Central Alarm Station Building
- Security Building (SAS)
- Emergency Security Generator Room - Security Building

HU4.2

Other security events as determined from ~~(site-specific)~~ JAFNPP Safeguards Contingency Plan.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

This EAL is based on ~~(site specific) Site Security Plan~~ the JAFNPP Safeguards Contingency Plan. Security events which do not represent at least a potential degradation in the level of safety of the plant, are reported under 10CFR73.71 or in some cases under 10CFR50.72. The plant protected area boundary is ~~typically~~ that part within the security isolation zone and is defined in the ~~(site specific) security plan~~ JAFNPP Site Security Plan. Plant vital areas are also defined within the JAFNPP Security Contingency Plan. Bomb devices discovered within the plant vital area would result in EAL escalation.

References:

1. JAFNPP Security Contingency Plan
2. JAFNPP Site Security Plan

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: HU5 **Other conditions existing which in the judgement of the Emergency Director warrant declaration of an Unusual Event.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

HU5.1

Other conditions exist which in the judgement of the Emergency Director indicate a potential degradation of the level of safety of the plant.

Bases

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 Emergency Director to fall under the Unusual Event emergency class.

From a broad perspective, one area that may warrant Emergency Director judgement 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.

~~Specific example of actual events that may require Emergency Director judgement for Unusual Event declaration are listed here for consideration. However, this list is by no means all-inclusive and is not intended to limit the discretion of the site to provide further examples:~~

~~--Aircraft crash onsite~~ (Aircraft crash onsite is addressed in EAL HU1.4.)

~~--Train derailment onsite~~ (Trains are not used on JAFNPP site.)

~~--Near site explosion which may adversely affect normal site activities~~ (Explosions are addressed in EAL HU4.1)

~~--Near site release of toxic or flammable gas which may adversely affect normal site activities~~ (Toxic or flammable gas release is addressed EAL HU3.1 and EAL HU3.2.)

~~--Uncontrolled RCS cooldown due to secondary depressurization~~ (This condition is applicable to PWR plants only.)

It is also intended that the Emergency Directors judgement not be limited by any list of events as defined here or as augmented by the site. This list is provided solely as examples for consideration and it is recognized that actual events may not always follow a pre-conceived description.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: HA1 **Natural and destructive phenomena affecting the plant vital area.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

HA1.1

~~(Site-specific) method indicates seismic event greater than Operating Basis Earthquake (OBE).~~

Earthquake felt in plant by one or more plant operators.
AND
Seismic activity alarm (EPIC A124)
AND
Confirmation of earthquake greater than 0.08g at NMP2

HA1.2

~~Tornado or high winds striking plant vital areas: Tornado or high winds greater than (site-specific) mph strike within the protected area boundary.~~

Sustained winds greater than 90 mph
OR
Tornado strikes a plant vital area

(see HA1.3 for list of plant vital areas.)

HA1.3

Report of any visible structural damage to equipment needed for safe plant operation on any of the following plant structures:
~~••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~~
• Reactor Building, • Control Room/Relay Room, • Turbine Building
• Screenwell/Pumphouse, • Diesel Generator Building

HA1.4

~~(Site-specific) indications in the control room~~

HA1.5

Vehicle crash affecting or projectile impact which precludes access to or damages equipment in plant vital areas. (See HA1.3 for list of vital areas.)

HA1.6

~~Turbine failure generated missiles result in any visible structural damage to or penetration of any of the following plant areas: (site-specific) list.~~

HA1.7

~~Site-specific) occurrences.~~ Lake water level above 255 ft or ESW intake bay level below 235 ft

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

Each of these EALs is intended to address events that may have resulted 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. 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. Escalation to a higher emergency class, if appropriate, will be based on System Malfunction, Fission Product Barrier Degradation, Abnormal Rad Releases/Radiological Effluent, or Emergency Director Judgement ICs.

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in escalating the emergency class.~~

EAL #HA1.1 ~~should be~~ is based on ~~(site-specific)~~ FSAR design basis of 0.08 g. Seismic events of this magnitude can cause damage to safety functions. Confirmation of an earthquake from NMP-2 seismic instrumentation and recognition by plant operations personnel is included in this EAL to ensure that event declaration does not result from a spurious seismic alarm.

EAL #HA1.2 ~~should be~~ is based on ~~(site-specific)~~ FSAR design basis of 90 mph. Wind loads of this magnitude can cause damage to safety functions.

EAL #HA1.3 should specify ~~(site-specific)~~ structures containing systems and functions required for safe plant operation ~~safe shutdown of the plant.~~

EAL #HA1.4 ~~should specify specifies the types of instrumentation or indications including judgements which are to be used to assess occurrence.~~ The methods by which natural and destructive phenomena are indicated in the control room are adequately given by the means in which EAL HA1.1, 1.2 and 1.3 are determined. Therefore there is no need for this EAL.

EAL #HA1.5 is intended to address such items as plane or helicopter crash, ~~or on some sites~~, train crash, ~~or~~ barge crash, or impact of projectiles into a plant vital area.

EAL #HA1.6 ~~is intended to~~ addresses the threat to safety related equipment imposed by missiles generated by main turbine rotating component failures. The ~~is (site-specific) list of~~ areas should include all areas containing safety-related equipment, their controls, and their power supplies. 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. For JAF, missiles generated by main turbine rotating component failures would be confined to areas of the turbine building that do not contain safety-related equipment. Therefore, the potential does not exist for substantial degradation of the level of safety of the plant.

EAL #HA1.7 covers high and low lake water level conditions that could ~~other (site-specific) phenomena such as flood, or seiche)~~ exceed levels which threaten vital equipment. The high lake level is based upon the maximum probable flood level as specified in FSAR Section 2.4.3.5. The low level is based on ESW intake bay level and corresponds to the top of the ESW pump suction.

These EALs can also be a precursors of more serious events. In particular, sites subject to severe weather as defined in the NUMARC station blackout initiatives, should include an EAL based on activation of the severe weather mitigation procedures (e. g., precautionary shutdowns, diesel testing, staff call-outs, etc.). ~~{water levels correspond to (later)}~~

References:

1. AOP-14 Earthquake
2. Technical Specifications Section 5.6
3. FSAR Section 12.4.6.1
4. FSAR Section 12.3
5. FSAR Section 2.4.3.7
6. EAP-42 Obtaining Meteorological Data
7. JAFNPP Site Security Plan
8. Safety Evaluation JAF-SE-93-034 "Evaluation of Maximum and Minimum Water Levels at Screenwell for Safe Operation of Class I Equipment"

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: HA2 **Fire or explosion affecting the operability of plant safety systems required to establish or maintain safe shutdown.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

HA2.1

The following conditions exist:

a. Fire or explosion in any of the following ~~(site-specific)~~ areas:
~~(Site-specific) list~~
• Reactor Building • Control Room
• Turbine Building • Screenwell/Pumphouse
• Diesel Generator Building
• Radwaste Building/Track Bay • Reactor Track Bay
• Boiler House • Security Building
• CAS Building • #2 Oil Storage Shack
• CAD N2 Storage Building
• H2 Storage Building

AND

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

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

~~(Site-specific)~~ The listed areas containing functions and systems required for the safe shutdown of the plant ~~should be specified~~. ~~(Site-specific)~~ The JAF safe shutdown analysis should be consulted for equipment and plant areas required for the applicable mode. This will make 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 Releases/Radiological Effluent, or Emergency Director Judgement ICs.

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in escalating the emergency class.~~

With regard to explosions, only those explosions of sufficient force to damage permanent structures or equipment required for safe operation within the identified plant areas should be considered. As used here, an explosion is a rapid, violent, unconfined combustion, or a catastrophic failure of pressurized equipment, that potentially imparts significant energy to nearby structures and materials. 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 declaration of an Alert and the activation of the TSC will provide the Emergency Director with the resources needed to perform these damage assessments. The Emergency Director also needs to consider any security aspects of the explosions, if applicable.

References:

1. FSAR Section 12.3

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: HA3 **Release of toxic or flammable gases within a facility structure which jeopardizes operation of systems required to maintain safe operations or to establish or maintain cold shutdown.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

HA3.1	HA3.2
Report or detection of toxic gases within a the following facility structures in concentrations that will be life threatening to plant personnel: • Reactor Building • Control Room/ Relay Room • Turbine Building • Screenwell/Pumphouse • Diesel Generator Building	Report or detection of flammable gases within a the following structures in concentrations that will preclude access to equipment necessary for affect the safe operation of the plant: • Reactor Building • Control Room/ Relay Room • Turbine Building • Screenwell/Pumphouse • Diesel Generator Building

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

This IC is based on gases that have entered a plant structure ~~affecting~~ precluding access to equipment necessary for the safe operation of the plant. This IC applies to buildings and areas contiguous to plant vital areas or other significant buildings or areas (i. e., Service Water Pump house). The intent of this IC is not to include buildings (i. e., warehouses) or other areas that are not contiguous or immediately adjacent to plant vital areas. It is appropriate that increased monitoring be done to ascertain whether consequential damage has occurred. Escalation to a higher emergency class, if appropriate, will be based on System Malfunction, Fission Product Barrier Degradation, Abnormal Rad Releases/Radiological Effluent, or Emergency Director Judgement ICs.

