

October 27, 1993

MEMORANDUM TO: James E. Dyer, Project Director
Project Directorate III-2
Division of Reactor Projects III/IV/V
Office of Nuclear Reactor Regulation

FROM: Robert A. Erickson, Chief
Emergency Preparedness Branch
Division of Radiation Safety
and Safeguards
Office of Nuclear Reactor Regulation

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION REGARDING PROPOSED
EAL CHANGES IN COMMONWEALTH EDISON'S GENERATING
STATION EMERGENCY PLAN (GSEP) ANNEXES

By letter dated September 1, 1993, as supplemented by letter dated October 1, 1993, Commonwealth Edison Company (CECo) submitted proposed changes to the emergency action levels (EALs) in their GSEP Annexes for the staff's review and approval. The Emergency Preparedness Branch has completed its initial review of the proposed EALs and, as a result, a number of EALs were identified which require additional information in order to determine whether the EALs conform with applicable guidance and requirements.

The proposed EALs were reviewed against the guidance in NUMARC/NESP-007, Rev. 2, "Methodology for Development of Emergency Action Levels." NUMARC/NESP-007 has been endorsed by the NRC in Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Reactors," as an alternative means by which licensees can meet the requirements of 10 CFR 50.47 (b)(4) and Appendix E to 10 CFR Part 50. Details of each review are enclosed.

If you have any questions concerning this matter, please contact Scott Boynton or Jim O'Brien at 504-3924.

Original signed by R. Erickson

Robert A. Erickson, Chief
Emergency Preparedness Branch
Division of Radiation Safety
and Safeguards
Office of Nuclear Reactor Regulation

Enclosures: Dresden review
Braidwood review
Byron review
Lasalle review
Quad Cities review
Zion review

*RD-8-2 (Commonwealth Edison)
X 06 10-7 (NUMARC)
X L-4-1 Part 50 (Reporting Requirements)*

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**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

**OFFICE OF NUCLEAR REACTOR REGULATION
DIVISION OF RADIATION SAFETY
AND SAFEGUARDS
EMERGENCY PREPAREDNESS BRANCH**

**RE: REQUEST FOR ADDITIONAL INFORMATION ON PROPOSED
EMERGENCY ACTION LEVEL CHANGES IN REVISION LAS-93-02
OF THE LASALLE EMERGENCY PLAN**

TAC NOs: M87331 and M87332

The NRC has completed its initial review of the proposed emergency action levels (EALs) in Revision LAS-93-02 to the Commonwealth Edison Generating Stations Emergency Plan (GSEP) LaSalle Station Annex. The proposed EALS were reviewed against the guidance in NUMARC/NESP-007, "Methodology for Development of Emergency Action Levels." NUMARC/NESP-007 has been endorsed by the NRC in Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors," 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.

Because of the staff's previous endorsement of 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 with NUMARC/NESP-007. Please provide this additional information as discussed below.

A. GENERAL COMMENTS

The licensee did not include the NUMARC criteria relating to judgement of the Emergency Director for fission product barrier loss or potential loss in any of the fission product barrier EALs. These EALs should be incorporated into the emergency classification scheme or justification should be provided for their omission.

Definitions between the plants are not consistent. For example: Dresden defines Valid as "Reading are assumed valid unless circumstances cause the reading to be suspect." LaSalle and Quad Cities define Valid as "A reading confirmed by redundant measurement, instrumentation, local reading or grab sample." The licensee should use the same definitions at all the nuclear plants.

B. EAL SPECIFIC COMMENTS

Recognition Category R - Abnormal Rad Levels/Radiological Effluent

1. Subcategory RG1 - 1 Rem Total Effective Dose Equivalent (tede) OR 5 Rem Committed Dose Equivalent (cde) to the Thyroid

NUMARC AG1 - Abnormal Rad Levels/Radiological Effluent example EALs state:

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):*

(site-specific list)

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.

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]*
3. *Valid dose assessment capability indicates dose consequences greater than 1000 mR whole body or 5000 mR child thyroid.*
4. *Field survey results indicate site boundary dose rates exceeding 1000 mR/hr expected to continue for more than one hour; or analysis of field survey samples indicate child thyroid commitment of 5000 mR for one hour of inhalation.*

Lasalle EAL Abnormal Rad Levels/Radiological Effluent RG1 threshold values state:

ONE of the following when Drywell Radiation level \geq 94 R/hr, or Reactor Vessel Level \leq -161 inches, or Radiation level \geq 1 R/hr on Refuel Floor indicating clad/core damage:

1. *The station total release as indicated by the SUM of VALID readings of both units on the following monitors indicate the release has or is expected to exceed 1 Rem total effective dose equivalent (tede) OR 5*

Rem committed dose equivalent (cde) to the thyroid and indicates the need to assess the release with dose projection models.

*The Sum of:
Vent Stack WRGM, AND
SBGT WRGM*

$$\geq 5.9E+08 \mu\text{Ci/sec}$$

2. *Dose assessment results indicate dose consequences of 1 Rem (tede), or Dose assessment results indicate dose consequences of 5 Rem (cde) to the thyroid.*
3. *RESTRICTED AREA BOUNDARY dose rates ≥ 1 R/hr expected to continue for ≥ 1 hour, or Analysis indicates 5 Rem (cde) to the thyroid at the RESTRICTED AREA BOUNDARY.*
4. *Valid A-model Effluent Release Report indicating a General Emergency*

COMMENT: The licensee inclusion of drywell radiation level, vessel level, and refuel floor radiation level is inconsistent with the guidance and potentially confusing. A valid (confirmed) stack monitor release in excess of the calculated threshold value is sufficient to classify the event. All reactor emergency events that cause a high release rate may not trigger one of the three entry level conditions. The similar EALs for CECOs PWRs do not include this entry condition requirement. The licensee should eliminate these conditions in the EAL or provide justification on their benefit.

RG1 does not include the following note which is contained in the corresponding NUMARC/NESP-007 IC,

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.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

The licensee basis for threshold value #4 states that the A-model reports at 1000 mRem/hr. No mention is made about the NUMARC criteria of 5000 mR child thyroid dose. Information should be provided on the capability of the A-model to assess thyroid dose.

2. Subcategory RS1 - 100 mRem Total Effective Dose Equivalent (tede) OR 500 mRem Committed Dose Equivalent (cde) to the Thyroid

NUMARC AS1 - Abnormal Rad Levels/Radiological Effluent example EALs state:

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):*

(site-specific list)

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.

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]*
3. *Valid dose assessment capability indicates dose consequences greater than 100 mR whole body or 500 mR child thyroid.*
4. *Field survey results indicate child indicate site boundary dose rates exceeding 100 mR/hr expected to continue for more than one hour; or analysis of field survey samples indicate child thyroid commitment of 500 mR for one hour of inhalation.*

Lasalle EAL Abnormal Rad Levels/Radiological Effluent RS1 threshold values state:

ONE of the following when Drywell Radiation level \geq 94 R/hr, or Reactor Vessel Level \leq -161 inches, or Radiation level \geq 1 R/hr on Refuel Floor indicating clad/core damage:

1. *The station total release as indicated by the SUM of VALID readings of Units 2 and 3 on the following monitors indicate the release has or is expected to exceed 100 mRem total effective dose equivalent (tede) OR 500 mRem committed dose equivalent (cde) to the thyroid.*

*The Sum of:
Vent Stack WRGM, AND*

SBGT WRGM:

$$\geq 5.9E+07 \mu\text{Ci/sec}$$

2. *Dose assessment results indicate dose consequences of 100 mRem (tede), or Dose assessment results indicate dose consequences of 500 mRem (cde) to the thyroid.*
3. *RESTRICTED AREA BOUNDARY dose rates ≥ 100 mR/hr expected to continue for ≥ 1 hour, or Analysis indicates 500 mRem (cde) to the thyroid at the RESTRICTED AREA BOUNDARY.*
4. *Valid A-model Effluent Release Report indicating a SITE Emergency*

COMMENT: The licensee inclusion of drywell radiation level, vessel level, and refuel floor radiation level is inconsistent with the guidance and potentially confusing. A valid (confirmed) stack monitor release in excess of the calculated threshold value is sufficient to classify the event. Furthermore, all reactor emergency events that cause a high release rate may not trigger one of the three entry level conditions. The similar EALs for CECOs PWRs do not include this entry condition requirement. The licensee should eliminate these conditions in the EAL or provide justification on their benefit.

