

January 31, 1996

Mr. George A. Hunger, Jr.
Manager-Licensing, MC 62A-1
PECO Energy Company
Nuclear Group Headquarters
Correspondence Control Desk
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SUBJECT: REQUEST FOR ADDITIONAL INFORMATION (RAI) FOR PEACH BOTTOM ATOMIC
POWER STATION, UNITS 2 AND 3, EMERGENCY ACTION LEVELS (TAC NOS.
M92363 AND M92364)

Dear Mr. Hunger:

On May 4, 1995, PECO Energy Company submitted an application for review and approval of the revised emergency action levels (EALs) for the Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3. The staff has reviewed your submittal for PBAPS and has determined that additional information, as stated in the enclosure, is needed to complete the review.

The proposed EALs were reviewed against the guidance in NUMARC/NESP-007, "Methodology for Development of Emergency Action Levels," Revision 2. This document has been endorsed by the NRC in Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors," Revision 3, as an alternative means by which licensees can meet the requirements in 10 CFR 50.47 (b)(4) and Appendix E to 10 CFR Part 50. Since the staff has previously endorsed the guidance in NUMARC/NESP-007, the review focused on those EALs that deviated from the guidance and those EALs that required the development of site-specific thresholds. As a result of the initial review, a number of EALS were identified which required additional information in order to determine whether the EALS conform to NUMARC/NESP-007.

This requirement affects nine or fewer respondents, and therefore, is not subject to Office of Management and Budget review under P.L. 96-511.

Sincerely,

/s/
Joseph W. Shea, Project Manager
Project Directorate I-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket Nos. 50-277/278

Enclosure: RAI

cc w/encl: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

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Mr. George A. Hunger, Jr.
PECO Energy Company

Peach Bottom Atomic Power Station,
Units 2 and 3

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REQUEST FOR ADDITIONAL INFORMATION
REGARDING PEACH BOTTOM ATOMIC POWER STATION
EAL REVISION TO NUMARC/NESP-007 METHODOLOGY

The NRC has completed its initial review of the proposed emergency action levels (EALs) in the May 4, 1995, Peach Bottom Atomic Power Station (PBAPS) submittal. The submittal consisted of the EAL table, the PBAPS EAL Technical Basis Manual, and a table that correlated the PBAPS EALs with the NUMARC example EALs and identified any deviations from the NUMARC guidance. The EAL table contained the EAL statements, the corresponding emergency classifications, a unique PBAPS designator number for each EAL, the plant Operating Condition Applicability, and any tables or other data necessary for interpretation of the EAL. The Technical Basis Document gave further details on the EAL, provided justification for any deviations from the NUMARC example EALs and cited specific PBAPS procedure numbers and other related references.

The proposed EALs were reviewed against the guidance in NUMARC/NESP-007, "Methodology for Development of Emergency Action Levels," Revision 2. This document has been endorsed by the NRC in Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors," Revision 3, as an alternative means by which licensees can meet the requirements in 10 CFR 50.47 (b) (4) and Appendix E to 10 CFR Part 50. Since the staff has previously endorsed the guidance in NUMARC/NESP-007, the review focused on those EALs that deviated from the guidance and those EALs that required the development of site-specific thresholds. As a result of the initial review, a number of EALS were identified which required additional information in order to determine whether the EALS conform to NUMARC/NESP-007. Please provide this additional information as discussed below.

General

Issue No. 1.

The PBAPS EAL scheme deviated from the NUMARC methodology by not grouping EALs under initiating conditions (ICs). The PBAPS EAL Basis Document did list the IC associated with each EAL on the page describing that particular EAL, but the actual EAL procedure, that onsite and offsite decision makers would use during an event, did not list the ICs. The grouping of EALs under the ICs to which they correspond allows the person classifying (and the people being notified of the classification) to understand the plant condition of concern.

Please provide justification for this deviation from the NUMARC guidance.

ENCLOSURE

NUMARC Recognition Category A
Abnormal Rad Levels/Radiological Effluent

Issue No.2.

NUMARC Initiating Condition (IC) AU1 states:

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.

Two NUMARC Example EALs associated with IC AU1 are:

1. *A valid reading on one or more of the following monitors that exceeds the "value shown" (site specific monitors) indicates that the release may have exceeded the above criterion and indicates the need to assess the release with (site specific procedure):
(site-specific list)*
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).*

The licensee has split the liquid and gaseous release aspects of the AU1 IC into two separate ICs and EALs. The PBAPS EAL applicable to gaseous releases (5.1.1.a) states:

Main Stack, Vent Stack, or Torus Hardened Vent Rad monitor continuously in HiHi Alarm OR known Unmonitored Release continuously in progress for > 60 minutes

AND

Calculated maximum offsite dose rate exceeds 0.114 mrem/hr TPARD OR 0.342 mrem/hr child thyroid CDE based on a 60 minute average

The PBAPS EAL applicable to liquid release (5.1.1.b) states:

Report indicates Liquid Release exceeds TWO TIMES Tech Specs (T.S. 3.8.B.1) for > 60 minutes

- A. The PBAPS EAL 5.1.1.a for gaseous releases is stated only in terms of instrument readings, although other measurement and indication methods should also apply.

- B. The PBAPS EAL 5.1.1.b for liquid releases does not explicitly state the source of reports or indications that are to serve as the basis for classifying the event.
- C. The "NUMARC EAL Versus PBAPS EAL Comparison Matrix" is incorrect when it states that NUMARC Example EAL AU1.2 is addressed by PBAPS EALs 5.1.1.a and 5.1.1.b. In fact, AU1.2 is not addressed at all by PBAPS EAL 5.1.1.a and is not addressed explicitly by PBAPS EAL 5.1.1.b.
- D. NUMARC example EAL AU1.1 includes a "site specific procedure" as the method for assessment of the dose from any release. PBAPS EAL 5.1.1.a does not cite a specific procedure or method to be used for the dose calculation.
- E. The use of the terms "TPARD" and "CDE" in PBAPS EAL 5.1.1.a creates unnecessary confusion. NUMARC IC AU1 describes conditions relating to radiological releases that do not comply with licensee commitments for an extended period of time. The emphases on this IC is on the release rate, rather than the dose rate observed. The NUMARC IC AU1 does not relate to a dose rate except as described in example EALs AU1.3 and AU1.4. PBAPS does not have systems necessary to support these EALs (i.e., telemetered perimeter monitors and automatic real-time dose assessment capability). PBAPS does not, therefore, need to use dose rate indications to determine if this EAL has been exceeded.