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in escalating the emergency class.~~

References:

1. FSAR Section 12.3

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: HA4 **Security event in a plant protected area.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

HA4.1	HA4.2
Intrusion into plant protected area by an adversary ~~a hostile force~~.	Other security events as determined from ~~(site-specific)~~ JAFNPP Safeguards Contingency Plan.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

This class of security events represents an escalated threat to plant safety above that contained in the Unusual Event. For the purposes of this IC, intrusion byan adversary inside ~~a civil disturbance which penetrates~~ the protected area boundary can be considered a significant security threat ~~a hostile force~~. Intrusion into a vital area by an adversary ~~a hostile force~~ will escalate this event to a Site Area Emergency.

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in escalating the emergency class.~~

The JAFNPP protected area boundary is illustrated in the JAFNPP Site Security Plan.

References:

1. FSAR Section 2.1.1
2. JAFNPP Site Security Plan
3. JAFNPP Security Contingency Plan

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: HA5 **Control room evacuation has been initiated.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

HA5.1

Entry into ~~(site-specific) procedure~~ AOP-43 Shutdown from Outside the Control Room, for control room evacuation.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

With the control room evacuated, additional support, monitoring and direction through the Technical Support Center and/or other Emergency Operations Center is necessary. Inability to establish plant control from outside the control room will escalate this event to a Site Area Emergency.

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in escalating the emergency class.~~

References:

1. AOP-43 Shutdown from Outside the Control Room

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: HA6 **Other conditions existing which in the judgement of the Emergency Director warrant declaration of an Alert.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

HA6.1

Other conditions existing which in the judgement of the Emergency Director indicate that plant safety systems may be degraded and that increased monitoring of plant functions is warranted.

Bases

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 Emergency Director to fall under the Alert emergency class.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: HS1 **Security event in a plant vital area.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

HS1.1

Intrusion into the following plant security vital areas by an adversary ~~a hostile force~~:

- RHRSW/ESW Pump Room
- Cable Tunnels
- Battery Room
- Cable Spreading Room
- Electrical Switchgear Room
- Diesel Generator Rooms
- Relay Room
- Control Room
- Remote Safe Shutdown Panel for ADS/MSIV No. ASP-4.5
- Reactor Building
- Central Alarm Station Building
- Security Building (SAS)
- Emergency Security Generator Room - Security Building

HS1.2

Other security events as determined from ~~(site-specific)~~ JAFNPP Safeguards Contingency Plan.

Bases

This class of security events represents an escalated threat to plant safety above that contained in the Alert IC in that an adversary ~~a hostile force~~ has progressed from the protected area to the vital area.

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in escalating the emergency class.~~

The JAFNPP protected area boundary is illustrated in the JAFNPP Site Security Plan

References:

1. FSAR Section 2.1.1
2. JAFNPP Site Security Plan

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: HS2 **Control room evacuation has been initiate and ~~plant~~ control of core cooling cannot be established.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

HS2.1

The following conditions exist:

a. Control room evacuation has been initiated.

AND

b. Control of the plant cannot be established per ~~(site specific) procedure~~ AOP-43 Shutdown from Outside the Control Room within ~~(site specific)~~ 30 minutes.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

Expeditious transfer of safety systems has not occurred but fission product barrier damage may not yet be indicated. ~~(Site-specific)~~ The time for transfer is based on analysis or assessments as to how quickly control must be reestablished without core uncovering and/or core damage. For JAFNPP, this time has been specified as 30 minutes. ~~This time should not exceed 15 minutes.~~ In cold shutdown and refueling modes, operator concern is directed toward maintaining core cooling such as is discussed in Generic Letter 88-17, "Loss of Decay Heat Removal." In power operation , hot standby, and hot shutdown modes, operator concern is primarily directed toward ~~maintaining critical safety functions~~ monitoring and controlling plant parameters dictated by the EOPs and thereby assuring fission product barrier integrity. Escalation of this event, if appropriate, would be by Fission Product Barrier Degradation, Abnormal Rad Releases/Radiological Effluent, or Emergency Director Judgement ICs.

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in escalating the emergency class.~~

References:

1. AOP-43 Shutdown from Outside the Control Room
2. AOP-30, Loss of S/D Cooling
3. Appendix B

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: HS3 **Other conditions which in the judgement of the Emergency Director warrant declaration of Site Area Emergency.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

HS3.1

Other conditions which in the judgement of the Emergency Director warrant declaration of Site Area Emergency.

Bases

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 Emergency Director to fall under the emergency class description for Site Area Emergency.

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in escalating the emergency class.~~

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: HG1 **Security event resulting in loss of ability to reach and maintain cold shutdown.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

HG1.1	HG1.2
Loss of plant ~~physical~~ control ~~of~~ from the control room due to security event. OR Loss of physical control of the remote shutdown capability due to security event.	~~Loss of physical control of the remote shutdown capability due to security event.~~

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SA5 **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.**

Op. Mode Applicability ■ 1 (Pwr Ops) ■ 2 (HSB) ■ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ☐ All

SA5.1

The following conditions exist (a and b):

a. ~~Loss of power to (site-specific)~~ Available emergency bus AC power reduced to only one of the following sources for > 15 min.:

~~for greater than 15 minutes.~~

~~AND~~

~~b. Onsite power capability has been degraded to one (train of) emergency bus(ses) powered from a single onsite power source due to the loss of:~~

~~(site-specific list):~~

- EDG A (105000)
- EDG C (106000)
- EDG B (105000)
- EDG D (106000)
- Reserve Station Transformer T-2
- Reserve Station Transformer T-3
- Station Service Transformer T-4

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

This IC and the associated EALs are intended to provide an escalation from IC SU1 "Loss of All Offsite Power to Essential Busses for Greater than 15 Minutes." The condition indicated by this IC is the degradation of the 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 IC SS1 "Loss of All Offsite and Loss of All Onsite AC Power to Essential Busses."

Example EAL #SA5.1b should be expanded to identify the control room indication of the status of offsite-specific power sources and distribution busses that, if unavailable, establish a single failure vulnerability.

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

References:

1. OP-44 115 kv system
2. OP-45 345 kv system
3. OP-45A Backfeeding Normal Station Service Transformer
4. OP-46A 4160 V & 600 V Normal AC Power Distribution
5. OP-22 Diesel Generator Emergency Power

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SS1 **Loss of all offsite power and loss of all onsite AC power to essential busses.**

Op. Mode Applicability ■ 1 (Pwr Ops) ■ 2 (HSB) ■ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ☐ All

SS1.1

Loss of all offsite and onsite AC power as indicated by:

a.•Loss of power to ~~(site specific)~~ :
Reserve Station Transformer T-2
AND
Reserve Station Transformer T-3
AND
Station Service Transformer T-4 fed from the main generator
••••••AND
b.•Failure of ~~(site specific)~~ all emergency diesel generators to supply power to any vital bus (10500 - EDG A or C and 10600 - EDG B or D) ~~emergency generators are supplying power to emergency buses.~~
••••••AND
c.•Failure to restore power to 10500 OR 10600 ~~at least one emergency bus~~ within 15 minutes from the time of loss of both offsite and onsite AC power.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

Loss of all AC power compromises all plant safety systems requiring electric power ~~including RHR, 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 ~~(site-specific)~~ time duration should be selected to exclude transient or momentary power losses, but should not exceed 15 minutes.

Escalation to General Emergency is via Fisson Product Barrier Degradation or IC SG1, "Prolonged Loss of All Offsite Power and Prolonged Loss of All Onsite AC Power."

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in escalating the emergency class.~~

References:

1. OP-44 115 kv system
2. OP-45 345 kv system
3. OP-45A Backfeeding Normal Station Service Transformer
4. OP-46A 4160 V & 600 V Normal AC Power Distribution
5. OP-22 Diesel Generator Emergency Power

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SS2 **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 and boron injection is required.**

Op. Mode Applicability ■ 1 (Pwr Ops) ■ 2 (HSB) □ 3 (HSD) □ 4 (CSD) □ 5 (Refuel) □ 6 (Defuel) □ All

SS2.1

(Site-specific) ~~indications exist that automatic and manual scram were not successful.~~
Any RPS setpoint has been exceeded
AND
Automatic and manual scrams fail to result in a control rod pattern which assures reactor shutdown under all conditions without boron
AND Either:
Reactor power ≥ 2.5%
OR
Torus temperature ≥ Boron Injection Initiation Temperature

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

~~Automatic and manual scram are not considered successful if action away from the reactor control console was required to scram the reactor.~~

This condition indicates failure of the automatic and/or manual protection system to scram the reactor to the extent which precludes the reactor being made shutdown under all conditions without boron. A manual scram 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., reactor trip button). 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. 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 Fission Product Barrier Degradation or Emergency Director Judgement ICs.