RS1 does not include the following note which is contained in the corresponding NUMARC/NESP-007 IC,

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.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

The licensee basis for threshold value #4 states that the A-model reports at 100 mRem/hr. No mention is made about the NUMARC criteria of 500 mR child thyroid dose. Information should be provided on the capability of the A-model to assess thyroid dose.

3. Subcategory RA2 - Release ≥ 10 X ODCM limits for ≥ 15 Minutes.

NUMARC AA1 - Abnormal Rad Levels/Radiological Effluent example EALs state:

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):

(site-specific list)

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.

2. Confirmed sample analysis for gaseous or liquid releases indicates concentrations or release rates in excess of (200 X site-specific technical specifications) for 15 minutes or longer.
3. A valid reading on perimeter radiation monitoring system greater than 10 mR/hr sustained for 15 minutes or longer. [for sites having telemetered perimeter monitors]
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]

Lasalle EAL Abnormal Rad Levels/Radiological Effluent RA2 threshold values state:

ONE of the following when Drywell Radiation level < 94 R/hr, or Reactor Vessel Level > -161 inches, or Radiation level < 1 R/hr on Refuel Floor indicating no clad/core damage:

1. The station total release as indicated by the SUM of VALID readings of both units on the following monitors indicates that the release may have exceeded $\geq 10 \times$ ODCM limits and indicates the need to assess the release:

The Sum of:
Vent Stack WRGM, AND
SBGT WRGM:

a. $\geq 6.5E+06 \mu\text{Ci/sec}$

b. Liquid Releases:

UNPLANNED Liquid Releases $\geq 10 \times$ the ODCM maximum instantaneous release limit.

2. *Grab sample indicate concentrations or release rates $\geq 10 \times$ the ODCM maximum instantaneous release limit for ≥ 15 minutes.*
3. *RESTRICTED AREA BOUNDARY dose rates ≥ 10 mR/hr expected to continue for ≥ 15 minutes.*
4. *Valid A-model Effluent Release Report indicating an ALERT.*

COMMENT: The licensee inclusion of drywell radiation level, vessel level, and refuel floor radiation level is inconsistent with the guidance and potentially confusing. A valid (confirmed) stack monitor release in excess of the calculated threshold value is sufficient to classify the event. Furthermore, all reactor emergency events that cause a high release rate may not trigger one of the three entry level conditions. The similar EALs for CECOs PWRs do not include this entry condition requirement. The licensee should eliminate these conditions in the EAL or provide justification on their benefit.

RA2 does not include the following note which is contained in the corresponding NUMARC/NESP-007 IC,

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.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

IC RA2 deviates from NUMARC/NESP-007 in that the EAL for releases is set at $10 \times$ ODCM limits whereas NUMARC/NESP-007 specifies 200 times the radiological technical specifications as the threshold for this EAL (ODCM values can be used for sites that have eliminated radiological technical specifications). The basis for the Lasalle IC states that "The Alert value for gaseous effluents was reduced to $10 \times$ ODCM to ensure sequential classifications." It is not clear from the information provided why this reduction is necessary.

Provide justification for this deviation from the NESP guidance.

The licensee does not provide site specific monitor/s for a liquid release. If installed, the monitor/s should be specified and threshold values provided in the EAL/s.

4. Subcategory RU2 - Release $\geq 2 \times$ ODCM for ≥ 60 Minutes.

NUMARC AU1 - Abnormal Rad Levels/Radiological Effluent example EALs state:

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)

Note: If the monitor reading(s) is sustained for longer than 60 minutes and the required assessments cannot be completed within this period, then the declaration must be made based on the valid reading.

2. *Confirmed sample analysis for gaseous or liquid releases indicates concentrations or release rates with a release duration of 60 minutes or longer in excess of (2 X site-specific technical specifications).*
3. *A 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]*
4. *Valid indication on automatic real-time dose assessment capability greater than (site-specific value) for 60 minutes or longer. [for sites having such capability]*

Lasalle EAL Abnormal Rad Levels/Radiological Effluent RU2 threshold values state:

ONE of the following when Drywell Radiation level < 94 R/hr, or Reactor Vessel Level > -161 inches, or Radiation level < 1 R/hr on Refuel Floor indicating no clad/core damage:

1. *The station total release as indicated by the SUM of VALID readings of both units on the following monitors indicates that the release may have exceeded $\geq 2 \times$ ODCM limits.*

*The Sum of:
Vent Stack WRGM, AND
SBGT WRGM:*

a. $\geq 1.3E+06 \mu\text{Ci}/\text{sec}$

*b. Liquid Releases:
UNPLANNED Liquid Releases $\geq 2 \times$ the ODCM maximum
instantaneous release limit for 60 minutes.*

- 2. Grab sample indicate concentrations or release rates $\geq 2 \times$ the ODCM maximum instantaneous release limit for ≥ 60 minutes.*
- 3. Valid A-model Effluent Release Report indicating an UNUSUAL EVENT.*

COMMENT: The licensee inclusion of drywell radiation level, vessel level, and refuel floor radiation level is inconsistent with the guidance and potentially confusing. A valid (confirmed) stack monitor release in excess of the calculated threshold value is sufficient to classify the event. Furthermore, all reactor emergency events that cause a high release rate may not trigger one of the three entry level conditions. The similar EALs for CECOs PWRs do not include this entry condition requirement. The licensee should eliminate these conditions in the EAL or provide justification on their benefit.

The licensee does not provide site specific monitor/s for a liquid release. If installed, the monitor/s should be specified and threshold values provided in the EAL/s.

Recognition Category F - Fission Product Barrier Degradation

5. Subcategory 1.a - Containment pressure

The NUMARC table 3, Primary Containment Barrier Example EALs, Loss example #1, Drywell Pressure states:

Rapid unexplained decrease following initial increase OR Drywell pressure response not consistent with LOCA conditions.

The LaSalle EAL 1.a - Containment Pressure threshold value for loss states:

Rapid pressure decrease in containment after increase without containment spray.

COMMENT: The licensee omitted the NUMARC criteria, Drywell pressure response not consistent with LOCA conditions, from this EAL. However, the licensee does explain in the basis for this EAL that "Containment pressure should increase as a result of mass and energy release into the containment from a LOCA."

The licensee should revise this EAL to be consistent with the NUMARC EALs or provide a rationale in the basis for the variations.

6. Subcategory 1.c.2 - Containment Breached/Bypassed

The Lasalle EAL 1.c.2 - Containment Breached/Bypassed threshold value for loss states:

UNISOLABLE breach of primary containment.

COMMENT: The licensee basis for this EAL basis states:

"UNISOLABLE - A breach that is not readily isolable OR attempts for immediate isolation of the breach have been made and were unsuccessful. Attempts for isolation should be made prior to the accident classification. LOSS - an unisolable breach implies that a breach is NOT readily isolable OR attempts for immediate isolation of the breach have been made and were unsuccessful. Attempts for isolation should be made prior to the accident classification. If isolable upon identification no declaration need be made under this EAL although other EALs may be applicable. A breach of primary containment refers to a loss of primary containment integrity as described in the Technical Specifications definitions or primary containment Limiting Conditions for Operation (LCO)."

The terms "readily" and "immediate" are not defined. The term "attempts" implies more than one try at isolation, but does not define the number of attempts. The wording "If isolable upon identification..." implies some time to identify the breach location, but no time period is provided. There is no NUMARC EAL that directly correlates to this licensee EAL.

The licensee should provide clear definition for the terms used in this EAL. The licensee should provide additional information for the inclusion of this EAL in the classification scheme.

7. Subcategory 1.d - Containment Radiation Monitors.

NUMARC Primary Containment Barrier, Example number 3, Significant Radioactive Inventory in Containment.

The Lasalle basis for this parameter states:

The value of 8000 R/hr uncorrected is conservative up to 4 hours after shutdown. A four hour time is used to provide reasonable assurance that the Technical Support Center personnel would be available to provide an evaluation to determine if clad failure has exceeded 20%.