The monitor readings stated in the EAL should be stand alone indications or, at most, be combined with main stack or vent stack or Torus Hardened Vent flow rates to come up with a radioactive material release rate (in units of, e.g., $\mu\text{Ci}/\text{sec}$). Instrument readings by themselves should be adequate to declare the event unless the reading that equates to the EAL is beyond the indicating range for the monitor(s). Thresholds for the instrument readings should be derived using the same methodologies as used in the Offsite Dose Calculation Manual (ODCM). The sample analysis methodologies assumed in the ODCM should also be used when sampling to determine if the thresholds have been exceeded.

The use of a term such as "TPARD" also will confuse outside agencies when it is used in notifications of emergency conditions. TPARD is not a commonly used term and the need to explain its meaning during time critical notifications will potentially undermine the ability to rapidly accomplish these notifications.

Similarly, the use of the more widely recognized term of "CDE" when describing dose rates is not consistent with the proper use of that term. CDE (or Committed Dose Equivalent), described in 10 CFR Part 20.1003, is an integrated dose that incorporates the 50-year dose contribution to a specific organ from a given inhalation or ingestion.

- F. The PBAPS EAL Technical Basis Manual states that in the event a HiHi alarm condition is present and dose projections are necessary, the dose projections will be performed using the monitor readings and actual meteorology. The intent of NUMARC IC AUI is to use ODCM methodology, including meteorological assumptions, rather than actual meteorology.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 3.

NUMARC Example EAL AU2.4 states:

4. *Valid direct area radiation monitor readings increase by a factor of 1000 over normal levels.*

The corresponding PBAPS EAL states:

Inplant radiation level > 1×10^3 mR/hr requiring T-103 entry

- A. The PBAPS basis states that the value of 1000 mR/hr indicates a level of "approximately 1000 times normal". The EAL does not appear to address increased radiation levels in areas of the plant where radiation levels routinely exceed the implied "normal" value of 1 mR/hr. The significance of the "requiring T-103 entry" condition is not explained fully in the basis.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 4.

Note: This issue concerns NUMARC IC AA1 and is exactly analogous to Issue No. 2 regarding IC AU1.

NUMARC Initiating Condition (IC) AA1 states:

AA1 Any unplanned Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds 200 Times the Radiological Technical Specifications for 15 Minutes or Longer.

Two NUMARC example EALs associated with IC AU1 are:

1. *A valid reading on one or more of the following monitors that exceeds 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):
(site-specific list)*
2. *Confirmed sample analyses for gaseous or liquid releases indicates concentrations or release rates in excess of (200 x site-specific technical specifications) for 15 minutes or longer.*

The licensee has split the liquid and gaseous release aspects of the AA1 IC into two separate EALs. The PBAPS EAL applicable to gaseous releases (5.1.2.a) states:

*Main Stack, Vent Stack, or Torus Hardened Vent Rad monitor continuously in HiHi Alarm OR known Unmonitored Release continuously in progress for > 15 minutes
AND
Calculated maximum offsite dose rate exceeds 11.4 mrem/hr TPARD OR 34.2 mrem/hr child thyroid CDE based on a 15 minute average*

The PBAPS EAL applicable to liquid release (5.1.2.b) states:

Report indicates Liquid Release exceeds TWO HUNDRED TIMES Tech Specs (T.S. 3.8.B.1) for > 15 minutes

- A. The PBAPS EAL 5.1.2.a for gaseous releases is stated only in terms of instrument readings, although other measurement and indication methods should also apply.
- B. The PBAPS EAL 5.1.2.b for liquid releases does not explicitly state the source of reports or indications that are to serve as the basis.
- C. The "NUMARC EAL Versus PBAPS EAL Comparison Matrix" is incorrect when it states that NUMARC Example EAL AA1.2 is addressed by PBAPS EALs 5.1.2.a and 5.1.2.b. In fact, AA1.2 is not addressed at all by PBAPS EAL 5.1.2.a and is not addressed explicitly by PBAPS EAL 5.1.2.b.
- D. Example EAL AA1.1 includes a "site specific procedure" as the method for assessment of the dose from any release. PBAPS EAL 5.1.2.a does not cite a specific procedure or method to be used for the dose calculation.
- E. The use of the terms "TPARD" and "CDE" in PBAPS EAL 5.1.2.a creates unnecessary confusion. NUMARC IC AA1 describes conditions relating to radiological releases that do not comply with licensee commitments for an extended period of time. The emphases on this IC is on the release rate, rather than the dose rate observed. The NUMARC IC AA1 does not relate to a dose rate except as described in example EALs AA1.3 and AA1.4. PBAPS does not have systems necessary to support these EALs (i.e., telemetered perimeter monitors and automatic real-time dose assessment capability). PBAPS does not, therefore, need to use dose rate indications to determine if this EAL has been exceeded.

The monitor readings stated in the EAL should be stand alone indications or, at most, be combined with main stack or vent stack or Torus Hardened Vent flow rates to come up with a radioactive material release rate (in units of, e.g., $\mu\text{Ci}/\text{sec}$). Instrument readings by themselves should be adequate to declare the event unless the reading that equates to the EAL is beyond the indicating range for the monitor(s). Thresholds for the instrument readings should be derived using the same methodologies as used in the Offsite Dose Calculation Manual (ODCM). The sample analysis methodologies assumed in the ODCM should also be used when sampling to determine if the thresholds have been exceeded.

The use of a term such as "TPARD" also will confuse outside agencies when it is used in notifications of emergency conditions. TPARD is not a commonly used term and the need to explain its meaning during time critical notifications will potentially undermine the ability to rapidly accomplish these notifications.

Similarly, the use of the more widely recognized term of "CDE" when describing dose rates is not consistent with the proper use of that term. CDE (or Committed Dose Equivalent), described in 10 CFR Part 20.1003, is an integrated dose that incorporates the 50-year dose contribution to a specific organ from a given inhalation or ingestion.

- F. The PBAPS EAL Technical Basis Manual states that in the event a HiHi alarm condition is present and dose projections are necessary, the dose projections will be performed using the monitor readings and actual meteorology. The intent of NUMARC IC AA1 is to use ODCM methodology, including meteorological assumptions, rather than actual meteorology.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 5.

NUMARC IC AA2 states:

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.

The NUMARC Example EALs for this IC state:

- I. A (site-specific set point) 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*

2. *Report of visual observation of irradiated fuel uncovered.*
3. *Water level less than (site-specific) feet for the Reactor Refueling Cavity that will result in Irradiated Fuel Uncovering.*
4. *Water Level less than (site-specific) feet for the Spent Fuel Pool and Fuel Transfer Canal that will result in Irradiated Fuel uncovering.*

The PBAPS EAL Comparison Matrix identifies PBAPS EAL 1.3.2.a as corresponding to Example EALs 1, 2, 3, and 4. PBAPS EAL 1.3.2.a states:

*Unplanned general area radiation > 500 mR/hr on the refuel floor
(Table 1-1)*

With regard to Example EAL 3, the Comparison Matrix includes the comment:

This EAL is addressed by utilizing radiation levels which could be caused by uncovering the fuel.