This IC and resuiting EAL have been specifically modified to more acurately define the condition described in NUMARC/NRC Questions and Answers, June 1993 System Malfunctions Question 7. The failure of automatic initiation of a reactor scram followed by unsuccessful manual initiation actions which can be rapidly taken at the reactor control console does not, by itself, lead to imminent loss of either fuel clad or RCS boundaries. It is the continued criticality under conditions requiring a reactor scram along with the continued addition of heat to containment which poses the imminent threat to RSC or fuel clad integrity. Per the JAFNPP EOPs, boron injection is rerquired based on heat addition to containment in excess of safety system capability under failure to scram conditions.

Power operation mode does not encompass all of the plant conditions where an ATWS would be of concern in a BWR, therefore, it is appropriate to expand this EAL to include startup/hot standby mode.

References:

1. JAFNPP PSTG Rev. 4
2. NUMARC/NRC Questions and Ans... June 1993

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SS3 **Loss of all vital DC power.**

Op. Mode Applicability: ■ 1 (Pwr Ops) ■ 2 (HSB) ■ 3 (HSD) □ 4 (CSD) □ 5 (Refuel) □ 6 (Defuel) □ All

SS3.1

Loss of all vital DC power based on ~~(site-specific)~~ ≤105 vdc bus voltage indications on 125 vdc battery buses 71-BCB-2A and 71-BCB-2B for greater than 15 minutes.

Bases

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 by Abnormal Rad Levels/Radiological Effluent, Fission Product Barrier Degradation, or Emergency Director Judgement ICs. Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in escalating the emergency class.~~

References:

1. OP-43A 125 V DC Power System
2. AOP-45 Loss of DC Power System 'A'
3. AOP-46 Loss of DC Power System 'B'

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SS4 **Complete loss of function needed to achieve or maintain hot shutdown.**

Op. Mode Applicability ■ 1 (Pwr Ops) ■ 2 (HSB) ■ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ☐ All

SS4.1

Complete loss of ~~any (site-specific) function required for hot shutdown.~~ RPV pressure and torus temperature cannot be maintained below the Heat Capacity Temperature Limit.

Bases

This EAL addresses complete loss of functions, including ultimate heat sink and reactivity control, required for hot shutdown with the reactor at pressure and temperature. 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 a General Emergency would occur by Abnormal Rad Levels/Radiological Effluent, Fission Product Barrier Degradation, or Emergency Director Judgement ICs.

Functions required for hot shutdown consist of the ability to achieve reactor shutdown and to discharge decay heat energy from the reactor to the ultimate heat sink. Appropriate emergency declarations required by the inability to achieve reactor shutdown are addressed by EAL SA2.1 and EAL SS2.1. Inability to remove decay heat energy is reflected in an increase in suppression pool temperature. Elevated torus temperature is addressed by the Heat Capacity Temperature Limit (HCTL). The HCTL is a function of RPV pressure and suppression pool temperature. If RPV pressure and torus temperature cannot be maintained below the HCTL, the ultimate heat sink is threatened and declaration of a Site Area Emergency is warranted.

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in escalating the emergency class.~~

References:

FSAR Figure 2.1-4

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SS5 **Loss of RPV water level that has or will uncover fuel in the RPV.**

Op. Mode Applicability ■ 1 (Pwr Ops) ■ 2 (HSB) ■ 3 (HSD) ■ 4 (CSD) ■ 5 (Refuel) □ 6 (Defuel) □ All

SS5.1

Loss of RPV water level ~~as indicated by:~~

a.•Loss of all ~~decay heat removal cooling as determined by (site-specific) procedure~~

••••••AND

b.•(Site-specific) ~~indicators that the core is or will be uncovered.~~ RPV water level cannot be restored and maintained above 0 in. (TAF)

SS5.2

Primary containment hydrogen concentration exceeds 4%.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

Under the conditions specified by this IC, severe core damage can occur and reactor coolant system pressure boundary integrity may not be assured. ~~For BWRs, it is intended to address concerns raised by NRC Office for Analysis and Evaluation of Operational Data (AEOD) Report AEOD/E600, "BWR Operating Experience Involving Inadvertent Draining of the Reactor Vessel," dated August 8, 1986. This report states:~~

~~In broadest terms, the dominant causes of inadvertent reactor vessel draining are related to the operational and design problems associated with the residual heat removal system when it is entering into or exiting from the shutdown cooling mode. During this transitional period, water is drawn from the reactor vessel, cooled by the residual heat removal system heat exchangers (from the cooling provided by the service water system), and returned to the reactor vessel. First, there are piping and valves in the residual heat removal system which are common to both the shutdown cooling mode and other modes of cooling. These valves, when improperly positioned, provide a drain path for reactor coolant to flow from the reactor vessel to the suppression pool or the radwaste system. Second, establishing or making such evolutions vulnerable to personnel and procedural errors, the residual heat removal system valves that could be activated during shutdown cooling. Collectively, these factors have contributed to the inadvertent draining of the reactor vessel.~~

~~For PWRs, this IC covers sequences such as prolonged boiling following loss of decay heat removal.~~

Uncovery of the fuel irrespective of the event that causes fuel uncovery is justification alone for declaring a Site Area Emergency. Since other events could lead to fuel uncovery in cold shutdown or refuel other than a loss of decay heat removal capability, it is inappropriate to base the EAL on this one event. For other operating modes, fuel uncovery is a loss of the Fuel Clad and RCS barriers which requires declaration of a Site Area Emergency.

EAL# SS5.2 has been added to this initiating condition to address the possiblity of hydrogen generation due to core uncovery which may not be indicated by the RPV water level instrumentation. 4% hydrogen concentration is the lowest hydrogen concentation which, in the presence of sufficient oxygen, can support upward flame propagation. This hydrogen concentration is generally considered the lower boundary of the range in which localized deflagrations may occer. To generate such a concentration of combustible gas, loss of both the fuel clad and RCS barriers must have occurred. Therefore, declaration of a Site Area Emergency is warranted. Primary containment hydrogen includes hydrogen levels in either the suppression chamber or drywell volumes.

If hydrogen concentrations increase in conjunction with the presence of oxygen to global deflagration levels (i.e. ≥ 6% hydrogen and ≥ 5% oxygen), venting of the containment irrespective of the offsite radioactive release rate would be required by EOPs and declaration of a General Emergency required.

Operating mode applicability has been expanded to include power operation, hot standby and hot shutdown for consistency with the fission product barrier loss and potential loss indicators.

Thus, declaration of a Site Area Emergency is warranted under the conditions specified by the IC. Escalation to a General Emergency is via radiological effluence IC AG1.

References:

1. AOP-30 Loss of Shutdown Cooling
2. JAFNPP PSTG Rev. 4

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SS6 **Inability to monitor a significant transient in progress.**

Op. Mode Applicability ■ 1 (Pwr Ops) ■ 2 (HSB) ■ 3 (HSU) □ 4 (CSD) □ 5 (Refuel) □ 6 (Defuel) □ All

SS6.1

All of the following conditions exist:

a. •Loss of ~~(site-specific)~~ annunciators or indications on one or more Control Room Panels: 09-3, 09-4, 09-5, 09-6, 09-7, 09-8 and 09-75 ~~associated with safety systems~~.

•••••AND

b.•Compensatory ~~non-alarming indications~~ EPIC ~~are~~ is unavailable.

•••••AND

c.•Indications needed to monitor ~~(site-specific)~~ all of the following plant parameters ~~safety functions~~ are unavailable:

- RPV water level
- RPV pressure
- Reactor power
- Torus water temperature
- Drywell temperature
- Primary containment pressure
- Torus water level
- Combustible gas concentration (hydrogen and oxygen)

•••••AND

d.•Transient in progress.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

This IC and its associate EAL are 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~~ <u>all RPV and primary containment EOP parameters</u> needed for protection of the public.

~~(Site specific)~~ Annunciators for this EAL should be limited to include those identified in the Abnormal Operating Procedures, in the Emergency Operating Procedures, and in other EALs (e. g., rad monitors, etc.).

"Compensatory non-alarming indications" in this context includes computer based information such as SPDS. This should include all computer systems available for this use depending on specific plant design and subsequent retrofits.

"Significant Transient" includes response to automatic or manually initiated functions such as scrams, runbacks involving greater than 25% thermal power change, ECCS injections, or thermal power oscillations of 10% or greater.

~~(Site specific)~~ Indications needed to monitor safety functions necessary for protection of the public must include control room indications, computer generated indications and dedicated annunciation capability. The specific indications should be those used to determine such functions as the ability to shut down the reactor, maintain the core cooled and in a coolable geometry, to remove heat from the core, to maintain the reactor coolant system intact, and to maintain containment intact.

"Planned" actions are excluded from the is EAL 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.