COMMENT: NUMARC does not discuss a 4 hour time for the corresponding EAL basis. The licensee use of a 4 hour window is potentially confusing. The licensee basis needs to be clear that the 4 hour time period does not delay the classification and that an assessment > 20% fuel clad will be treated as an equivalent threshold value.

8. Subcategory 2.c - Fuel Clad.

NUMARC Fuel Clad Barrier EAL example #3, Drywell Radiation Monitoring.

The Lasalle basis for this parameter states:

2000 R/hr uncorrected is a value which is conservative up to 4 hours following a reactor shutdown. A four hour time is used to provide reasonable assurance that the Technical Support Center personnel would be available to provide an evaluation to determine if clad failure has exceeded 5%.

COMMENT: NUMARC does not discuss a 4 hour time for the corresponding EAL basis. The licensee use of a 4 hour window is potentially confusing. The licensee basis needs to be clear that the 4 hour time period does not delay the classification that an assessment > 5% fuel clad will be treated as an equivalent threshold value.

9. Subcategory 3.a.1 - RCS Leakrate

The NUMARC table 3, RCS Barrier Example EALs, Loss example #1, RCS Leak Rate states:

The "Loss" EAL is based on design basis accident analysis which show that even if MSIV closure occurs within design limits, dose consequences offsite from the "puff" release would be in excess of 10 millirem. Thus, this EAL is included for consistency with the Alert emergency classification.

The Lasalle EAL 3.a.1 - RCS Leakrate threshold value for loss states:

LOSS: UNISOLABLE Main Steam Line Break.

POTENTIAL LOSS: UNISOLABLE RCS Leakage \geq 50 GPM.

COMMENT: The licensee basis defines UNISOLABLE as: "A leak that is NOT readily isolable OR attempts for immediate isolation of the leak have been made and were unsuccessful. Attempts for Isolation should be made prior to accident classification." The licensee deals with unisolable primary system leakage outside the drywell in EAL #3.a.2. This EAL, #3.a.1, is directed to RCS leakage inside containment however, it does not specifically state inside containment. NUMARC, in table 3, uses the qualifier UNISOLABLE for leakage outside the drywell and specifically does not qualify leakage inside the drywell. Inclusion of the qualifier "UNISOLABLE" is not consistent with the NUMARC criteria.

The licensee provides for "attempts to isolate" before accident classification, but does not provide any time limit or number of attempt limits. The licensee does not define "immediate" or "readily."

The licensee should revise this EAL to be consistent with the NUMARC EALs or provide a rationale in the basis for the variations.

10. Subcategory 3.b - Drywell Pressure

The NUMARC table 3, RCS Barrier Example EALs, Loss example #2, Drywell Pressure states:

The (site-specific) drywell pressure is based on the drywell high pressure 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 Leak.

The Lasalle EAL 3.b - Drywell Pressure threshold value for loss states:

Drywell Pressure \geq 1.69 PSIG (ECCS setpoint) due to reactor coolant leakage.

COMMENT: The NUMARC criteria suggests the selection of the drywell high pressure alarm setpoint or a higher value may be used if 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 licensee selected the ECCS setpoint. It is not clear that the ECCS setpoint is the same as the high pressure alarm setpoint or is equivalent to 50 gpm system leak. The licensee basis for the selected value is not sufficient to determine if the conservative NUMARC criteria is met.

The licensee should provide additional information before acceptance of this EAL.

Recognition Category M - System Malfunctions

11. Subcategory NUMARC SS4 - Complete Loss of Function Needed to Achieve or Maintain Hot Shutdown example EAL number 1. states:

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

COMMENT: There is no licensee EAL that specifically addresses loss of hot shutdown function.

In the October 1, 1993 Revision package (attachment C) under NUMARC EAL SS4, CECO makes the statement "Not applicable to BWRs. Hot Shutdown is defined for BWRs as having the mode switch in shutdown with all control rods inserted and temperature > 212 °F. If these conditions are not met, an ATWS has occurred and the ATWS EALs cover the situation." While the reviewer would agree that the "reactivity control" function of this EAL is adequately addressed for BWRs in the ATWS EALs (because of no need to borate or maintain boration once the rods are inserted), the Heat Sink function still needs to be addressed.

The licensee should address the loss of hot shutdown function as suggested by the NUMARC criteria.

12. Subcategory MS4 - Loss of 125 VDC Power \geq 15 minutes.

The NUMARC SS3 example EAL #1 states:

Loss of all DC Power based on (site-specific) bus voltage indications for greater than 15 minutes.

The Lasalle EAL MS4 EAL threshold value #1 states:

CONFIRMED loss of all 125 VDC power to required dc buses 111Y (211Y) and 112Y (212Y) for \geq 15 minutes.

COMMENT: The licensee does not provide a specific meter/s or control panel indication/s for use with this EAL. No minimum safe bus voltage is specified to ensure adequate voltage is supplied to vital DC equipment.

The licensee should consider providing a specific meter/s or control panel indication/s that can be used to determine the power status of the DC buses.

13. Subcategory MU4 - UNPLANNED Loss of 125 VDC Power \geq 15 minutes.

The NUMARC SU7 example EAL #1 states:

a. *UNPLANNED Loss of all 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 Lasalle EAL MU4 EAL threshold values state:

1. *UNPLANNED loss of all 125 VDC buses 111y (211Y) and 112Y (212Y) is CONFIRMED. AND*

2. *Failure to restore power to at least one 125 VDC bus in < 15 minutes from the time of loss.*

COMMENT: The licensee does not provide a specific meter/s or control panel indication/s for use with this EAL. No minimum safe bus voltage is specified, as required by the NUMARC criteria, to ensure adequate voltage is supplied to vital DC equipment.

The licensee should provide a specific meter/s or control panel indication/s that can be used to determine the power status of the DC buses.

14. Subcategory MU7 - Fuel Clad Degradation

The NUMARC SU4 example EAL 1. states:

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

The Lasalle EAL MU7 - Fuel Clad Degradation EAL threshold value 1. states:

Offgas system isolation has occurred on a VALID Offgas Post-treatment radiation monitor high trip.

COMMENT: The Post-Treatment monitor reading versus coolant activity are dependent on the adsorber bed line up and hold up time. The licensee should consider use of other indications such as pre-treatment monitors and main steam line monitors. The licensee selection of the trip setpoint might not be as conservative as suggested by the NUMARC criteria "radiation monitor readings."

The licensee should provide information that the selected threshold value meets the NUMARC conservative criteria.

15. Subcategory MU8 - RCS leakage.

The NUMARC SU5 example EAL 1. states:

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

The Lasalle EAL MU8 - RCS leakage EAL threshold value states:

*1. UNIDENTIFIED RCS leakage into the primary containment \geq 10 gpm.
OR 2. Total (IDENTIFIED + UNIDENTIFIED) RCS leakage into the primary containment \geq 35 gpm.*

COMMENT: The licensee use of total leakage is not consistent with the NUMARC criteria.

The licensee should revise this EAL to be consistent with the NUMARC EALs or provide a rationale in the basis for the variations.

16. Subcategory MA11 - Major Fuel Damage OR Fuel Uncovery Outside the Reactor Vessel.

The NUMARC AA2 example EAL 1. states:

A (site-specific set point) alarm on one or more of the following radiation monitors:

*Refuel Floor Area Radiation Monitor
Fuel Handling Building Ventilation Monitor
Fuel Bridge Area Radiation Monitor*

The Lasalle EAL MA11 - Major Fuel Damage OR Fuel Uncovery Outside the Reactor Vessel EAL threshold value number 1 states:

Valid reading of \geq 100 R/hr on refuel floor radiation monitor OD21-K604A.

COMMENT: The licensee selected value \geq 100 R/hr seems high for this threshold value.

The licensee should confirm that the selected value is the alarm setpoint or provide a rationale in the basis for use of the \geq 100 R/hr value.

17. Subcategory MA12 - UNCONTROLLED Loss of Refueling Cavity Volume.

The NUMARC initiating condition states:

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

The Lasalle MA12 - UNCONTROLLED Loss of Refueling Cavity Volume initiating condition states:

Damage to spent fuel OR loss of water level such that irradiated fuel will become uncovered.

COMMENT: The licensee initiating condition indicates damage to spent fuel. However, no specific criteria is presented to define what is meant by damage. Only uncovering is presented as EAL threshold values.