With regard to Example EAL 4, the comment is:

PBAPS does not have level indication on the Spent Fuel Pool. This EAL is addressed by utilizing radiation levels which could be caused by uncovering the fuel.

- A. The PBAPS EALs for this IC are based only on radiation levels and do not address the "loss of water level" aspect of NUMARC IC AA2. By not addressing the loss of water level, the PBAPS EALs for this IC lack the inherent redundancy and anticipatory quality of the NUMARC Example EALs.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 6.

NUMARC Example EAL AA3.1 states:

1. *Valid (site-specific) radiation monitor readings GREATER THAN 15 mR/hr in areas requiring continuous occupancy to maintain plant safety functions*

NUMARC Example EAL AA3.2 states:

2. *Valid (site-specific) radiation monitor readings GREATER THAN <site specific> values in areas requiring infrequent access to maintain plant safety functions.*

(Site-specific) list

The corresponding PBAPS EALs are:

- 5.2.2.b *Control Room area radiation level > 15 mR/hr for > 1 hour*
- 5.2.2.a *Inplant radiation level > 9×10^3 mR/hr for > 1 hour requiring T-103 entry*

The basis includes the following statements:

T-103 lists the areas in the plant that locate systems interfacing with the reactor coolant system.

Access to the areas listed in T-103 may be necessary to perform manual actions to achieve or maintain cold shutdown.

- A. It is not clear that the 9000 mR/hr criterion applies only to those areas specifically listed in T-103 or to any areas in the plant where personnel access might be required to maintain safe operations or to establish or maintain cold shutdown..
- B. It is not clear whether the EAL is met whenever the 9000 mR/hr criterion is exceeded for more than one hour or only when entry into the affected area is required.
- C. PBAPS EALs 5.2.2.a and 5.2.2.b deviate from the NUMARC guidance by providing a time limit (1 hr) for which the radiation levels must exceed the setpoint. This deviation was not justified and may unnecessarily delay classifying events.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 7.

NUMARC IC AS1 states:

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.

NUMARC Example EAL AS1.1 states:

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):*

NUMARC Example EAL AS1.4 states:

4. *Field survey results indicate site boundary dose rates exceeding 100 mR/hr expected to continue for more than one hour; or analyses of field survey samples indicate child thyroid dose commitment of 500 mR/hr for one hour of inhalation.*

The PBAPS Comparison Matrix identifies PBAPS EAL 5.1.3 as corresponding to NUMARC EAL AS1.1 with the following note:

PBAPS contains this within AS1.3 & 1.4, but does not specifically address.

PBAPS EAL 5.1.3 states:

*Projected offsite dose exceeds 100 mrem TPARD, OR
Projected offsite dose exceeds 500 mrem child thyroid CDE, OR
Actual offsite whole body dose rate exceeds 100 mrem/hr*

- A. PBAPS EAL 5.1.3 does not reflect the basic intent of Example EAL AS1.1, i.e., that the EAL be stated in terms of readings on effluent or other plant radiation monitors.

- B. PBAPS EAL 5.1.3 does not provide for a classification based on analyses of field survey samples indicating that the child thyroid dose commitment has been exceeded.
- C. PBAPS EAL 5.1.3 does not reflect the intent of NUMARC EAL AS1.4 in that it does not equate the actual offsite whole body dose rate to a total effective dose by integrating the dose rate over time for those releases "expected to continue for more than one hour".
- D. The use of a term such as "TPARD" in PBAPS EAL 5.1.3 will confuse outside agencies when it is used in notifications of emergency conditions. TPARD is not a commonly used term and the need to explain its meaning during time critical notifications will potentially undermine the ability to rapidly accomplish these notifications. The more commonly understood term of Total Effective Dose Equivalent (TEDE) is an appropriate term to use in this EAL since it is the integrated dose term recognized when comparing offsite doses to the Protective Action Guides (PAGs) established for radiological accident scenarios.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 8.

Note: This issue concerns NUMARC IC AG1 and is exactly analogous to Issue No. 7 above.

NUMARC IC AG1 states:

AG1 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 Using Actual Meteorology.

NUMARC Example EAL AG1.1 states:

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):*

NUMARC Example EAL AG1.4 states:

4. *Field survey results indicate site boundary dose rates exceeding 1000 mR/hr expected to continue for more than one hour; or analyses of field survey samples indicate child thyroid dose commitment of 5000 mR/hr for one hour of inhalation.*

The PBAPS Comparison Matrix identifies PBAPS EAL 5.1.4 as corresponding to this example, with the following note:

PBAPS contains this within ASI.3 & 1.4 (sic), but does not specifically address.

PBAPS EAL 5.1.4 states:

*Projected offsite dose exceeds 1000 mrem TPARD, OR
Projected offsite dose exceeds 5000 mrem child thyroid CDE, OR
Actual offsite whole body dose rate exceeds 1000 mrem/hr*

- A. PBAPS EAL 5.1.4 does not reflect the basic intent of Example EAL AG1.1, i.e., that the EAL be stated in terms of readings on effluent or other plant radiation monitors.
- B. PBAPS EAL 5.1.4 does not provide for a classification based on analyses of field survey samples indicating that the child thyroid dose commitment has been exceeded.
- C. PBAPS EAL 5.1.4 does not reflect the intent of NUMARC EAL AG1.4 in that it does not equate the actual offsite whole body dose rate to a total effective dose by integrating the dose rate over time for those releases "expected to continue for more than one hour".
- D. The use of a term such as "TPARD" in PBAPS EAL 5.1.4 will confuse outside agencies when it is used in notifications of emergency conditions. TPARD is not a commonly used term and the need to explain its meaning during time critical notifications will potentially undermine the ability to rapidly accomplish these notifications. The more commonly understood term of Total Effective Dose Equivalent (TEDE) is an appropriate term to use in this EAL since it is the integrated dose term recognized when comparing offsite doses to the Protective Action Guides (PAGs) established for radiological accident scenarios.

Provide additional information that justifies the departure from the NUMARC guidance.

NUMARC Recognition Category F
Fission Product Barrier Degradation

Issue No. 9

The NUMARC EAL methodology includes a fission product barrier matrix for determining whether or not a barrier (fuel clad, reactor coolant system, or containment) is lost or potentially lost and for classifying events based on the combination of lost or potentially lost barriers. The fission product barrier matrix provides multiple indications to operators to assess the status of each of the barriers.