<u>References:</u>

1. <u>JAFNPP PSTG Rev. 4</u>

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SG1 **Prolonged locs of all offsite power and prolonged loss of all onsite AC power.**

Op. Mode Applicability ■ 1 (Pwr Ops) ■ 2 (HSB) ■ 3 (HSD) □ 4 (CSD) □ 5 (Refuel) □ 6 (Defuel) □ All

SG1.1

Prolonged loss of all offsite and onsite AC power as indicated by:

a.•Loss of power to ~~(site-specific)~~ :
Reserve Station Transformer T-2
AND
Reserve Station Transformer T-3
AND
Station Service Transformer T-4 fed from the main generator

•••••AND
b.•Failure of ~~(site-specific)~~ all emergency diesel generators to supply power to any vital bus (10500 - EDG A or C and 10600 - EDG B or D) ~~emergency generators are supplying power to emergency buses.~~
•••••AND
c.•At least one of the following conditions exist:
• Restoration of power to at least one emergency bus within ~~(site-specific)~~ 4 hours is NOT likely
•••• •OR
• ~~(Site-specific) indication of continuing degradation of core cooling based on Fission~~

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

Loss of all AC power compromises all plant safety systems requiring electric power ~~including RHR, 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. The 4 ~~(site specific)~~ hours to restore AC power is ~~can be~~ based on site blackout coping analysis performed in conformance with 10CFR50.63 and Regulatory Guide 1.155, "Station Blackout", as available, with appropriate allowance for offsite emergency response. Although this IC may be viewed as redundant to the Fission Product Barrier Degradation IC, its inclusion is necessary to better assure timely recognition and emergency response.

This IC is specified to assure that in the unlikely event of 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 Emergency Director a reasonable idea of how quickly (s)he may need to declare a General Emergency based on two major considerations:

1.•Are there any present indications that core cooling is already degraded to the point that Loss or Potential Loss of fission product barriers is imminent? ~~(Refer to Tables 3 and 4 for more information.)~~

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 Emergency Director judgement as it relates to imminent loss or potential loss of fission product barriers and degraded ability to monitor fission product barriers.

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in escalating the emergency class.~~

References:

1. OP-44 115 kv system
2. OP-45 345 kv system
3. OP-45A Backfeeding Normal Station Service Transformer
4. OP-46A 4160 V & 600 V Normal AC Power Distribution
5. OP-22 Diesel Generator Emergency Power
6. Misc. Calculation JAF-CALC-89-012 "Determination of Required SBO Coping Duration Per NUMARC 8700" Rev. 0 3/28/93
7.•JAFNPP PSTG Rev. 4

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SG2 **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.**

Op. Mode Applicability ■ 1 (Pwr Ops) ■ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ☐ All

SG2.1

1.•~~(Site-specific) indications exist that automatic and manual scram were not successful.~~
Any RPS setpoint has been exceeded

AND

Automatic and manual scrams fail to result in a control rod pattern which assures reactor shutdown under all conditions without boron

•••••AND

2.•Either of the following:

a. ~~(Site-specific) indications exist that the core cooling is extremely challenged.~~ RPV water level cannot be restored and maintained above -31 in.

•••••OR

b. ~~(Site-specific) indication exists that heat removal is extremely challenged.~~ Torus temperature and RPV pressure cannot be maintained below the Heat Capacity Temperature Limit.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

Automatic and manual scram are not considered successful if action away from the reactor control console is required to scram 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 boron in PWRs, or~~ standby liquid control in BWRs, the continuing temperate rise indicates that these capabilities are not effective. This situation could be precursor for a core melt sequence.

~~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 °F or that the reactor vessel water level is below the top of active fuel. For plants using CSFSTs, this EAL equates to a core cooling RED condition.~~ For BWRs, the extreme challenge to the ability to cool the core is intended to mean that the reactor vessel water level is below 2/3 coverage of active fuel for the design basis loss of coolant accident. For the broadest spectrum of events for which the control room crew must be prepared, the Minimum Steam Cooling RPV Water Level (-31 in.) is selected for this EAL. This level is used in the plant's EOPs to define the lowest RPV water level in a failure-to-scram event above which adequate core cooling can be maintained.

Another consideration is the inability to initially remove heat during the early stages of this sequence. ~~For PWRs, if emergency feedwater flow is insufficient to remove the amount of heat required by design from at least one steam generator, an extreme challenge should be considered to exist. For plants using CSFSTs, this EAL equates to a Heat Sink RED condition.~~ For BWRs, ~~(site specific)~~ considerations include inability to remove heat via the main condenser, or via the suppression pool or torus (e. g., due to high pool water temperature). The Heat Capacity Temperature Limit (HCTL) is a measure of the maximum heat load which the primary containment can withstand.

In the event either of these challenges exist 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 to permit maximum offsite intervention time.

Power operation mode does not encompass all of the plant conditions where an ATWS would be of concern in a BWR, therefore, it is appropriate to expand this EAL to include startup/hot standby mode.

References:

1. JAFNPP PSTG Rev. 4

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

This IC encompasses conditions under which a hostile force has taken physical control of vital area required to reach and maintain safe shutdown. The concern here is the loss of ability to shutdown the reactor and maintain core cooling. Therefore this EAL has been modified to relect a loss of plant control from both the control room and remote shutdown panels.

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in how rapidly a General Emergency is declared.~~

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: HG2 **Other conditions existing which in the judgement of the Emergency Director warrant declaration of General Emergency.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

HG2.1

Other conditions existing which in the judgement of the Emergency Director indicate: (1) actual or imminent substantial core degradation with potential for loss of containment, or (2) potential for uncontrolled radio nuclide releases. These releases can reasonably be expected to exceed EPA PAG plume exposure levels outside the site boundary.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

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 Emergency Director to fall under the General Emergency class.

~~**Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in how rapidly a General Emergency is declared.**~~

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SU1 **Loss of all offsite power to essential busses for greater than 15 minutes.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

SU1.1

The following conditions exist:

a.•Loss of power to ~~(site-specific)~~ :
Reserve Station Transformer T-2
AND
Reserve Station Transformer T-3
AND
Station Service Transformer (If T-4 back fed from 345 kv line Station Main Transformer T-1A/T1B)
for greater than 15 minutes.

•

•••••AND

b.•At least ~~(site-specific)~~ one emergency diesel generator is capable of supplying power to each vital bus (10500 - EDG A or C and 10600 - EDG B or D) ~~emergency generators are supplying power to emergency buses.~~

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

Prolonged loss of offsite AC power sources 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 (station blackout). Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Backfeeding of the Normal Station Transformer has been included to allow for those conditions in which maintenance is being performed on the Station Reserve Transformers or 115 kv system. It is recognized that this is not a readily available source of emergency power under emergency condition and should only be taken credit for those conditions under which backfeeding has already been established.

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in escalating the emergency class.~~

References:

1. OP-44 115 kv system
2. OP-45 345 kv system
3. OP-45A Backfeeding Normal Station Service Transformer
4. OP-46A 4160 V & 600 V Normal AC Power Distribution
5. OP-22 Diesel Generator Emergency Power

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SU2 **Inability to reach required shutdown within Technical Specification Limits.**

Op. Mode Applicability ■ 1 (Pwr Ops) ■ 2 (HSB) ■ 3 (HSD) □ 4 (CSD) □ 5 (Refuel) □ 6 (Defuel) □ All

SU2.1

Plant is not brought to required operating mode within ~~(site-specific)~~ Technical Specifications LCO Action Statement Time.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

Limiting Conditions of 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 Specification requires a one hour report under 10CFR50.72 (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 Notification of an Unusual Event is required when the plant is not brought to the required operating mode within the allowable action statement time in the Technical Specifications. Declaration of an Unusual Event 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.

References:

1. Technical Specifications Section 3.0.A and 3.0.B

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SU3 **Unplanned loss of most or all safety system annunciation or indication in the control room for greater than 15 minutes.**

Op. Mode Applicability ■ 1 (Pwr Ops) ■ 2 (HSB) ■ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ☐ All

SU3.1

The following conditions exist:

a.•Loss of ~~most or all (site-specific)~~ annunciators or indicators on one or more Control Room Panels 09-3, 09-4, 09-5, 09-6, 09-7, 09-8 and 09-75 ~~associated with safety systems~~ for greater than 15 minutes.

•

••••••AND

b.•Compensatory ~~non-alarming indications are~~ is ~~available~~.

••••••AND

c.•In the opinion of the Shift Supervisor, the loss of the annunciators or indicators requires increased surveillance to safely operate the unit~~(s)~~.

•

••••••AND

d.•Annunciator or indicator loss does not result from planned action.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

This IC and its associated EAL are intended to recognize the difficulty associated with monitoring changing plant conditions without the use of a major portion of the annunciation or indication equipment.

Recognition of the availability of computer based indication equipment is considered ~~(SPDS, plant computer, etc.~~ EPIC).

"Unplanned" loss of annunciators or indicator excludes scheduled maintenance and testing activities.