The licensee should consider including a definition of damage to spent fuel in this EAL.

Recognition Category H - Hazards and Other Conditions.

18. Subcategory HS1 - Security Event in a Vital Area.

The NUMARC HS1 example EAL #2 states:

Other security events as determine from (site-specific) Safeguards Contingency Plan.

The Lasalle basis for HS1 states:

A security event is as defined in the security plan, section 1.

COMMENT: The licensee reference to a separate document, security plan, for the definition of a security event places an unnecessary burden on the Emergency Director. The licensee should include those defined security events that result in emergency classification in the EAL threshold value section.

19. Subcategory HA4 - Natural OR destructive phenomena inside Vital Area.

The NUMARC HA1 example EALs state:

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

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 Room
Other (site-specific) Structures.*

The Lasalle HA4 - Natural OR destructive phenomena inside Vital Area EAL threshold value states:

2. *Tornado strike within the Protected Area which affects equipment or structures within a vital area.*

3. *Sustained high winds \geq 90 mph on A-model report, computer point OR meter reading.*

4. *Report of visible structural damage to a structure (building, tanks, etc) affecting operations of systems required to establish or maintain Cold Shutdown.*

COMMENT: The licensee use of the terms "affects" and "affecting" places a qualifying condition on these events that is not present in the NUMARC EALs. The NUMARC criteria only provides for tornado, high winds or report of visible structural damage (structure specific). Affecting operation of equipment is not part of the NUMARC criteria. The NUMARC basis for structure damage states that the EAL should specify a site-specific list of structures containing systems and functions required for safe shutdown of the plant. The licensee does not provide a complete list of specific structures.

The licensee should revise this EAL to be consistent with the NUMARC EALs or provide a rationale in the basis for the variations.



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

**OFFICE OF NUCLEAR REACTOR REGULATION
DIVISION OF RADIATION SAFETY
AND SAFEGUARDS
EMERGENCY PREPAREDNESS BRANCH**

**RE: REQUEST FOR ADDITIONAL INFORMATION ON PROPOSED
EMERGENCY ACTION LEVEL CHANGES IN REVISION QCA-93-01
OF THE QUAD CITIES EMERGENCY PLAN**

TAC NOs: M87333 and M87334

The NRC has completed its initial review of the proposed emergency action levels (EALs) in Revision QCA-93-01 to the Commonwealth Edison Generating Stations Emergency Plan (GSEP) Quad Cities Station Annex. The proposed EALS were reviewed against the guidance in NUMARC/NESP-007, "Methodology for Development of Emergency Action Levels." NUMARC/NESP-007 has been endorsed by the NRC in Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors," 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.

Because of the staff's previous endorsement of 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 with NUMARC/NESP-007. Please provide this additional information as discussed below.

A. GENERAL COMMENTS

The licensee did not include the NUMARC criteria relating to judgement of the Emergency Director for fission product barrier loss or potential loss in any of the fission product barrier EALs. These EALs should be incorporated into the emergency classification scheme or justification should be provided for their omission.

Definitions between the plants are not consistent. For example: Dresden defines Valid as "Reading are assumed valid unless circumstances cause the reading to be suspect." LaSalle and Quad Cities define Valid as "A reading confirmed by redundant measurement, instrumentation, local reading or grab sample." The licensee should use the same definitions at all the nuclear plants.

B. EAL SPECIFIC COMMENTS

Recognition Category R - Abnormal Rad Levels/Radiological Effluent

1. Subcategory RG1 - 1 Rem Total Effective Dose Equivalent (tede) OR 5 Rem Committed Dose Equivalent (cde) to the Thyroid

NUMARC AG1 - Abnormal Rad Levels/Radiological Effluent example EALs state:

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):*

(site-specific list)

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.

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]*
3. *Valid dose assessment capability indicates dose consequences greater than 1000 mR whole body or 5000 mR child thyroid.*
4. *Field survey results indicate site boundary dose rates exceeding 1000 mR/hr expected to continue for more than one hour; or analysis of field survey samples indicate child thyroid commitment of 5000 mR for one hour of inhalation.*

Quad Cities EAL Abnormal Rad Levels/Radiological Effluent RG1 threshold values state:

ONE of the following when Drywell Radiation level \geq 80 R/hr, or Reactor Vessel Level \leq -14? inches, or Radiation level \geq 1 R/hr on Refuel Floor indicating clad/core damage:

1. *The station total release as indicated by the SUM of VALID readings of both units on the following monitors indicate the release has or is expected to exceed 1 Rem total effective dose equivalent (tede) OR 5*

Rem committed dose equivalent (cde) to the thyroid and indicates the need to assess the release with dose projection models.

The Sum of:

*Reactor Building SPING channel 5, 7, or 9, and
Chimney SPING channel 5, 7, or 9:*

$\geq 2.1E+06 \mu\text{Ci}/\text{sec}$ as determined by QEP 155-S8

2. *Dose assessment results indicate dose consequences of 1 Rem (tede), or Dose assessment results indicate dose consequences of 5 Rem (cde) to the thyroid.*
3. *RESTRICTED AREA BOUNDARY dose rates ≥ 1 R/hr expected to continue for ≥ 1 hour, or Analysis indicates 5 Rem (cde) to the thyroid at the RESTRICTED AREA BOUNDARY.*
4. *Valid A-model Effluent Release Report indicating a General Emergency*

COMMENT: The licensee inclusion of drywell radiation level, vessel level, and refuel floor radiation level is inconsistent with the guidance and potentially confusing. A valid (confirmed) stack monitor release in excess of the calculated threshold value is sufficient to classify the event. All reactor emergency events that cause a high release rate may not trigger one of the three entry level conditions. The similar EALs for CECO PWRs do not include this entry condition requirement. The licensee should eliminate these conditions in the EAL or provide justification on their benefit.

RG1 does not include the following note which is contained in the corresponding NUMARC/NESP-007 IC,

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.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

The licensee basis for threshold value #4 states that the A-model reports at 1000 mRem/hr. No mention is made about the NUMARC criteria of 5000 mR child thyroid dose. Information should be provided on the capability of the A-model to assess thyroid dose.

2. Subcategory RS1 - 100 mRem Total Effective Dose Equivalent (tede) OR 500 mRem Committed Dose Equivalent (cde) to the Thyroid

NUMARC AS1 - Abnormal Rad Levels/Radiological Effluent example EALs state:

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):*

(site-specific list)

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.

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]*
3. *Valid dose assessment capability indicates dose consequences greater than 100 mR whole body or 500 mR child thyroid.*
4. *Field survey results indicate child indicate site boundary dose rates exceeding 100 mR/hr expected to continue for more than one hour; or analysis of field survey samples indicate child thyroid commitment of 500 mR for one hour of inhalation.*

Quad Cities EAL Abnormal Rad Levels/Radiological Effluent RS1 threshold values state:

ONE of the following when Drywell Radiation level \geq 80 R/hr, or Reactor Vessel Level \leq -142 inches, or Radiation level \geq 1 R/hr on Refuel Floor indicating clad/core damage:

1. *The station total release as indicated by the SUM of VALID readings of both units on the following monitors indicate the release has or is expected to exceed 100 mRem total effective dose equivalent (tede) OR 500 mRem committed dose equivalent (cde) to the thyroid.*

The Sum of:

Reactor Building SPING channel 5, 7, or 9, and

Chimney SPING channel 5, 7, or 9:

$\geq 2.1E+05 \mu\text{Ci/sec}$ as determined by QEP 155-S8

2. *Dose assessment results indicate dose consequences of 100 mRem (tede), or Dose assessment results indicate dose consequences of 500 mRem (cde) to the thyroid.*
3. *RESTRICTED AREA BOUNDARY dose rates ≥ 100 mR/hr expected to continue for ≥ 1 hour, or Analysis indicates 500 mRem (cde) to the thyroid at the RESTRICTED AREA BOUNDARY.*
4. *Valid A-model Effluent Release Report indicating a SITE Emergency*

COMMENT: The licensee inclusion of drywell radiation level, vessel level, and refuel floor radiation level is inconsistent with the guidance and potentially confusing. A valid (confirmed) stack monitor release in excess of the calculated threshold value is sufficient to classify the event. Furthermore, all reactor emergency events that cause a high release rate may not trigger one of the three entry level conditions. The similar EALs for CEC Co PWRs do not include this entry condition requirement. The licensee should eliminate these conditions in the EAL or provide justification on their benefit.