The PBAPS EAL scheme did not include a fission product barrier matrix but rather specified a predetermined set of EALs which represented the loss or potential loss of one or more barriers. For example, Drywell pressure greater than 62.5 psig was stated to be indicative of the loss of containment, the loss of reactor coolant system and the potential loss of fuel clad, and therefore warranted a General Emergency classification.

By eliminating the barrier matrix and substituting predetermined groupings of indications, the PBAPS EAL scheme may, in some cases, decrease the accuracy and timeliness of classifying events. The licensee did not provide a thorough evaluation of the equivalence of their proposed EAL scheme to the NUMARC fission product barrier scheme.

The NRC staff systematically evaluated a limited set of combinations of the NUMARC fission product barrier indications against the PBAPS EALs to determine whether the PBAPS EALs provided for equivalent classification. Several deviations were identified with the PBAPS EAL methodology.

For example, the NUMARC barrier failure matrix describes a rapid, unexplained decrease in drywell pressure following an initial increase as indicative of a loss of the primary containment barrier. Under the NUMARC barrier matrix arrangement, this particular loss of the primary containment (drywell) barrier could be classified as:

1. an unusual event if it occurred by itself,
2. a site area emergency if it occurred with a potential loss of either of the other barriers, or
3. a general emergency if it occurred with a loss of another barrier and the potential loss of the third barrier

The licensee has listed PBAPS EAL 3.1.3 as comparable to the NUMARC EAL described above. PBAPS EAL 3.1.3 is classified, however, as a site area emergency only. The PBAPS EAL scheme does not permit a rapid, unexplained decrease in drywell pressure following an initial increase to be classified as either an unusual event or as a contributor to a general emergency.

This was only one example of the deviations that were observed. Because the deviations identified in this limited evaluation of the possible combinations were not identified or justified in the EAL submittal, the staff is concerned that the licensee did not thoroughly evaluate the equivalence of the proposed PBAPS EAL scheme to all possible combinations of barrier loss or degradation under the NUMARC scheme.

Provide the results of a systematic evaluation of the equivalence of the proposed EAL scheme to the NUMARC fission product barrier EAL scheme and justify any deviations.

Issue No. 10.

NUMARC Example EALs FC5, RC6, and PC 6 state:

Emergency Director Judgement

The NUMARC basis states, in part:

This EAL addresses any other factors that are to be used by the Emergency Director in determining whether the (Fuel Clad, RCS, or Containment) barrier is lost or potentially lost. In addition, the inability to monitor the barrier should also be incorporated into this EAL as a factor in Emergency Director judgement that the barrier may be considered lost or potentially lost.

The corresponding PBAPS EALs state:

9.1.2 Events are in progress or have occurred which indicate an actual or potential substantial degradation of the level of safety of the plant

9.1.3 Events are in progress or have occurred which indicate an actual or likely major failure of plant functions needed for protection of the public

9.1.4 Events are in progress or have occurred which indicate an actual or imminent substantial core degradation or melting with the potential for loss of containment integrity

- A. PBAPS EALs 9.1.2, 9.1.3 and 9.1.4 are not consistent with the NUMARC Example EAL bases in that they do not explicitly state that the basis for the classification is the judgement of the Emergency Director regarding the status of specific barriers. This feature of the example EAL is important to resolving the ambiguity that may surround the classification of events and conditions not addressed explicitly in the EALs.
- B. PBAPS EALs 9.1.2, 9.1.3 and 9.1.4 are not consistent with the NUMARC Example EAL bases in that they do not address the loss or potential loss of fission product barriers.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 11.

The NUMARC basis for Example EAL RC2 (Drywell Pressure) states;

The (site-specific) drywell pressure is based on the drywell high pressure alarm set point 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.

PBAPS states in the bases for EALs 1.1.3 and 3.1.2 that exception is taken to the NUMARC methodology because their drywell high pressure alarm setpoint of 2 psig can be reached as a result of a "small primary system leak and/or loss of drywell cooling." A value of 9 psig has been selected to represent the loss of RCS integrity and the basis states:

The value of 9 psig was selected in that it is larger than experience shows of blown packing and recirc seal leaks. The value of 9 psig is more representative of a LOCA condition and this torus pressure is in the TRIPs for actions to protect the containment.

- A. PBAPS does not provide documentation supporting the contention that 9 psig is less than the drywell pressure that would be reached for a 50 gpm RCS leak rate.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 12.

Table 3 of the NUMARC Fission Product Barrier Reference Table lists the following RCS Barrier Example EAL:

RC1 - potential loss of RCS barrier based on RCS leak rate:

RCS leakage GREATER THAN 50 GPM inside the drywell, OR

Unisolable primary system leakage outside drywell as indicated by area temp or area rad alarm

Table 3 of the NUMARC guidance lists the following Primary Containment Barrier Example EAL:

PC2 - loss of Primary Containment Barrier based on Containment Isolation Valve after Containment Isolation:

Unisolable primary sys leakage outside drywell as indicated by area temp or area rad alarm

The IC for PBAPS EAL 4.1.2 (Alert) states:

Potential loss of Reactor Coolant System and Potential loss of Containment

PBAPS EAL 4.1.2 states:

An Unisolable Primary System Leak is discharging into Secondary Containment

AND

A T-103 Temperature Action Level is exceeded in ONE area requiring a SCRAM

The PBAPS basis for EAL 4.1.2 states:

This EAL represents a challenge to both the Reactor Coolant and Containment Barriers. The case of single area exceeding their Temperature Action Levels indicates that there is a potential bypass of primary containment, as well as the potential loss of the reactor coolant pressure boundary by either a breach in high energy piping without isolation or interfacing systems LOCA. Increase in temperature in only one area indicates that the size of the leak is small enough to not cause a direct flow path to the environment.

The IC for PBAPS EAL 4.1.3 (Site Area Emergency) states:

Loss of Reactor Coolant System and Containment

PBAPS EAL 4.1.3 states:

An Unisolable Primary System Leak is discharging into Secondary Containment

AND

T-103 Temperature Action Levels are exceeded in TWO OR MORE areas requiring an Emergency Blowdown per T-112

- A. An EAL corresponding to "RCS leakage GREATER THAN 50 gpm inside the drywell" was not provided in the PBAPS EAL scheme as a potential loss of the RCS barrier. The basis for not providing this EAL was "This barrier is not explicitly addressed at PBAPS. There are

several EALs, including which adequately address this situation." The intent of the NUMARC EAL methodology is to use all available indications to determine the integrity of the fission product barriers and to classify the event.