"Compensatory non-alarming indications: in this context includes computer based information such as SPDS . This should include all computer systems available for this use depending on specific plant design and subsequent retrofits. The words "~~Compensatory non-alarming indications ... is available.~~" have been deleted because they are unecessary. SA4.1 requires declaration of an Alert based on thier loss.

~~Quantification of "Most" is arbitrary, however, it is estimated that if approximately 75% of the safety system annunciators or indicators are lost there is an increased risk that a degraded plant condition could go undetected.~~ It is not intended that plant personnel perform a detailed count of instrumentation lost but the use of ~~the value as a~~ judgement by the Shift Supervisor as the threshold for determining the severity of the plant conditions. This judgement is supported by the specific opinion of the Shift Supervisor that additional operating personnel will be required to provide increased monitoring of system operation to safely operate the unit(s).

It is further recognized that most plant designs provide redundant safety system indication powered from separate uninterruptable 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 their specific Technical Specification. The initiation of a Technical Specification imposed plant shutdown related to the instrument loss will be reported via 10CFR50.72. If the shutdown is not in compliance with the Technical Specification action, the Unusual Event is based on SU2, Inability to Reach Required Shutdown Within Technical Specification Limits."
~~(Site-specific)~~ Annunciators ~~or indicator~~ for this EAL must include those identified in the Abnormal Operating procedures, in the Emergency Operating Procedures, and in other EALs (e. g., area, process, and/or effluent rad monitors, etc.).

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

Due to the limited number of safety systems in operation during cold shutdown, refueling, and defueled modes, no IC is indicated during these modes of operation.

This Unusual Event will be escalated to an Alert if a transient is in progress during the loss of annunciation or indication.

References:

None

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SU4 **Fuel clad degradation.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

SU4.1	SU4.2
Operable offgas monitors 17RM-150 A and B trip on high-high alarm (275 mR/hr) which fails to clear within 15 minutes ~~(Site specific) radiation monitor readings indicating fuel clad degradation greater than Technical Specification allowable limits.~~	≥31 µCi/gm dose equivelent I-131 ~~(Site specific)~~ coolant sample activity value ~~indicating fuel clad degradation greater than Technical Specification allowable limits.~~

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

This IC is included as an Unusual Event 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 #SU4.1 addresses (~~site-specific~~) offgas radiation monitor readings ~~such as BWR air ejector monitors, PWR failed fuel monitors, etc.~~, that provide indication of fuel clad integrity. The Technical Specification allowable limit is 500,000 µCi/sec (recombiner discharge gross noble gases beta and/or gamma). The high-high alarm setpoint (275 mR/hr) is set at 50% of the instantaneous release limit. The high-high alarm setpoint has been conservatively selected because it is operationally significant and is readily recognizable by Control Room operating staff. 15 minutes is alloted for operator action to reduced the offgas radiation levels and exclude transient conditions.

EAL #SU4.2 addresses coolant samples exceeding coolant technical specifications for iodine spike. Escalation of this IC to the Alert level is via the fission product barrier degradation monitoring ICs.

References:

1. Technical Specification 3.2.D and Radiological Effluent Technical Specifications 3.5
2. PSP-14 Main Steam Line and SJAE Radiation Monitor Calibration
3. AOP-3 High Activity in Reactor Coolant or Offgas
4. Technical Specifications 3.6.C

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SU5 **RCS leakage.**

Op. Mode Applicability ■ 1 (Pwr Ops) ■ 2 (HSB) ■ 3 (HSD) □ 4 (CSD) □ 5 (Refuel) □ 6 (Defuel) □ All

SU5.1

Either of the following conditions exist:

a.•Unidentified ~~or pressure boundary~~ reactor coolant system to drywell leakage greater than 10 gpm

••••OR

b.•Identified reactor coolant system to drywell leakage greater than 25 gpm.

Bases

This IC is included as an Unusual Event 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. 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 test (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 Fission Product Barrier Degradation ICs or IC SA3, "Inability to Maintain Plant in Cold Shutdown."

Only operating modes in which there is fuel in the reactor coolant system and the system is pressurized are specified.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SU6 **Unplanned loss of all onsite or offsite communications capabilities.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ■ All

SU6.1

Either of the following conditions exist: a.•Loss of all **(site-specific list)** of the following onsite communications capability affecting the ability to perform routine operations: • Page/Party System (Gaitronics) • Sound Powered Phones • Control Room/Portable Unit Radios • Plant Telephone System •••••OR b.•Loss of all **(site-specific list)** of the following offsite communications capability: • Plant Telephone System • Radiological Emergency Communications System (RECS) • Dedicated Phone lines including NRC • Health Physics Network - FTS-2000 • Offsite radio systems

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

The purpose of this IC and its associated EALs is to recognize a loss of communications capability that either defeats the plant operations staff ability to perform routine tasks necessary for plant operations or the ability to communicate problems with offsite authorities. The loss of offsite communications ability is expected to be significantly more comprehensive than the condition addressed by 10CFR50.72.

~~(Site-specific list)~~ The onsite communications loss must encompass the loss of all means of routine communications (i. e., phones, sound powered phone systems, page party system and radios/walkie talkies).

~~(Site-specific list)~~ The offsite communications loss must encompass the loss of all means of communications with offsite authorities. This should include ENS, Bell lines, FAX transmissions, and dedicated EPP phone systems. This EAL is intended to be used only when extraordinary means are being utilized to make communications possible (relaying of information from radio transmissions, individuals being sent to offsite locations, etc.).

References:

1. JAFNPP Emergency Plan Section 7 "Emergency Facilities and Equipment"

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SU7 **Unplanned loss of required DC power during cold shutdown or refueling mode for greater than 15 minutes.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ■ 4 (CSD) ■ 5 (Refuel) ☐ 6 (Defuel) ☐ All

SU7.1

Either Both of the following conditions exist:

a.•Unplanned loss of vital DC power to required DC busses based on ~~(site-specific)~~ ≤105 vdc bus voltage indications on 125 vdc battery buses 71-BCB-2A and 71-BCB-2B

•••••AND

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

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

The purpose of this IC and its associated EALs is to recognize a loss of DC power compromising the ability to monitor and control the removal of decay heat during cold shutdown or refueling operations. This EAL is intended to be anticipatory in as much as the operating crew may not have necessary indication and control of equipment needed to respond to the loss.

Unplanned is included in this IC and EAL to preclude the declaration of an emergency as a result of planned maintenance activities. Routinely plants will 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. If this loss results in the inability to maintain cold shutdown, the escalation to an Alert will be per SA3 "Inability to Maintain Plant in Cold Shutdown."

~~(Site specific)~~ The bus voltage ~~should be~~ is based on the minimum bus voltage necessary for the operation of safety related equipment. This voltage value should incorporate a margin of at least 15 minutes of operation before the onset of inability to operate those loads. This voltage is usually near the minimum voltage selected when battery sizing is performed. Typically the value for the entire battery set is approximately 105 volts per cell. For a 56 string battery set the minimum voltage is typically 1.81 volts per cell.

References:

1. OP-43A 125 V DC Power System
2. AOP-45 Loss of DC Power System 'A'
3. AOP-46 Loss of DC Power System 'B'

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SA1 **Loss of all offsite power and loss of all onsite AC power to essential busses during cold shutdown or refueling mode.**

Op. Mode Applicability 1 (Pwr Ops) 2 (HSB) 3 (HSD) 4 (CSD) 5 (Refuel) 6 (Defuel) All

SA1.1

a.•Loss of power to ~~(site-specific)~~ :

Reserve Station Transformer T-2
AND
Reserve Station Transformer T-3
AND
Station Service Transformer T-4 (If back fed from 345 kv line Station Main Transformer T-1A/T1B)
for greater than 15 minutes.

•••

• •AND

b.•Failure of ~~(site-specific)~~ all emergency diesel generators to supply power to any vital bus (10500 - EDG A or C and 10600 - EDG B or D) ~~emergency generators are supplying power to emergency buses~~.

••••AND

c.•Failure to restore power to 10500 OR 10600 ~~at least one emergency bus~~ within 15 minutes from the time of loss of both offsite and onsite AC power.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

Loss of all AC power compromises all plant safety systems requiring electric power ~~including RHR, ECCS, containment heat removal, Spent Fuel Heat Removal and the Ultimate Heat Sink~~. When in cold shutdown, refueling, or defueled mode the event can be classified as an Alert, because of the significantly reduced decay heat, lower temperature and pressure, increasing the time to restore one of the emergency busses, relative to that specified for the Site Area Emergency EAL. Escalating to the Site Area Emergency, if appropriate, is by Abnormal Rad Levels/Radiological Effluent, or Emergency Director Judgement ICs. Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Backfeeding of the Normal Station Transformer has been included to allow for those conditions in which maintenance is being performed on the Station Reserve Transformers or 115 kv system. It is recognized that this is not a readily available source of emergency power under emergency conditions and should only be taken credit for those conditions under which backfeeding has already been established.

Note that Defuel mode is not applicable to this IC because the IC is specifically written for cold shutdown and refuel modes.