RS1 does not include the following note which is contained in the corresponding NUMARC/NESP-007 IC,

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.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

The licensee basis for threshold value #4 states that the A-model reports at 100 mRem/hr. No mention is made about the NUMARC criteria of 500 mR child thyroid dose. Information should be provided on the capability of the A-model to assess thyroid dose.

3. Subcategory RA2 - Release ≥ 10 X ODCM limits for ≥ 15 Minutes.

NUMARC AA1 - Abnormal Rad Levels/Radiological Effluent example EALs state:

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):*

(site-specific list)

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.

2. *Confirmed sample analysis for gaseous or liquid releases indicates concentrations or release rates in excess of (200 X site-specific technical specifications) for 15 minutes or longer.*
3. *A valid reading on perimeter radiation monitoring system greater than 10 mR/hr sustained for 15 minutes or longer. [for sites having telemetered perimeter monitors]*
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]*

Quad Cities EAL Abnormal Rad Levels/Radiological Effluent RA2 threshold values state:

ONE of the following when Drywell Radiation level < 80 R/hr, or Reactor Vessel Level > -142 inches, or Radiation level < 1 R/hr on Refuel Floor indicating no clad/core damage:

1. *The station total release as indicated by the SUM of VALID readings of both units on the following monitors indicates that the release may have exceeded ≥ 10 X ODCM limits and indicates the need to assess the release:*

The Sum of Gaseous Releases:

*Reactor Building SPING channel 5, 7, or 9, and
Chimney SPING channel 5, 7, or 9:*

a. $\geq 1.4E+05$ μ Ci/sec as determined by QEP 155-S8

b. *Liquid Releases:*

UNPLANNED Liquid Releases ≥ 10 X the ODCM maximum instantaneous release limit.

2. *Grab sample indicate concentrations or release rates ≥ 10 X the ODCM maximum instantaneous release limit for ≥ 15 minutes.*
3. *RESTRICTED AREA BOUNDARY dose rates ≥ 10 mR/hr expected to continue for ≥ 15 minutes.*
4. *Valid A-model Effluent Release Report indicating an ALERT.*

COMMENT: The licensee inclusion of drywell radiation level, vessel level, and refuel floor radiation level is inconsistent with the guidance and potentially confusing. A valid (confirmed) stack monitor release in excess of the calculated threshold value is sufficient to classify the event. Furthermore, all reactor emergency events that cause a high release rate may not trigger one of the three entry level conditions. The similar EALs for CECo PWRs do not include this entry condition requirement. The licensee should eliminate these conditions in the EAL or provide justification on their benefit.

RA2 does not include the following note which is contained in the corresponding NUMARC/NESP-007 IC,

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.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

IC RA2 deviates from NUMARC/NESP-007 in that the EAL for releases is set at 10 x ODCM limits whereas NUMARC/NESP-007 specifies 200 times the radiological technical specifications as the threshold for this EAL (ODCM values can be used for sites that have eliminated radiological technical specifications). The basis for the Dresden IC states that "The Alert value for gaseous effluents was reduced to 10 x ODCM to ensure sequential classifications." It is not clear from the information provided why this reduction is necessary.

Provide justification for this deviation from the NESP guidance.

The licensee does not provide site specific monitor/s for a liquid release. If installed, the monitor/s should be specified and threshold values provided in the EAL/s.

4. Subcategory RU2 - Release $\geq 2 \times$ ODCM for ≥ 60 Minutes.

NUMARC AU1 - Abnormal Rad Levels/Radiological Effluent example EALs state:

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)

Note: If the monitor reading(s) is sustained for longer than 60 minutes and the required assessments cannot be completed within this period, then the declaration must be made based on the valid reading.

2. *Confirmed sample analysis for gaseous or liquid releases indicates concentrations or release rates with a release duration of 60 minutes or longer in excess of (2 X site-specific technical specifications).*
3. *A 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]*
4. *Valid indication on automatic real-time dose assessment capability greater than (site-specific value) for 60 minutes or longer. [for sites having such capability]*

Quad Cities EAL Abnormal Rad Levels/Radiological Effluent RU2 threshold values state:

ONE of the following when Drywell Radiation level < 80 R/hr, or Reactor Vessel Level > -142 inches, or Radiation level < 1 R/hr on Refuel Floor indicating no clad/core damage:

1. *The station total release as indicated by the SUM of VALID readings of both units on the following monitors indicates that the release may have exceeded $\geq 2 \times$ ODCM limits.*

*The Sum of Gaseous releases:
Reactor Building SPING channel 5, 7, or 9, and
Chimney SPING channel 5, 7, or 9:*

a. $\geq 2.8E+05 \mu\text{Ci/sec}$ as determined by QEP 155-S8

b. *Liquid Releases:
UNPLANNED Liquid Releases $\geq 2 \times$ the ODCM maximum
instantaneous release limit for 60 minutes.*

2. *Grab sample indicate concentrations or release rates $\geq 2 \times$ the ODCM maximum instantaneous release limit for ≥ 60 minutes.*
3. *Valid A-model Effluent Release Report indicating an UNUSUAL EVENT.*

COMMENT: The licensee inclusion of drywell radiation level, vessel level, and refuel floor radiation level is inconsistent with the guidance and potentially confusing. A valid (confirmed) stack monitor release in excess of the calculated threshold value is sufficient to classify the event. Furthermore, all reactor emergency events that cause a high release rate may not trigger one of the three entry level conditions. The similar EALs for CECOs PWRs do not include this entry condition requirement. The licensee should eliminate these conditions in the EAL or provide justification on their benefit.

The licensee does not provide site specific monitor/s for a liquid release. If installed, the monitor/s should be specified and threshold values provided in the EAL/s.

Recognition Category F - Fission Product Barrier Degradation

5. Subcategory 1.a - Containment pressure

The NUMARC table 3, Primary Containment Barrier Example EALs, Loss example #1, Drywell Pressure states:

Rapid unexplained decrease following initial increase OR Drywell pressure response not consistent with LOCA conditions.

The Quad Cities EAL 1.a - Containment Pressure threshold value for loss states:

Rapid pressure decrease in containment after increase without containment spray.

COMMENT: The licensee omitted the NUMARC criteria, Drywell pressure response not consistent with LOCA conditions, from this EAL. However, the licensee does explain in the basis for this EAL that "Containment pressure should increase as a result of mass and energy release into the containment from a LOCA."

The licensee should revise this EAL to be consistent with the NUMARC EALs or provide a rationale in the basis for the variations.

6. Subcategory 1.c.2 - Containment Breached/Bypassed

The Quad Cities EAL 1.c.2 - Containment Breached/Bypassed threshold value for loss states:

UNISOLABLE breach of primary containment.

COMMENT: The licensee basis for this EAL basis states:

"UNISOLABLE - A breach that is not readily isolable OR attempts for immediate isolation of the breach have been made and were unsuccessful. Attempts for isolation should be made prior to the accident classification. LOSS - an unisolable breach implies that a breach is NOT readily isolable OR attempts for immediate isolation of the breach have been made and were unsuccessful. Attempts for isolation should be made prior to the accident classification. If isolable upon identification no declaration need be made under this EAL although other EALs may be applicable. A breach of primary containment refers to a loss of primary containment integrity as described in the Technical Specifications definitions or primary containment Limiting Conditions for Operation (LCO)."

The terms "readily" and "immediate" are not defined. The term "attempts" implies more than one try at isolation, but does not define the number of attempts. The wording "If isolable upon identification..." implies some time to identify the breach location, but no time period is provided. There is no NUMARC EAL that directly correlates to this licensee EAL.

The licensee should provide clear definition for the terms used in this EAL. The licensee should provide additional information for the inclusion of this EAL in the classification scheme.

7. Subcategory 1.d - Containment Radiation Monitors.

NUMARC Primary Containment Barrier, Example number 3, Significant Radioactive Inventory in Containment.