- B. NUMARC Table 3 identifies the potential loss of EITHER the fuel clad or reactor coolant system boundary AND the loss of any additional boundary as a Site Area Emergency instead of the Alert specified by PBAPS EAL 4.1.2.
- C. The consistency of EAL 4.1.2 with the NUMARC barrier loss system appears to hinge on a site-specific definition under Example EAL PC5 (Other Site Specific Indications), i.e., that a leak causing increased temperatures in only one area is only a potential loss of containment integrity. Although the EAL appears reasonable as a precursor to the Site Area Emergency declaration required by EAL 4.1.3, the basis does not adequately support it, specifically the contention that "*Increase in temperature in only one area indicates that the size of the leak is small enough to not cause a direct flow path to the environment.*"

Provide additional information that justifies the departure from the NUMARC guidance.

NUMARC Recognition Category H
Hazards and Other Conditions Affecting Plant Safety

Issue No. 13.

NUMARC Example EAL HU1.1 states:

- 1. *(Site-specific) method indicates felt earthquake.*

PBAPS EAL 8.4.1.a, which corresponds to this example, states:

Earthquake > .01 g

The PBAPS basis states:

The magnitude of 0.01g (OC693) is the lowest detectable earthquake measured on PBAPS seismic instrumentation per SO 67.7.A.

- A. Contrary to the NUMARC guidance, the method by which an earthquake of the stated magnitude will be identified is not included in the EAL statement.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 14.

NUMARC Example EAL HU1.2 states:

2. *Report by plant personnel of tornado striking within protected area boundary.*

PBAPS EAL 8.4.1.b, which corresponds to this example, states:

Report of a Tornado within the Site Boundary

OR

Wind speeds > 75 mph as indicated on site meteorological data for > 15 minutes

The basis includes the statement:

A tornado touching down within the Protected Area or wind speeds > 75 mph within the owner controlled area are of sufficient velocity to have the potential to cause damage to the Plant Vital Structures.

- A. PBAPS EAL 8.4.1.b is not consistent with NUMARC Example EAL HU1.2 regarding the location of a tornado strike that requires a Unusual Event declaration, i.e., within the site boundary vs the protected area boundary.
- B. There is apparent inconsistency between PBAPS EAL 8.4.1.b and the basis regarding the location of a tornado strike that requires a Unusual Event declaration. The EAL states site boundary while the basis refers to the Protected Area.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 15.

NUMARC Example EAL HU1.3 states:

3. *Assessment by the control room that an event has occurred.*

The PBAPS Comparison Matrix identifies PBAPS EAL corresponding to this example as 9.1.1, which falls under the Initiating Condition of "Other conditions existing which in the judgement of the Emergency Director warrant declaration of an Unusual Event". PBAPS EAL 9.1.1 states:

Events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant

This EAL is not explicit as regards its applicability to the "Natural or Destructive Phenomena" IC. In the NUMARC workshop questions and answers (number 5 under Hazards and Other Conditions Affecting Plant Safety), the intent of this example is explained as follows:

As stated in the basis, EAL 3 of HU1 allows control room personnel to make the determination (without having to wait for verification) that a natural or destructive phenomenon has occurred that warrants the declaration of an Unusual Event. HU5 applies to any situation not explicitly addressed in the EALs that, in the judgement of the Emergency Director, merits an emergency declaration.

- A. It is clear that the NUMARC guidance intends that HU1.3 be explicitly stated in terms of the control room staff's judgement regarding the existence of a natural/destructive phenomenon affecting the protected area, and not for HU1.3 to be subsumed under some other broad "Emergency Director judgement" EAL.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 16.

NUMARC Example EAL HU1.5 states:

5. *Report by plant personnel of an unanticipated explosion within protected area boundary resulting in visible damage to permanent structure or equipment.*

The corresponding PBAPS EAL, 8.2.1.c, states:

Report by plant personnel confirming the occurrence of an explosion in a Plant Vital Structure (Table 8-1)

Table 8-1 identifies the Plant Vital Structures as the Power Block, Diesel Generator Building, Emergency Pump Structure, Inner Screen Structure and Emergency Cooling Tower.

- A. PBAPS EAL 8.2.1.c is not consistent with NUMARC Example EAL HU1.5 regarding the location (*within protected area boundary vs. in a Plant Vital Structure*) and effect (*resulting in visible damage vs. occurrence*) of the explosion.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 17.

NUMARC Example EAL HU2.1 states:

1. *Fire in buildings or areas contiguous to any of the following (site-specific) areas not extinguished within 15 minutes of control room notification or verification of a control room alarm:*

The corresponding PBAPS EAL, 8.2.1.a, states:

Fire within ON-114 Plant Vital Structures (Table 8-1) which is not extinguished within 15 minutes of verification of alarms

- A. PBAPS EAL 8.2.1.a is not consistent with NUMARC Example EAL HU2.1 in that it does not include "control room notification" as one starting point for the 15-minute time criterion. The Control Room may be notified of a fire by an observer prior to (or instead of) the tripping of an alarm, in which case the report should serve as verification that a fire exists.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 18.

NUMARC Example EAL HU5.1 states:

1. *Other conditions exist which in the judgement of the Emergency Director indicate a potential degradation of the level of safety of the plant.*

The corresponding PBAPS EAL, 9.1.1, states:

Events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant.

- A. PBAPS EAL 9.1.1 is not consistent with the NUMARC Example EAL HU5.1 in that it does not explicitly state that the basis for the classification is the judgement of the Emergency Director. This feature of the example EAL is important to resolving the ambiguity that may surround the classification of events and conditions not addressed explicitly in the EALs.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 19.

NUMARC Example EAL HA1.1 states:

1. *(Site-Specific) method indicates Seismic Event greater than Operating Basis Earthquake (OBE).*

The corresponding PBAPS EAL, 8.4.2.a, states:

Earthquake > .05 g

The basis states:

This EAL addresses an earthquake that exceeds the Operating Basis Earthquake level of .05g and is beyond design basis limits.

- A. Contrary to the NUMARC guidance, the method by which an earthquake of the stated magnitude will be identified is not included in the EAL statement.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 20.

NUMARC Example EAL HA1.2 states:

2. *Tornado or high winds striking plant vital areas: Tornado or high winds greater than (site-specific) mph strike within protected area boundary.*

The corresponding PBAPS EAL, 8.4.2.b, states:

Tornado or wind speeds > 75 mph causing damage to Plant Vital Structures (Table 8-1)

- A. The PBAPS EAL deviates from the NUMARC guidance in that a damage assessment must be made in the PBAPS EAL.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 21.

NUMARC EXAMPLE EAL HA1.3 states:

3. *Report of any visible structural damage 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 Rooms*
 - *Other (Site-Specific) Structures*

The corresponding PBAPS EAL, 8.4.2.b, states:

Tornado or wind speeds > 75 mph causing damage to Plant Vital Structures (Table 8-1)

Table 8-1 identifies the Plant Vital Structures as the Power Block, Diesel Generator Building, Emergency Pump Structure, Inner Screen Structure and Emergency Cooling Tower.