References:

1. OP-44 115 kv system
2. OP-45 345 kv system
3. OP-45A Backfeeding Normal Station Service Transformer
4. OP-46A 4160 V & 600 V Normal AC Power Distribution
5. OP-22 Diesel Generator Emergency Power

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SA2 — **Failure of Reactor Protection system instrumentation to complete or initiate a ~~an automatic~~ reactor scram that shuts down the reractor once a Reactor Protection system setpoint has been exceeded or a manual scram has been initiated ~~and manual scram was successful.~~**

Op. Mode Applicability ■ 1 (Pwr Ops) ■ 2 (HSB) ☐ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ☐ All

SA2.1

(Site-specific) ~~indication(s) exist that indicate that Reactor Protection system setpoint was~~ exceeded and ~~automatic scram did not occur, and a successful manual scram occurred.~~

Any RPS setpoint has been exceeded

AND

Automatic scram fails to result in a control rod pattern which assures reactor shutdown under all conditions without boron

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

This condition indicates failure of the automatic protection system to scram the reactor to the extent that the reactor will remain shutdown under all conditions wothout boron. 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. Reactor Protection system setpoint being exceeded (rather than limiting safety system setpoint being exceeded) is specified here because failure of the automatic protection system is the issue. A manual scram 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., ~~reactor trip button~~ manual scram push buttons, mode switch or ARI). ~~Failure of manual scram would escalate the event to a Site Area Emergency.~~

This IC and resulting EAL have been specifically modified to more acurately reflect the clarification provided in "NUMARC/NRC Questions and Answers, June 1993, System Malfunctions Question 7"

In determining whether to declare an emergency based on this EAL the following guidance is provided by NUMARC:
Regarding the occurance of an event in which the EAL is reached with no adverse consequences:
"If an emergency condition no longer exists, there is no reason to declare an emergency. The NRC shall be notified after discovery within 1 hour, meeting 10CFR50.72 reporting criteria. State and local authorities should also be notified as soon as practical, or in accordance with arrangements made in advance."

References:

1. JAFNPP PSTG Rev. 4
2. NUMARC/NRC Questions and Answers, June 1993.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SA3 **Inability to maintain plant in cold shutdown.**

Op. Mode Applicability ☐ 1 (Pwr Ops) ☐ 2 (HSB) ☐ 3 (HSD) ■ 4 (CSD) ■ 5 (Refuel) ☐ 6 (Defuel) ☐ All

SA3.1

The following conditions exist:

a. •Loss of ~~(site-specific) Technical Specification required functions to maintain cold~~ shutdown.

•••••AND

b. • Reactor coolant temperature cannot be maintained below 212 °F. ~~Tempereure~~ increase
that either:
•• Exceeds Technical ~~Specification cold shutdown temperature limit~~
•••• OR
•• Results in ~~uncontrolled temperature rise approaching cold shutdown temperature technical specification limit~~.

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

This EAL addresses complete loss of functions required for core cooling during refueling and cold shutdown modes. Escalation to Site Area Emergency or General Emergency would be via Abnormal Rad Levels/Radiological Effluent or Emergency Director Judgement ICs.

~~For PWRs, this IC and its associated EAL 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 that can cause core uncovery in 15 to 20 minutes and severe core damage within an hour after decay heat removal is lost. Under these conditions, RCS integrity is lost and fuel clad integrity is lost or potentially lost, which is consistent with a Site Area Emergency. (Site specific) indicators for these EALs are those methods used by the plant in response to Generic Letter 88-17 which include core exit temperature monitoring and RCS water level monitoring. In addition, radiation monitor readings may also be appropriate as an indicator of this condition.~~

A reactor coolant temperature increase that approaches or exceeds the cold shutdown technical specification limit warrants declaration of an Alert irrespective of the availability of technical specification required functions to maintain cold shutdown. The concern of this IC is the loss of ability to maintain the plant in cold shutdown which is defined by reactor coolant temperature and not the operability of equipment which supports removal of heat from the reactor.

"Uncontrolled" means that system temperature increase is not the result of planned actions by the plant staff.

The EAL guidance related to uncontrolled temperature rise is necessary to preserve the anticipatory philosophy of NUREG-0654 for events starting from temperatures much lower than the cold shutdown temperature limit.

Escalation to the Site Area Emergency is by IC SS5, "Loss of Water Level in the Reactor Vessel that has or will Uncover Fuel in the Reactor Vessel," or by Abnormal Rad Levels/Radiological Effluent ICs.

~~Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in escalating the emergency class.~~

References:

1. AOP-30 Loss of Shutdown Cooling

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

IC#: SA4 — **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.**

Op. Mode Applicability ■ 1 (Pwr Ops) ■ 2 (HSB) ■ 3 (HSD) ☐ 4 (CSD) ☐ 5 (Refuel) ☐ 6 (Defuel) ☐ All

SA4.1

The following conditions exist:

a.••Loss of most ~~or all (site-specific)~~ annunciators or indicators on one or more Control Room Panels: 09-3, 09-4, 09-5, 09-6, 09-7, 09-8 and 09-75 ~~associated with safety~~ systems for greater than 15 minutes.

•••••AND

b. In the opinion of the Shift Supervisor, the loss of the annunciators or indicators requires increased surveillance to safely operate the unit~~(s)~~.

•••••AND

c.•Annunciator or indicator loss does not result from planned action.

•••••AND

d.•Either of the following:

- A significant plant transient is in progress

•••••OR

Plant Specific EAL Guideline (A,H,S)

J. A. FitzPatrick

Bases

This IC and its associated EAL are intended to recognize the difficulty associated with monitoring changing plant conditions without the use of a major portion of the annunciation or indication equipment during a transient. Recognition of the availability of computer based indication equipment is considered (SPDS, plant computer, etc.).

"Planned" loss of annunciators or indicators included 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 an increase 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 the use of ~~the value as a~~ judgement by the Shift Supervisor as the threshold for determining the severity of the plant conditions. This judgement is supported by the specific opinion o f the Shift Supervisor that additional operating personnel will be required to provide increased monitoring of system operation to safely operate the unit(s).

It is further recognized that most plant designs provide redundant safety system indication powered from separate unintorruptable 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 10CFR50.72. If the shutdown is not in compliance with the Technical Specification action, the Unusual Event is based on SU2 "Inability to Reach Required Shutdown Within Technical Specification Limits."

~~(Site-specific)~~ Annunciators ~~or indicators~~ for this EAL must include those identified in the Abnormal Operating Procedures, in the Emergency Operating Procedures, and in other EALs (e. g., area, process, and/or effluent rad monitors, etc.).

"Significant Transient" includes response to automatic or manually initiated functions such as scrams, runbacks involving greater than 25% thermal power change, ECCS injections, or thermal power oscillations of 10% or greater.

"Compensatory non-alarming indications" in this context includes computer based information such as SPDS. This should include all computer systems available for this use depending on specific plant design and subsequent retrofits. If both a major portion of the annunciation system and all computer monitoring are unavailable to the extent that the additional operating personnel are required to monitor indications, the Alert is required.

Due to the limited number of safety systems in operation during cold shutdown, refueling and defueled modes. No IC is indicated during these modes of operation.
This Alert will be escalated to a Site Area Emergency if the operating crew cannot monitor the transient in progress.

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: FC1 **Barrier:** Fuel Cladding **Type:** Loss

Description: Primary Coolant Activity Level

FC1.1 Coolant activity greater than ~~(site specific) value~~ 300 μCi/gm I-131 equivalent

Bases:

This ~~(site specific)~~ value corresponds to 300 μCi/gm I-131 equivalent. Assessment by the NUMARC EAL Task Force indicates that this amount of coolant activity is well above that expected for iodine spikes and corresponds to about 2% to 5% fuel clad damage. This amount of clad damage indicates significant clad heating and thus the fuel clad barrier is considered lost.

There is no equivalent "Potential Loss" EAL for this item.

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: FC2 **Barrier:** Fuel Cladding **Type:** Loss/Pot. Loss

Description: Reactor Vessel Water Level

FC2.1 RPV water level less than ~~(site-specific) value~~ 0 in. (TAF)

Bases:

The "Loss" EAL ~~(site specific)~~ value corresponds to the level which is used in EOPs to indicate challenge of core cooling. ~~Depending on the plant this may be top of active fuel or 2/3 coverage of active fuel.~~ This is the minimum value to assure core cooling without further degradation of the clad. The "Potential Loss" EAL is the same as teh RCS barrier "Loss" EAL 4 below and corresponds to the ~~(site specific)~~ water level at the top of the active fuel. Thus, this EAL indicates a "Loss" of RCS barrier and a "Potential Loss" of the Fuel Clad Barrier. This EAL appropriately escalates the emergency class to a Site Area Emergency.

References:

1. JAFNPP PSTG Rev. 4

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: FC3 **Barrier:** Fuel Cladding **Type:** Loss

Description: Drywell Radiation Monitoring

FC3.1 Drywell radiation monitor 17-RE-104 A or B reading greater than ~~(site specific)~~ 3000 R/hr.