The Quad Cities basis for this parameter states:

The value of 7000 R/hr uncorrected is conservative up to 4 hours after shutdown. A four hour time is used to provide reasonable assurance that the Technical Support Center personnel would be available to provide an evaluation to determine if clad failure has exceeded 20%.

COMMENT: NUMARC does not discuss a 4 hour time for the corresponding EAL basis. The licensee use of a 4 hour window is potentially confusing. The licensee basis needs to be clear that the 4 hour time period does not delay the classification and that an assessment > 20% fuel clad will be treated as an equivalent threshold value.

8. Subcategory 2.c - Fuel Clad.

NUMARC Fuel Clad Barrier EAL example #3, Drywell Radiation Monitoring.

The Quad Cities basis for this parameter states:

1750 R/hr uncorrected is a value which is conservative up to 4 hours following a reactor shutdown. A four hour time is used to provide reasonable assurance that the Technical Support Center personnel would be available to provide an evaluation to determine if clad failure has exceeded 5%.

COMMENT: NUMARC does not discuss a 4 hour time for the corresponding EAL basis. The licensee use of a 4 hour window is potentially confusing. The licensee basis needs to be clear that the 4 hour time period does not delay the classification that an assessment > 5% fuel clad will be treated as an equivalent threshold value.

9. Subcategory 3.a.1 - RCS Leakrate

The NUMARC table 3, RCS Barrier Example EALs, Loss example #1, RCS Leak Rate states:

The "Loss" EAL is based on design basis accident analysis which show that even if MSIV closure occurs within design limits, dose consequences offsite from the "puff" release would be in excess of 10 millirem. Thus, this EAL is included for consistency with the Alert emergency classification.

The Quad Cities EAL 3.a.1 - RCS Leakrate threshold value for loss states:

LOSS: UNISOLABLE Main Steam Line Break.

POTENTIAL LOSS: UNISOLABLE RCS Leakage \geq 50 GPM.

COMMENT: The licensee basis defines UNISOLABLE as: "A leak that is NOT readily isolable OR attempts for immediate isolation of the leak have been made and were unsuccessful. Attempts for Isolation should be made prior to accident classification." The licensee deals with unisolable primary system leakage outside the drywell in EAL #3.a.2. This EAL, #3.a.1, is directed to RCS leakage inside containment however, it does not specifically state inside containment. NUMARC, in table 3, uses the qualifier UNISOLABLE for leakage outside the drywell and specifically does not qualify leakage inside the drywell. Inclusion of the qualifier "UNISOLABLE" is not consistent with the NUMARC criteria.

The licensee provides for "attempts to isolate" before accident classification, but does not provide any time limit or number of attempt limits. The licensee does not define "immediate" or "readily."

The licensee should revise this EAL to be consistent with the NUMARC EALs or provide a rationale in the basis for the variations.

10. Subcategory 3.b - Drywell Pressure

The NUMARC table 3, RCS Barrier Example EALs, Loss example #2, Drywell Pressure states:

The (site-specific) drywell pressure is based on the drywell high pressure 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 Leak.

The Quad Cities EAL 3.b - Drywell Pressure threshold value for loss states:

Drywell Pressure \geq 2.5 PSIG (ECCS setpoint) due to reactor coolant leakage.

COMMENT: The NUMARC criteria suggests the selection of the drywell high pressure alarm setpoint or a higher value may be used if 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 licensee selected the ECCS setpoint. It is not clear that the ECCS setpoint is the same as the high pressure alarm setpoint or is equivalent to 50 gpm system leak. The licensee basis for the selected value is not sufficient to determine if the conservative NUMARC criteria is met.

The licensee should provide additional information before acceptance of this EAL.

Recognition Category M - System Malfunctions

11. Subcategory NUMARC SS4 - Complete Loss of Function Needed to Achieve or Maintain Hot Shutdown example EAL number 1. states:

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

COMMENT: There is no licensee EAL that specifically addresses loss of hot shutdown function.

In the October 1, 1993 Revision package (attachment C) under NUMARC EAL SS4, CECO makes the statement "Not applicable to BWRs. Hot Shutdown is defined for BWRs as having the mode switch in shutdown with all control rods inserted and temperature > 212 °F. If these conditions are not met, an ATWS has occurred and the ATWS EALs cover the situation." While the reviewer would agree that the "reactivity control" function of this EAL is adequately addressed for BWRs in the ATWS EALs (because of no need to borate or maintain boration once the rods are inserted), the Heat Sink function still needs to be addressed.

The licensee should address the loss of hot shutdown function as suggested by the NUMARC criteria.

12. Subcategory MS4 - Loss of 125 VDC Power ≥ 15 minutes.

The NUMARC SS3 example EAL #1 states:

Loss of all DC Power based on (site-specific) bus voltage indications for greater than 15 minutes.

The Quad Cities EAL MS4 EAL threshold value #1 states:

CONFIRMED loss of all VITAL 125 VDC power for ≥ 15 minutes.

COMMENT: The licensee does not provide a specific meter/s or control panel indication/s for use with this EAL. No minimum safe bus voltage is specified to ensure adequate voltage is supplied to vital DC equipment.

The licensee should consider providing a specific meter/s or control panel indication/s that can be used to determine the power status of the DC buses.

13. Subcategory MU4 - UNPLANNED Loss of 125 VDC Power \geq 15 minutes.

The NUMARC SU7 example EAL #1 states:

a. UNPLANNED Loss of all 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 Quad Cities EAL MU4 EAL threshold values state:

1. UNPLANNED loss of all 125 VDC buses is CONFIRMED. AND

2. Failure to restore power to at least one 125 VDC bus in < 15 minutes from the time of loss.

COMMENT: The licensee does not provide a specific meter/s or control panel indication/s for use with this EAL. No minimum safe bus voltage is specified, as required by the NUMARC criteria, to ensure adequate voltage is supplied to vital DC equipment.

The licensee should provide a specific meter/s or control panel indication/s that can be used to determine the power status of the DC buses.

14. Subcategory MU7 - Fuel Clad Degradation

The NUMARC SU4 example EAL 1. states:

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

The Quad Cities EAL MU7 - Fuel Clad Degradation EAL threshold value 1. states:

Offgas system isolation has occurred on a VALID SJAE radiation monitor high trip.

COMMENT: It is assumed that the high trip is from the post-treatment monitor. The Post-Treatment monitor reading versus coolant activity are dependent on the adsorber bed line up and hold up time. The licensee should consider use of other indications such as pre-treatment monitors and main steam line monitors. The licensee selection of the trip setpoint might not be as

conservative as suggested by the NUMARC criteria "radiation monitor readings."

The licensee should provide information that the selected threshold value meets the NUMARC conservative criteria.

15. Subcategory MU8 - RCS leakage.

The NUMARC SU5 example EAL 1. states:

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

The Quad Cities EAL MU8 - RCS leakage EAL threshold value states:

*1. UNIDENTIFIED RCS leakage into the primary containment \geq 10 gpm.
OR 2. Total (IDENTIFIED + UNIDENTIFIED) RCS leakage into the primary containment \geq 35 gpm.*

COMMENT: The licensee use of total leakage is not consistent with the NUMARC criteria.

The licensee should revise this EAL to be consistent with the NUMARC EALs or provide a rationale in the basis for the variations.

16. Subcategory MA11 - Major Fuel Damage OR Fuel Uncovery Outside the Reactor Vessel.

The NUMARC AA2 example EAL 1. states:

A (site-specific set point) alarm on one or more of the following radiation monitors:

*Refuel Floor Area Radiation Monitor
Fuel Handling Building Ventilation Monitor
Fuel Bridge Area Radiation Monitor*

The Quad Cities EAL MA11 - Major Fuel Damage OR Fuel Uncovery Outside the Reactor Vessel EAL threshold value number 1 states:

Valid reading of \geq 100 R/hr on refuel floor radiation monitor 1(2)1743-A or B.

COMMENT: The licensee selected value ≥ 100 R/hr seems high for this threshold value.

The licensee should confirm that the selected value is the alarm setpoint or provide a rationale in the basis for use of the ≥ 100 R/hr value.

17. Subcategory MA12 - UNCONTROLLED Loss of Refueling Cavity Volume.

The NUMARC initiating condition states:

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

The Quad Cities MA12 - UNCONTROLLED Loss of Refueling Cavity Volume initiating condition states:

Damage to spent fuel OR loss of water level such that irradiated fuel will become uncovered.