- A. It does not appear from the EAL or the basis that the Table 8-1 Plant Vital Structures list encompasses all the structures and components listed in the NUMARC Example EAL. Specifically, the tanks listed in NUMARC EAL HA 1.3 are not listed in PBAPS Table 8-1.
- B. Contrary to the NUMARC guidance, the PBAPS EAL contains an additional condition that the damage must be the result of high winds or a tornado.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 22.

NUMARC Example EALs HA4.1 and 4.2 state:

1. *Intrusion into plant protected area by a hostile force.*
2. *Other security events as determined from (site-specific) Safeguards Contingency Plan.*

The NUMARC basis states:

Intrusion into a vital area by a hostile force will escalate this event to a Site Area Emergency.

The corresponding PBAPS EAL, 8.1.2, states:

Confirmed hostile intrusion or act within the Protected Area as evidenced by

- *Actual attack and intrusion into the Protected Area, OR*
- *Suspected bomb, sabotage or sabotage device discovered in the Protected/Vital Area*

The PBAPS basis states:

Security threats which meet the threshold for declaration of an Alert are:

1. *Actual attack and intrusion into the Protected Area*
2. *Suspected bomb, sabotage or sabotage device discovered within the Protected Area*

This event will be escalated to a Site Area Emergency based upon a hostile intrusion or act in plant Vital Areas per EAL Section 8.1.3.

- A. PBAPS EAL 8.1.2 is inconsistent with the NUMARC guidance in that it identifies suspected bomb, sabotage or sabotage device discovered in the "Protected/Vital Area" as an Alert, whereas the guidance clearly intends that "Vital Area" not be included within this definition.
- B. PBAPS EAL 8.1.2 is inconsistent with its stated basis as regards the area within which discovery of a suspected bomb, sabotage or sabotage device will initiate an Alert (*Protected/Vital Area* vs. *Protected Area*).

- C. PBAPS EAL 8.1.2 contains an element of ambiguity that could make it very difficult to interpret and apply, i.e., the idea that a "*suspected* bomb, sabotage or sabotage act" can be evidence of a "*confirmed* hostile intrusion" and the related question of whether a confirmed bomb in the Protected Area is more serious (and deserving of a higher emergency class) than a suspected bomb.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 23.

NUMARC Example EAL HA5.1 states:

1. *Entry into (site-specific) procedure for control room evacuation.*

The corresponding PBAPS EAL, 7.1.2, states:

Control Room evacuation procedures have been initiated

- A. Contrary to the NUMARC guidance, the specific PBAPS procedure for control room evacuation is not identified in the EAL.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 24.

NUMARC Example EAL HA6.1 states:

1. *Other conditions exist 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.*

The corresponding PBAPS EAL, 9.1.2, states:

Events are in progress or have occurred which indicate an actual or potential substantial degradation of the level of safety of the plant

- A. PBAPS EAL 9.1.2 is not consistent with the NUMARC Example EAL HA6.1 in that it does not explicitly state that the basis for the classification is the judgement of the Emergency Director. This feature of the example EAL is important to resolving the ambiguity that may surround the classification of events and conditions not addressed explicitly in the EALs.
- B. PBAPS EAL 9.1.2 is not consistent with the NUMARC Example EAL HA6.1 in that it does not explicitly state that the need for "increased monitoring of plant functions" is a factor to be considered by the Emergency Director in deciding whether an Alert is warranted.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 25.

NUMARC Example EALs HS1.1 and 1.2 state:

1. *Intrusion into plant vital area by a hostile force.*
2. *Other security events as determined from (site-specific) Safeguards Contingency Plan.*

The NUMARC basis states:

This class of security events represents an escalated threat to plant safety above that contained in the Alert IC in that a hostile force has progressed from the Protected Area to the Vital Area.

The corresponding PBAPS EAL, 8.1.3, states:

- Confirmed hostile intrusion or act in plant Vital Areas as evidenced by:*
- *Actual attack and intrusion into a Vital Area, OR*
 - *Confirmed bomb, sabotage or sabotage device discovered in the Protected/Vital Area*

The PBAPS basis states:

Security threats which meet the threshold for declaration of a Site Area Emergency are:

1. *Actual attack and intrusion into a Vital Area*
 2. *Confirmed bomb, sabotage or sabotage device discovered within the Vital Area*
- A. PBAPS EAL 8.1.3 is inconsistent with the NUMARC guidance in that it identifies a confirmed bomb, sabotage or sabotage device discovered in the "Protected/Vital Area" as a Site Area Emergency, whereas the guidance clearly intends that the "Vital Area" alone be included within this definition.
- B. PBAPS EAL 8.1.2 is inconsistent with its stated basis as regards the area within which discovery of a confirmed bomb, sabotage or sabotage device will initiate a Site Area Emergency (*Protected/Vital Area vs. Vital Area*).

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 26.

NUMARC Example EAL HS2.1 states:

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 within (site-specific) minutes.*

The corresponding PBAPS EAL, 7.1.3, states:

Failure to establish Alternate/Emergency Control of the Plant within 15 minutes after evacuation of the Control Room

- A. Contrary to the NUMARC guidance, the specific PBAPS procedure for establishing alternate/emergency control of the plant is not identified in the EAL.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 27.

NUMARC Example EAL HS3.1 states:

1. *Other conditions exist which in the Judgement of the Emergency Director indicate actual or likely major failures of plant functions needed for protection of the public.*

The corresponding PBAPS EAL, 9.1.3, states:

Events are in progress or have occurred which indicate an actual or likely major failure of plant functions needed for protection of the public

- A. PBAPS EAL 9.1.3 is not consistent with the NUMARC Example EAL HS3.1 in that it does not explicitly state that the basis for the classification is the judgement of the Emergency Director. This feature of the example EAL is important to resolving the ambiguity that may surround the classification of events and conditions not addressed explicitly in the EALs.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 28.

NUMARC Example EAL HG2.1 states:

1. *Other conditions exist 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 radionuclide releases. These releases can reasonably be expected to exceed EPA PAG plume exposure levels outside the site boundary.*

The corresponding PBAPS EAL, 9.1.4, states:

Events are in progress or have occurred which indicate an actual or imminent substantial core degradation or melting with the potential for loss of containment integrity

- A. PBAPS EAL 9.1.4 is not consistent with the NUMARC Example EAL HG2.1 in that it does not explicitly state that the basis for the classification is the judgement of the Emergency Director. This feature of the example EAL is important to resolving the ambiguity that may surround the classification of events and conditions not addressed explicitly in the EALs.
- B. PBAPS EAL 9.1.4 is not consistent with the NUMARC Example EAL HG2.1 in that it does not explicitly include the aspect of potential uncontrolled radionuclide releases resulting in offsite doses exceeding the EPA PAG.