Bases:

~~The (site specific) reading~~ 3000 R/hr is a value which indicates the release of reactor coolant, with elevated activity indicative of fuel damage, into the drywell. The reading should be calculated assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with a concentration of 300 µCi/gm dose equivalent I-131 into the drywell atmosphere. Reactor coolant concentrations of this magnitude are several times larger than the maximum concentrations (including iodine spiking) allowed within technical specifications and are there fore indicative of fuel damage (approximately 2% - 5% clad failure depending on core inventory and RCS volume). The 3000 R/hr value was conservatively selected from EAP-18 Figure 18.10 based on Case #4 (1% noble gas release) one hour after shutdown. This value is higher than that specified for RCS barrier loss EAL #3. Thus, this EAL indicates a loss of both fuel clad barrier and RCS barrier.

Caution: it is important to recognize that in the event the radiation monitor is sensitive to shine from the reactor vessel or piping spurious readings will be present and another indicator of fuel clad damage is necessary.

There is no "Potential Loss" EAL associated with this item.

References:

1. EAP-18 Protective Action Recommendations Figure 18.9 and 18.10

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: FC4 **Barrier:** Fuel Cladding **Type:** Loss

Description: Other (Site-Specific) Indications

FC4.1 Air ejector offgas radiation monitors 17RM-150A or B reading > 2750 mR/hr

Bases:

This EAL is to cover other ~~(cit-specific)~~ indications that may indicate loss or potential loss of the fuel clad barrier, including indications from containment air monitors or any other ~~(site-specific)~~ instrumentation.

Air ejector offgas radiation monitors 17RM-150A or B reading ≥ 10 times the nominal high-high setpoint is indicative of significant fuel cladding failure and is consistent with the generic IC based on 300 μCi/gm I-131 equivalent coolant activity which is approximately 10 times the Technical Specification coolant activity of 31 μCi/gm I-131 equivalent. The off-gas Hi-Hi alarm is conservatively set at 275 mR/hr which is based on 50% of theTechnical Specification release limit of 500,000 μCi/sec. Therefore 10 x 275 mR/hr = 2750 mR/hr

References:

1. Technical Specification 3.2.D and Radiological Effluent Technical Specifications 3.5
2. PSP-14 Main Steam Line and SJAE Radiation Monitor Calibration
3. AOP-3 High Activity in Reactor Coolant or Offgas

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: FC5 **Barrier:** Fuel Cladding **Type:** Loss/Pot. Loss

Description: Emergency Director Judgement

FC5.1 Any condition in the judgement of the Emergency Director that indicates loss or potential loss of the fuel cladding barrier.

Bases:

This EAL addresses any other factors that are to be used by the Emergency Director in determining whether the fuel clad barrier is lost or potentially lost. In addition, the inability to monitor the barrier should also be incorporated in this EAL as a factor in Emergency Director judgement 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.)

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: RCS1 **Barrier:** RCS **Type:** Loss

Description: RCS Leak Rate

RCS1.1 ~~(site specific) Indications of main steam line break:~~

Bases:

~~The "Loss" EAL is based on design basis accident analyses which show that even if MSIV closure occurs within design limits, dose consequences offsite from a "puff" release would be in excess of 10 millirem. Thus, this EAL is included for consistency with the Alert emergency classification.~~
NUMARC/NESP-007 "Questions and Answers" published in June 1993 Fission Product Barriers - BWR Question 4 states that this condition should be removed from the FPB chart but must still be classified under system failures due to the probable offsite dose release from the puff release. It is agreed that this condition should not be included as a fission product barrier loss indicator. However, the Q&A response does not specify how this condition should be classified. The NUMARC bases for this RCS barrier loss condition states that this indicator was intended to be consistent with the Alert classification since "design basis" accident analysis shows that even with MSIV closure, the offsite dose consequences from a "puff" release would be in excess of 10 millirem. However, unless the initiating assumptions associated with the design basis steam line break existed at the time of the actual break, declaration of an Alert based on assumed dose results is inappropriate. The JAFNPP FSAR accident analysis assumes a complete double-ended shear of a MSL with delayed MSIV closure and fuel clad failures. The conditions of concern are more then adequately addressed by PC2.1, PC2.3 and RCS1.3 for failure to isolate conditions and AA1.1 for successful isolation resulting in $\geq$ 10 millirem dose due to steam release.

References:

1. NUMARC/NESP-007 "Questions and Answers" published in June 1993 Fission Product Barriers - BWR Question 4

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: **RCS1** **Barrier:** RCS **Type:** Potential Loss

Description: RCS Leak Rate

RCS1.2 RCS leakage greater than 50 gpm inside the drywell

RCS1.3 ~~Unisolatble primary system leakage outside drywell as indicated by area temperature or area radiation alarm:~~
Exceeding Reactor Building Area Temperature or Radiation Level Maximum Safe Operating Levels, EOP-5 and an unisolable primary system is discharging outside primary containment

Bases:

The potential loss of RCS based on leakage is set at a level indicative of a small breach of the RCS but which is well within the makeup capability of normal and emergency high pressure systems. Core uncovery is not a significant concern for a 50 gpm leak, however, break propagation leading to significantly larger loss of inventory is possible. Many BWRs may be unable to measure an RCS leak of this size because the leak would likely increase drywell pressure above the drywell isolation setpoint. The system normally used to monitor leakage is typically isolated as part of the drywell isolation and is therefore unavailable. If primary system leak rate information is unavailable, other indicators of RCS leakage should be used. Potential loss of RCS based on primary system leakage outside the drywell is determined from site-specific Maximum Safe Operating Levels ~~alarms~~ in the areas of the main steam line tunnel, ~~main turbine generator,~~ RCIC, HPCI, etc., which indicate a direct path from the RCS to areas outside primary containment.

References:

1. JAFNPP PSTG Rev. 4

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: **RCS2** **Barrier:** RCS **Type:** Loss

Description: Drywell Pressure

RCS2.1 Primary containment pressure cannot be maintained below ~~greater than (site specific)~~ 2.7 psig due to coolant leakage.

Bases:

The ~~(site specific)~~ drywell pressure is based on the drywell high pressure scram ~~alarm~~ setpoint ~~and indicates a LOCA~~. A higher value may be used if supporting documentation is provided which indicates the chosen value is less than the pressure which would be reached for a 50 gpm reactor coolant system leak.

The value selected for this IC, high drywell pressure scram setpoint, is more consistent with the generic bases as well as more operationally signifigant. The term "cannot be maintained below" is intended to be consistent with the conditions specified in EOP-4 Primary Containment Control indicative of a high energy release into containment for which normal containment cooling systems are insufficient and hence signifigant.

There is no "Potential Loss" EAL corresponding to this item.

References:

1. JAFNPP PSTG Rev. 4

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: **RCS3** **Barrier:** RCS **Type:** Loss

Description: Drywell Radiation Monitoring

RCS3.1 Drywell radiation monitors 17-RE-104 A or B reading greater than ~~(site-specific)~~ >300 R/hr

Bases:

~~The (site-specific)~~ >300 R/hr reading is a value which indicates the release of reactor coolant to the drywell. The reading should be calculated assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with normal operating concentrations (i. e., within T/S) into the drywell atmosphere. This reading will be less than that specified for fuel clad barrier EAL #3. The 300 R/hr value was conservatively selected from EAP-18 Figure 18.10 based on Case #5 (1/10th of 1% noble gas release) one hour after shutdown. Thus, this EAL would be indicative of a RCS leak only. If the radiation monitor reading increased to that value specified by the fuel clad barrier EAL #3, fuel damage would also be indicated.

However, if the site-specific physical location of the drywell radiation monitor is such that radiation from a cloud of released RCS gases could not be distinguished from radiation from adjacent piping and components containing elevated reactor coolant activity, this EAL should be omitted and other site -specific indications of RCS leakage substituted.

There is no "Potential Loss" EAL associated with this item.

References:

1. EAP-18 Protective Action Recommendations Figure 18.9 and 18.10

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: RCS4 **Barrier:** RCS **Type:** Loss

Description: Reactor Vessel Water Level

RCS4.1 RPV level less than ~~(site-specific) value~~ 0 in. (TAF)

Bases:

This "Loss" EAL is the same as "Potential Loss" fuel clad barrier EAL #2. The ~~(site-specific)~~ water level corresponds to the level which is used in EOPs to indicate challenge of core cooling. Depending on the plant this may be top of active fuel or 2/3 coverage of active fuel. This EAL appropriately escalates the emergency class to a Site Area Emergency. Thus, this EAL indicates a loss of the RCS barrier and a potential loss of the fuel clad barrier.

References:

1. JAFNPP PSTG Rev. 4

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: **RCS5** **Barrier:** RCS **Type:** Loss

Description: Other (site-specific) indications

RCS5.1 ~~(site specific) as applicable~~ None

Bases:

This EAL is to cover other ~~(site specific)~~ indications that may indicate loss or potential loss of the RCS barrier.