COMMENT: The licensee initiating condition indicates damage to spent fuel. However, no specific criteria is presented to define what is meant by damage. Only uncovering is presented as EAL threshold values.

The licensee should consider including a definition of damage to spent fuel in this EAL.

Recognition Category H - Hazards and Other Conditions.

18. Subcategory HS1 - Security Event in a Vital Area.

The NUMARC HS1 example EAL #2 states:

Other security events as determine from (site-specific) Safeguards Contingency Plan.

The Quad Cities basis for HS1 states:

A security event is as defined in the security plan, section 1.

COMMENT: The licensee reference to a separate document, security plan, for the definition of a security event places an unnecessary burden on the Emergency Director. The licensee should include those defined security events that result in emergency classification in the EAL threshold value section.

19. Subcategory HA4 - Natural OR destructive phenomena inside Vital Area.

The NUMARC HA1 example EALs state:

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

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 Room
Other (site-specific) Structures.*

The Quad Cities HA4 - Natural OR destructive phenomena inside Vital Area EAL threshold value states:

2. *Tornado strike within the Protected Area which affects equipment or structures within a vital area.*

3. *Sustained high winds \geq 90 mph on A-model report, computer point OR meter reading.*

4. *Report of visible structural damage to a structure (building, tanks, etc) affecting operations of systems required to establish or maintain Cold Shutdown.*

COMMENT: The licensee use of the terms "affects" and "affecting" places a qualifying condition on these events that is not present in the NUMARC EALs. The NUMARC criteria only provides for tornado, high winds or report of visible structural damage (structure specific). Affecting operation of equipment is not part of the NUMARC criteria. The NUMARC basis for structure damage states that the EAL should specify a site-specific list of structures containing systems and functions required for safe shutdown of the plant. The licensee does not provide a complete list of specific structures.

The licensee should revise this EAL to be consistent with the NUMARC EALs or provide a rationale in the basis for the variations.



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

**OFFICE OF NUCLEAR REACTOR REGULATION
DIVISION OF RADIATION SAFETY
AND SAFEGUARDS
EMERGENCY PREPAREDNESS BRANCH**

**RE: REQUEST FOR ADDITIONAL INFORMATION ON PROPOSED
EMERGENCY ACTION LEVEL CHANGES IN REVISION ZIN-93-01
OF THE ZION EMERGENCY PLAN**

TAC NOs: M87335 and M87336

The NRC has completed its initial review of the proposed emergency action levels (EALs) in Revision ZIN-93-01 to the Zion Station Site Specific Generating Station Emergency Plan Annex. The proposed EALs were reviewed against the guidance in NUMARC/NESP-007, "Methodology for Development of Emergency Action Levels." NUMARC/NESP-007 has been endorsed by the NRC in Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors," 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.

Because of the staff's previous endorsement of 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 with NUMARC/NESP-007. Please provide this additional information as discussed below.

1. RG1 - 1 Rem Total Effective Dose Equivalent (tede) OR 5 Rem Committed Dose Equivalent (cde) to the Thyroid

Initiating Condition (IC) RG1 does not include the following note which is contained in the corresponding NUMARC/NESP-007 IC,

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.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

2. RS1 - 100mRem Total Effective Dose Equivalent (tede) OR 500 mRem Committed Dose Equivalent (cde) to the Thyroid

IC RS1 does not include the following note which is contained in the corresponding NUMARC/NESP-007 IC,

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.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

3. RA2 - Release > 10 X ODCM limits for > 15 minutes

- a. IC RA2 does not include the following note which is contained in the corresponding NUMARC/NESP-007 IC,

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.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

- b. IC RA2 deviates from NUMARC/NESP-007 in that site specific liquid effluent monitors and readings are not specified in the EAL under this IC. The Zion EAL specifies *Liquid Releases: UNPLANNED Liquid Release $\geq 10 X$ the ODCM maximum instantaneous release limit for ≥ 15 minutes.* The corresponding NUMARC/NESP-007 EAL is *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 exceed the above criterion and indicates the need to assess the release with (site-specific procedure):*

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

- c. IC RA2 deviates from NUMARC/NESP-007 in that the EAL for liquid release is set at 10 x ODCM limits whereas NUMARC/NESP-007 specifies 200 times the radiological technical specifications as the threshold for this EAL (ODCM values can be used for sites that have eliminated radiological technical specifications). The basis for the Zion IC states that "The Alert value for gaseous effluents was reduced to 10 x ODCM to ensure sequential classifications." It is not clear from the information provided why this reduction is necessary.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

4. RU2 - Release > 2X ODCM for > 60 minutes

IC RU2 deviates from NUMARC/NESP-007 in that site specific liquid effluent monitors and readings are not specified in the EAL under this IC. The Zion EAL specifies *Liquid Releases: UNPLANNED Liquid Release $\geq 2 X$ the ODCM maximum instantaneous release limit for ≥ 60 minutes.* The corresponding NUMARC/NESP-007 EAL is *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 exceed the above criterion and indicates the need to assess the release with (site-specific procedure):*

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

5. MA11 - Major Fuel Damage OR Fuel Uncovery Outside the Reactor Vessel
MA12 - Uncontrolled Loss of Refueling Cavity Volume

ICs MA11 and MA12 deviate from the corresponding NUMARC/NESP-007 IC (AA2) in that EALs contained in NUMARC/NESP-007 are not included. In particular the following NUMARC/NESP-007 example EALs for IC AA2 are not included:

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.*

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

6. 1.b - Containment Critical Safety Function

EAL 1.b, entitled "Containment Critical Safety Function" deviates from the corresponding NUMARC/NESP-007 EAL, *Containment pressure greater than containment depressurization system setpoint with less than one full train of depressurization equipment operating in the*. The Zion EAL includes the condition of *No Containment Spray Available*. It is not clear why the term "available" was substituted for the phrase "less than one full train of depressurization equipment operating" for this EAL.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

7. CONTAINMENT 1.a - Containment Radiation

The basis for this EAL contains the following statement;

POTENTIAL LOSS -This value corresponds to 20% clad damage and represents a direct (uncorrected) value which is conservative for up to 4 hours after reactor shutdown. A 4 hour time is used to provide reasonable assurance that the Technical Support Center (TSC) would be available to provide evaluation to determine if clad damage has exceeded 20%.

This statement can be read as directing the licensee staff to delay classifying events on Containment Radiation indications until 4 hours after the initiation of the event.

Revise this statement to clarify its intent or provide additional information justifying retaining the basis in its present form.

8. FUEL CLAD 2.c - Containment Radiation

The basis for this EAL contains the following statement;

LOSS -The value of represents a direct (uncorrected) value which is conservative for up to 4 hours after reactor shutdown. A 4 hour time is used to provide reasonable assurance that the Technical Support Center (TSC) personnel would be available to provide evaluation to determine if clad failure has exceeded 5%.....

This statement can be read as directing the licensee staff to delay classifying events on Containment Radiation indications until 4 hours after the initiation of the event.

Revise this statement to clarify its intent or provide additional information justifying retaining the basis in its present form.

9. Zion Station Fission Product Barrier Matrix

The Zion fission product barrier matrix did not contain an EAL which corresponds to NUMARC fission product barrier EALs contained under the heading of *Emergency Director Judgement*.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

10. MU1, Loss of All Offsite Power for \geq 15 minutes

This IC contains the following EAL, *ESF busses are energized*. It is not clear whether including the general term "ESF busses" in this EAL is adequate to ensure accurate classification.

Provide information regarding the adequacy of the general term "ESF busses" in this EAL.

11. MA2, Loss of All Offsite and Onsite AC Power \geq 15 minutes

This IC contains the following EAL, *Failure of ...ESF busses*. It is not clear whether including the general term "ESF busses" in this EAL is adequate to ensure accurate classification.

Provide information regarding the adequacy of the general term "ESF busses" in this EAL.

12. MA3, Auto Trip NOT Successful

- a. This IC deviates from NUMARC/NESP-007 in that the condition that *a plant shutdown has commenced* is included in the Zion EAL under this IC.