Provide additional information that justifies the departure from the NUMARC guidance.

NUMARC Recognition Category S
System Malfunction

Issue No. 29.

NUMARC Example EAL SU1.1 states:

- 1. *The following conditions exist:*
 - a. *Loss of power to (site-specific) transformers for greater than 15 minutes*
 - AND**
 - b. *At least (site-specific) emergency generators are supplying power to emergency busses.*

The corresponding PBAPS EAL, 6.1.1.a, states:

Loss of ALL Offsite Power for > 15 minutes

- A. PBAPS EAL 6.1.1.a is not consistent with the NUMARC guidance in that it does not include the aspect of emergency generators supplying power to emergency busses. This point is mentioned in the EAL basis, but it is not included in the actual EAL.
- B. Contrary to the NUMARC guidance, PBAPS EAL 6.1.1.a does not identify site-specific transformers, loss of power to which constitutes "loss of all offsite power". Again, these transformers are listed in the basis, but not in the actual EAL.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 30.

NUMARC Example EAL SU3.1 states:

- 1. *The following conditions exist:*
 - a. *Loss of most or all (site-specific) annunciators associated with safety systems for greater than 15 minutes.*
AND
 - b. *Compensatory non-alarming indications are 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.*

The corresponding PBAPS EAL, 7.3.1.a, states:

Loss of All Annunciators in the Control Room for > 15 minutes

- A. PBAPS EAL 7.3.1.a is inconsistent with the NUMARC guidance in that it specifies loss of all annunciators and does not address the availability of compensatory non-alarming indications, the need for increased plant surveillance, or whether the loss was planned.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 31.

NUMARC IC SU4, *Fuel Clad Degradation*, is identified as being applicable in all operating modes. Example EAL SU4.1 for this IC states:

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

The corresponding PBAPS EALs, 1.1.1.b and 4.2.1, both identified as being applicable only in modes 1,2 and 3, are stated as follows:

1.1.1.b *SJAE Radiation (Offgas Monitor) > 2.5x10³ mR/hr*

4.2.1 *Main Steam Line HiHi Radiation (10xNFPB)*

- A. It is reasonable for the two radiation monitor readings specified in the above PBAPS EALs to be valid EALs only in modes 1-3. However, it is not clear from the PBAPS basis that the PBAPS EALs include indications that are valid in all operating modes for which there are applicable clad integrity technical specifications.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 32.

NUMARC Example EAL SU5.1 states:

1. *The following conditions exist:*
 - a. *Unidentified or pressure boundary leakage greater than 10 gpm*
 - OR**
 - b. *Identified leakage greater than 25 gpm*

The corresponding PBAPS EAL, 3.1.1.b, states:

Unidentified Primary System Leakage > 10 gpm into the Drywell
OR
Identified Primary System leakage > 25 gpm into the Drywell

The PBAPS basis states:

The value of 10 gpm unidentified leakage is significantly higher than the expected pressurized leak rate from the reactor coolant system. The 10 gpm value for the unidentified pressure boundary leakage was selected as it is twice the Technical Specification value, indicating an increase beyond that assumed in Safety Analysis.

- A. PBAPS EAL 3.1.1.b is not consistent with the NUMARC guidance in that it does not specify a value for pressure boundary leakage.
- B. PBAPS EAL 3.1.1.b is inconsistent with its stated basis in that the basis appears to justify a 10 gpm EAL for pressure boundary leakage in addition to a 10 gpm EAL for unidentified leakage, whereas the EAL addresses only unidentified leakage.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 33.

NUMARC Example EAL SU7.1 states:

1. *Either of the following conditions exist:*
 - a. *Unplanned Loss of Vital DC power to required DC busses based on (site-specific) bus voltage indications.*

AND

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

The applicable PBAPS EAL, 6.1.1.b, states:

Loss of ALL safety related DC Power indicated by <107.5 VDC for > 15 minutes

- A. PBAPS EAL 6.1.1.b is inconsistent with the NUMARC guidance in that it does not address the "unplanned" aspect of the power loss.
- B. Contrary to the NUMARC guidance, PBAPS EAL 6.1.1.b does not identify site-specific busses on which the EAL is based.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 34.

NUMARC Example EAL SA1.1 states:

1. *The following conditions exist:*
- a. *Loss of power to (site-specific) transformers*
AND
- b. *Failure of (site-specific) emergency generators to supply power to emergency busses.*
AND
- c. *Failure to restore power to at least one emergency bus within 15 minutes from the time of loss of both offsite and onsite AC power.*

The corresponding PBAPS EAL, 6.1.2.b, states:

Loss of ALL Offsite Power

AND

All 4 KV Emergency Busses are unavailable for > 15 minutes

- A. Contrary to the NUMARC guidance, PBAPS EAL 6.1.2.b does not identify site-specific transformers, loss of power to which is the basis for the EAL.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 35.

NUMARC Example EAL SA2.1 states:

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.*

The corresponding PBAPS EAL, 2.2.2, states:

Failure of Automatic RPS SCRAM to reduce reactor power to < 3%

- A. Contrary to the NUMARC guidance, PBAPS EAL 2.2.2 does not identify site-specific indications that a RPS trip setpoint was exceeded and that an automatic RPS SCRAM should have been initiated.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 36.

NUMARC Example EAL SA3.1 states:

1. *The following conditions exist:*
a. *Loss of (site-specific) Technical Specification required functions to maintain cold shutdown.*

- AND**
- b. *Temperature increase that either:*
- *Exceeds Technical Specification cold shutdown temperature limit*
- OR**
- *Results in uncontrolled temperature rise approaching cold shutdown technical specification limit.*

The corresponding PBAPS EAL, 7.2.2, states:

Uncontrolled Reactor Coolant temperature increase to > 212°F
AND
Inability to establish alternate decay heat removal capability

- A. Contrary to the NUMARC guidance, PBAPS EAL 7.2.2 does not identify site-specific Technical Specification required functions necessary to maintain cold shutdown.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 37.

NUMARC Example EAL SA4.1 states:

1. *The following conditions exist:*
- a. *Loss of most or all (site-specific) annunciators 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:*
1. *A significant plant transient is in progress.*
- OR**
2. *Compensatory non-alarming indications are unavailable.*

The corresponding PBAPS EAL, 7.3.2, states:

Loss of All Annunciators in the Control Room for >15 minutes

AND

*Significant Plant Transient (Table 7-2) is in progress **OR** Plant Monitoring System is unavailable)*

- A. PBAPS EAL 7.3.2 is inconsistent with the NUMARC guidance in that it requires loss of all annunciators rather than most or all annunciators associated with safety systems.
- B. The opinion of the Shift Supervisor with regard to the need for increased surveillance is not explicitly stated in PBAPS EAL 7.3.2.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 38.