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: RCS5 **Barrier:** RCS **Type:** Potential Loss

Description: Other (site-specific) indications

RCS5.2 ~~(site-specific) as applicable~~ None

Bases:

This EAL is to cover other ~~(site-specific)~~ indications that may indicate loss or potential loss of the RCS barrier.

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: RCS6 **Barrier:** RCS **Type:** Loss/Pot. Loss

Description: Emergency Director Judgment

RCS6.1 Any condition in the judgment of the Emergency Director that indicates loss or potential loss of the RCS barrier

Bases:

This EAL addresses any other factors that are to be used by the Emergency Director in determining whether the RCS barrier is lost or potentially lost. In addition, the inability to monitor the barrier should also be incorporated in the EAL as a factor in Emergency Director judgement that the barrier may be considered lost or potentially lost. (See also IC SG1, "Prolonged Loss of Offsite Power and Prolonged Loss of All Onsite AC Power,", for additional information.)

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: PC1 **Barrier:** Primary Containment **Type:** Loss

Description: Drywell Pressure

PC1.1 ~~Rapid unexplained decrease following initial increase~~

PC1.2 ~~Drywell pressure response not consistent with LOCA conditions~~

Bases:

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

For BWR pressure suppression type containments, the numerous variables which can affect containment pressure under accident conditions makes it impossible to evaluate thier integrity based upon containment pressure response alone. While the example generic EAL descriptions may in fact be symptomatic of a loss of primary containment integrity under certain conditions, they are not, by themselves, definitive indicators of a loss of containment integrity. Containment integrity loss is better indicated by radiological, area temperature, water level or direct visual observation indicators.

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: **PC1** **Barrier:** Primary Containment **Type:** Potential Loss

Description: Drywell Pressure

PC1.3 ~~(site specific)~~ Primary containment venting is required to maintain suppression chamber pressure below the Primary Containment Pressure Limit. ~~psig and increasing~~

PC1.4 Explosive mixture of 6% hydrogen and 5% oxygen exists

Bases:

The ~~(site specific) PSIG for~~ potential loss of containment is based on the containment drywell design pressure as implemented in the Primary Containment Pressure Limit (PCPL). Existence of an explosive mixture means a hydrogen and oxygen concentration of at least the lower deflagration limit ~~curve~~ exists. ~~This applies to BWRs with Mark III containments, as well as Mark I and II containment designs when they are de-inerted.~~

References

1. FSAR Section 5.2.3.2
2. JAFNPP PSTG Rev. 4

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: **PC2** **Barrier:** Primary Containment **Type:** Loss

Description: Containment Isolation Valve Status after Containment Isolation Signal

PC2.1 ~~Failure of both valves in any one line to close and downstream pathway to environment exists~~ Any steam line or RWCU isolation failure resulting in a release pathway outside primary containment:
• Main Steam Line
• HPCI Steam Line
• RCIC Steam Line

PC2.2 Intentional venting per EOPs:

Primary containment venting is required due to combustible gas concentrations
• OR
•Primary containment venting is required due to PCPL

PC2.3 ~~Unisolable primary system leakage outside drywell as indicated by: area temperature or area radiation alarm~~
Primary system is discharging outside PC AND EITHER
•RB area temperatures are ≥ maximum safe operating levels in two or more areas, EOP-5 OR
•RB area radiation levels are ≥ maximum safe operating levels in two or more areas, EOP-5

Bases:

This EAL is intended to cover containment isolation failures allowing a direct flow path to the environment such as failure of both MSIVs to close with open valves downstream to the turbine or to the condenser. A release pathway outside primary containment exists when steam flow is not prevented by downstream isolations. In the case of a failure of both isolation valves to close but in which no downstream flowpath exists, declaration under this EAL would not be required. RWCU System has been added to PC2.1 as a significant RCS leakage source under failure to isolate conditions. In addition, the presence of area radiation or temperature alarms indicating unisolable primary system leakage outside the drywell are covered. Also, an intentional venting of primary containment per EOPs to the secondary containment and/or the environment to considered a loss of containment.

There is no "Potential Loss" EAL associated with this item.

References:

EOP-4
EOP-5

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: PC3 **Barrier:** Primary Containment **Type:** Potential Loss

Description: Significant Radioactivity Inventory in Containment

PC3.1 Drywell radiation monitors 17RE-104 A or B reading greater than ~~(site-specific)~~ >250,000 R/hr

Bases:

~~The (site-specific)~~ 250,000 reading is a value which indicates significant fuel damage well in excess of that required for loss of RCS and fuel clad. ~~As stated in Section 3.8,~~ A major release of radioactivity requiring offsite protective actions from core damage is not possible unless a major failure into the reactor coolant. Regardless of whether containment is challenged, this amount of activity in containment, if released, could have such sever 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%. The 250,000 R/hr value was conservatively selected from EAP-18 Figure 18.10 based on Case #3 (10% noble gas release) one hour after shutdown. Unless there is ~~a (site-specific)~~ analysis justifying a higher value, it is recommended that a radiation monitor reading corresponding to 20% fuel clad damage be specified here.

There is no "Loss" EAL associated with this item.

References:

1. EAP-18 Protective Action Recommendations Figure 18.9 and 18.10
2. Calculation SL-4370, Sargent & Lundy, May 1985 "High Range Containment Monitor Response to Post Accident Fission Product Barrier Releases - JAFNPP"

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: **PC4** **Barrier:** Primary Containment **Type:** Potential Loss

Description: Reactor Vessel Water Level

PC4.1 ~~Reactor vessel water level less than (site specific) value and the maximum core uncovery time limit is in the unsafe region.~~ Primary Containment Flooding required

Bases:

~~In this EAL, the (site specific) water level corresponds to the level which is used in EOPs to indicate a severe challenge of core cooling. Depending on the plant this may be top of active fuel or 2/3 coverage of active fuel. This is the minimum value to assure core cooling without further degradation of the clad.~~

The conditions in this potential loss EAL represent imminent melt sequences which, if not corrected, could lead to vessel failure and increased potential for containment failure. In conjunction with the level EALs in the fuel and RCS barrier columns, this EAL will result in the declaration of a General Emergency -- loss of two barriers and the potential loss of a third. If the emergency operating procedures have been ineffective in restoring reactor vessel level ~~within the maximum core uncovery time limit~~, above the top of active fuel there is not a "success" path. The requirement for primary containmnent flooding addresses all plant conditions for which adequate core cooling is or is about to be lost. This includes RPV water level cannot be restored and maintained above TAF and RPV flooding conditions cannot be established and maintained. Thus, the PEG condition encompasses the NUMARC condition concerning RPV water level and the MCUTL.

Severe accident analysis (e. g., NUREG-1150) have concluded that function restoration procedures can arrest core degradation with the reactor vessel in a significant fraction of the core damage scenarios, and the likelihood of containment failure is very small in these events. Given this, it is appropriate to provide a reasonable period to allow emergency operation procedures to arrest the core melt sequence. Whether or not the procedures will be effective should be apparent within the time provided. The Emergency Director should make the declaration as soon as it is determined that the procedures have been, or will be ineffective.

There is no "loss" EAL associated with this item.

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: PC5 **Barrier:** Primary Containment **Type:** Loss

Description: Other (site-specific) indications

PC5.1 ~~(site specific) as applicable~~ None

Bases:

This EAL is to cover other ~~(site specific)~~ indications that may indicate loss or potential loss of the containment barrier.

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: **PC5** **Barrier:** Primary Containment **Type:** Potential Loss

Description: Other (site-specific) indications

PC5.2 ~~(site-specific) as applicable~~ None

Bases:

This EAL is to cover other ~~(site-specific)~~ indications that may indicate loss or potential loss of the containment barrier.

Plant Specific EAL Guideline (FPB)

J. A. FitzPatrick

BWR FPB IC#: PC6 **Barrier:** Primary Containment **Type:** Loss/Pot. Loss

Description: Emergency Director Judgment

PC6.1 Any condition in the judgment of the Emergency Director that indicates loss or potential loss of the containment barrier

Loss of containment indicators may include:
--Inconsistent LOCA response
--Rapid unexplained decrease following initial increase in containment pressure

Bases:

This EAL addresses any other factors that are to be used by the Emergency Director in determining whether the containment barrier is lost or potentially lost. In addition, the inability to monitor the barrier should also be incorporated in this EAL as a factor in Emergency Director judgement 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.)
For BWR pressure suppression type containments, the numerous variables which can affect containment pressure under accident conditions makes it impossible to evaluate thier integrity based upon containment pressure response alone. While the example generic EAL descriptions may in fact be symptomatic of a loss of primary containment integrity under certain conditions, they are not, by themselves, definitive indicators of a loss of containment integrity. Containment integrity loss is better indicated by radiological, area temperature, water level or direct visual observation indicators. Therefore, these indicators have been integrated with EAL PC6.1 Emergency Director Judgement.