NUMARC Example EAL SA5.1 states:

1. *The following conditions exist: (a and b)*
 - a. *Loss of power to <site-specific> Transformers for Greater than 15 minutes.*

AND

 - b. *Onsite Power Capability has been Degraded to one (Train of) Emergency Bus(es) Powered from a Single Onsite Power Source due to the Loss of: <site-specific list>*

The corresponding PBAPS EAL, 6.1.2.a, states:

LOSS of ALL Offsite Power for > 15 minutes
AND
Only ONE 4 KV Emergency Bus is available

- A. Contrary to the NUMARC guidance, PBAPS EAL 6.1.2.a does not identify site-specific transformers, loss of power to which constitutes "loss of all offsite power".
- B. The PBAPS EAL does not provide a site-specific list of combinations of losses of power sources that would meet condition b. of the NUMARC Example EAL.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 39.

NUMARC Example EAL SS1.1 states:

- 1. *Loss of all offsite and onsite AC power as indicated by:*
 - a. *Loss of power to (site-specific) transformers.*
AND
 - b. *Failure of (site-specific) emergency generators to supply power to emergency busses.*
AND
 - c. *Failure to restore power to at least one emergency bus within (site-specific) minutes from the time of loss of both offsite and onsite AC power.*

The corresponding PBAPS EAL, 6.1.3.a states:

Loss of ALL Offsite Power
AND
ALL 4 KV Emergency Busses are unavailable for > 15 minutes

- A. Contrary to the NUMARC guidance, PBAPS EAL 6.1.3.a does not identify site-specific transformers, loss of power to which constitutes "loss of all offsite power".

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 40.

NUMARC IC SS4 states:

Complete loss of Function Needed to Achieve or Maintain Hot Shutdown

NUMARC Example EAL SS4.1 states:

1. *Complete loss of any (site-specific) function required for hot shutdown.*

The NUMARC basis states:

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.

PBAPS EAL 7.2.3 states:

Loss of Main Condenser as a heat sink

AND

Loss of TORUS Heat sink capabilities as evidenced by T-102 legs [T/T, T/L, PC/P, or DW/T] requiring an Emergency Blowdown

The PBAPS basis states:

This EAL addresses complete loss of functions required to reach cold shutdown from MODE 1,2 or 3.

- A. Although the PBAPS EAL appears to address the heat sink function required to achieve and maintain hot shutdown, it does not address other functions such as reactivity control or inventory control.
- B. By its reference to the "cold shutdown" condition, the basis is apparently in conflict with the EAL and IC.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 41.

NUMARC Example EAL SS6.1 states:

1. *The following conditions exist:*
 - a. *Loss of (site-specific) annunciators associated with safety systems.*
AND
 - b. *Compensatory non-alarming indications are unavailable.*
AND
 - c. *Indications needed to monitor (site-specific) safety functions are unavailable.*
AND
 - c. *Transient is in progress.*

The NUMARC basis states:

(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.)

The corresponding PBAPS EAL, 7.3.3, states:

Loss of All Annunciators in the Control Room for > 15 minutes
AND
Significant Plant Transient (Table 7-2) is in progress
AND
Plant Monitoring System is unavailable

The PBAPS basis states:

Although loss of ALL annunciators is specified, if a large portion of annunciators or significant annunciators, as determined by the shift manager, are lost this EAL would then be appropriately entered.

and

Planned maintenance or testing activities are included in this EAL due to the significance of the event. Control Room panels with annunciators and the restoration is included in ON-123, Loss of Control Room Annunciators.

- A. PBAPS EAL 7.3.3 is inconsistent with the NUMARC guidance in that it requires loss of all annunciators rather than specified annunciators associated with safety systems.
- B. PBAPS EAL 7.3.3 is in apparent conflict with its stated basis in that the EAL require loss of ALL annunciators whereas the basis states that loss of a large portion of annunciators or significant annunciators is also basis for entering the EAL.
- C. The PBAPS basis provides no justification for the requirement that annunciators be lost for greater than 15 minutes to satisfy this EAL. Neither the NUMARC IC, the example EAL or the NUMARC basis provide for this delay.
- D. It appears that the PBAPS basis paragraph beginning "Planned maintenance or testing activities" correctly includes planned annunciator maintenance and testing activity under this EAL despite the ambiguity of the corresponding NUMARC basis statement. However, the second sentence of the PBAPS basis paragraph (beginning "Control Room panels with annunciators") is itself sufficiently ambiguous that the overall correctness and intent of the paragraph is subject to question.

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 42.

NUMARC Example EAL SG1.1 states:

- 1. *Prolonged loss of all offsite and onsite AC power as indicated by:*
 - a. *Loss of power to (site-specific) transformers.*
 - AND**
 - b. *Failure of (site-specific) emergency diesel generators to supply power to emergency busses.*
 - AND**

c. *At least one of the following conditions exists:*

- *Restoration of at least one emergency bus within (site-specific) hours is NOT likely*
- OR*
- *(Site-Specific) Indication of continuing degradation of core cooling based on Fission Product Barrier monitoring.*

The corresponding PBAPS EAL, 6.1.4, states:

Loss of All Offsite Power

AND

All 4 KV Emergency Busses are unavailable for > 2 hours

- A. Contrary to the NUMARC guidance, PBAPS EAL 6.1.4 does not identify site-specific transformers, loss of power to which constitutes "loss of all offsite power".
- B. PBAPS EAL 6.1.4 does not provide for a predictive recognition of a loss of emergency busses for > 2 hours. PBAPS EAL 6.1.4 is worded similarly to PBAPS EALs 6.1.2.b and 6.1.3.a regarding this point, and the duration of the losses described in those EALs were not intended to be predictive. The wording of the first condition described in NUMARC EAL SG1.1.c differs from the corresponding conditions listed in NUMARC EALs SA1.1.c and SS1.1.c.
- C. Contrary to the NUMARC guidance, PBAPS EAL 6.1.4 did not include a condition for "Indication of continuing degradation of core cooling based on Fission Product Barrier monitoring."

Provide additional information that justifies the departure from the NUMARC guidance.

Issue No. 43.

The PBAPS EAL scheme contained the following IC:

4.2.3 (- Site Area Emergency)

Loss of Reactor Coolant System and Containment

This IC contains the following EAL:

Main Steam Line Break discharging into the Turbine Building

AND

Vent Stack > 1×10^9 $\mu\text{Ci}/\text{sec}$

- A. It is unclear why the vent stack radiological release rate is needed to confirm the loss of the two barriers when other indications are available (such as direct reports of steam leakage and plant parameter indications).

Please provide justification for the radioactive material release setpoints used in this EAL.