NUMARC/NESP-007 Example EAL #1 for Initiating Condition SA2 states the following:

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 Zion EAL for Initiating Condition MA3 on page 5.1-40 state the following:

1. *A Reactor Protection System actuation signal was received AND automatic Reactor trip did not occur. A successful MANUAL TRIP occurred OR a plant shutdown has commenced.*

Revise this IC to delete the condition that *a unit shutdown has commenced* or provide addition justification for this deviation from the NUMARC/NESP-007 guidance.

13. MS4. Loss of Vital 125 Volt DC Power > 15 minutes

The EAL for this IC deviates from the corresponding NUMARC/NESP-007 EAL in that a site-specific bus voltage indication was not included in the Zion EAL.

NUMARC/NESP-007 Example EAL #1 for Initiating Condition SS3 states the following:

1. *Loss of All Vital DC Power based on (site-specific) bus voltage indications for greater than 15 minutes.*

The corresponding Zion EAL for Initiating Condition MS4 states the following:

Loss of all 125V DC power to a unit's ESF busses for \geq 15 minutes.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

14. MU4. Unplanned Loss of 125V DC Power for > 15 minutes

The EAL for this IC deviates from the corresponding NUMARC/NESP-007 EAL in that a site-specific bus voltage indication was not included in the Zion EAL.

NUMARC/NESP Example EAL #1 for Initiating Condition SU7 states the following:

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 with 15 minutes from the time of loss.*

The corresponding Zion EALs for Initiating Condition MU4 on page 5-1.42 state the following:

1. *Loss of all 125V DC power to a Unit.*

AND

2. *Failure to restore power to at least one ESF DC bus within 15 minutes from the time of loss.*

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

15. MS5, Loss of Hot Shutdown Capability

This IC deviates from the corresponding NUMARC/NESP-007 IC in that the condition of *Inadequate Shutdown Margin* is "anded" with the other condition specified in this EAL, i.e. *Loss of all effective means required for Hot Shutdown provided in AOP-6.3.*

NUMARC/NESP-007 Example EAL #1 for Initiating Condition SS4 states the following:

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

The corresponding Zion EAL for Initiating Condition MS5 on page 5.1-43 states the following:

- 1.a. *Total Available Feedwater flow \leq 340 gpm.*

OR

- b. *Loss of all effective means required for Hot Shutdown provided in AOP-6.3*

AND

2. *Inadequate Shutdown Margin*

Provide justification for this deviation from the NUMARC/NESP-007 guidance. In addition provide procedure AOP-6.3.

16. MU7, Fuel Clad Degradation

This IC deviates from the NUMARC/NESP-007 guidance in that site specific radiation monitor readings are not provided in the EALs for this IC.

NUMARC/NESP-007 Example EALs #1 and #2 for Initiating Condition SU4 state the following:

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

The corresponding Zion EAL for Initiating Condition MU7 on page 5-1.52 states the following:

VALID 1RE PR18/PR27 OR 2RE PR18/PR27 radiation monitor readings indicating fuel clad degradation > Technical Specification allowed limits.

OR

Coolant activity value requiring implementation of an action statement in Technical Specification 3.3.6.

Revise this EAL to conform with the NUMARC/NESP-007 guidance or provide justification for this deviation from the NUMARC/NESP-007 guidance.

17. HA1, Security Event in the Protected Area

This IC deviates from the NUMARC/NESP-007 guidance in that the following EAL is included, *A bomb device is discovered inside the vital area.* This EAL is indicative of a security event in a vital area and should therefore be included under Zion IC HS1 "Security Event in a Vital Area" which corresponds to NUMARC/NESP-007 IC HS1 "Security Event in a Vital Area."

Revise this IC and IC HS1 to be consistent with NUMARC/NESP-007 guidance or provide justification for this deviation from the NUMARC/NESP-007 guidance.

18. HA1, Security Event in a Plant Protected Area

This IC does not contain a list of (site-specific) security events.

NUMARC/NESP-007 Example EAL #2 for Initiating Condition HA4 states the following:

2. *Other security events as determined from (site-specific) Safeguards Contingency Plan.*

The corresponding Zion Threshold Value #3 for Initiating Condition HA1 on page 5.1-62 states the following:

3. *A security event of increasing severity that persists for ≥ 30 minutes.*

Revise the EAL to define and/or list specific security events that warrant classification or provide justification for maintaining this IC in its present form.

19. HS1, Security Event in a Plant Vital Area

The EAL for this IC does not contain a list of (site-specific) security events.

NUMARC/NESP-007 Example EAL #2 for Initiating Condition HS1 states as follows:

2. *Other security events as determined from (site-specific) Safeguards Contingency Plan.*

The corresponding Zion EAL for Initiating Condition HS1 on page 5.1-61 states the following:

2. *A security event which results in the loss of control of any vital area (other than the Control Room).*

Revise the EAL to define and/or list specific security events that warrant classification or provide justification for maintaining this IC in its present form.

20. HS3, Control Room Evacuated AND CONTROL NOT established in ≤ 30 minutes

The Zion EAL Threshold Value #2 on page 5.1-70 for Initiating Condition HS3, Evacuation of the Control Room AND CONTROL NOT established at remote locations in the plant in ≤ 30 minutes, states the following:

2. *CONTROL of the plant cannot be established per AOP-7.4 in ≤ 30 minutes.*

The licensee's basis information on page 5-1.70 for HS3 states:

Control - Control is defined as having placed all local control switches in local control necessary for operation from remote panels.

The criteria defining control is incomplete. Placing local control switches in local does not ensure control. This may be especially true considering the varied scenarios that may require control room evacuation (e.g., fire, electrical, security, sabotage, etc.). Placing local control switches in local should transfer control if all systems, controls, and interconnecting wiring are functional. The definition of "Control" should include a condition that functional control has been established per the identified procedure, AOP-7.4, not just switch positions changed.

The basis for IC HS2 in NUMARC/NESP-007 states that a determination of whether or not control is established should be made within 15 minutes.

Revise the EAL include a condition that functional control is established or provide justification for maintaining this EAL in its present form. Also, provide justification for utilizing a 30 minute time requirement.

21. HA4, Natural or Destructive Phenomena Inside a Vital Area.

This IC deviates from the NUMARC/NESP-007 guidance in that site specific areas, structures and buildings have not been identified.

NUMARC/NESP-007 Example EAL # 3 and #6 for Initiating Condition HA1 state the following:

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 Room
 - Other (Site-Specific) Structures

6. *Turbine failure generated missiles result in any visible structural damage to or penetration of any of the following plant areas: (Site-Specific) list.*

The corresponding Zion EAL for Initiating Condition HA4 on page 5-1.72 state the following:

4. *Report of visible structural damage to a structure (Building, tanks, etc.) affecting operations of systems required to establish or maintain Cold Shutdown.*

6. *Main Turbine rotating component failure which penetrates the casing and generates missiles causing damage to structures containing safety related equipment.*

Revise the EAL to include specific areas, structure, and buildings or provide justification for this deviation from the NUMARC/NESP-007 guidance.

22. HA2, Fire or Explosion Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown.

This IC deviates from the NUMARC/NESP-007 guidance in that site specific areas, structures and buildings have not been identified.

NUMARC/NESP-007 Example EAL # 1.a for Initiating Condition HA2 states the following:

1. *The following Conditions exist:*
 - a. *Fire or explosion in any of the following (Site-Specific) areas:
- (Site specific) list*

Corresponding Zion EAL #1 for Initiating Condition HA5 on page 5-1.76 states the following:

1. *Fire OR EXPLOSION affecting operability of safety systems required to establish or maintain Cold Shutdown*

Revise the EAL to include specific areas, structure, and buildings or provide justification for this deviation from the NUMARC/NESP-007 guidance.

23. 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.

This IC deviates from the NUMARC/NESP-007 guidance in that the following condition was added to the EAL associated with this IC, *toxic gases in life threatening concentrations that will affect the safe operation of the plant.*

NUMARC/NESP-007 Initiating Condition HA3, example EAL #1 states:

1. *Report or detection of toxic gases within a Facility Structure in concentrations that will be life threatening to plant personnel.*

The licensees' corresponding Initiating Condition HA6, EAL Threshold Value 1 on page 5.1-80 states:

1. *Report or detection of toxic gases within a Facility Structure in life threatening concentrations that will affect the safe operation of the plant.*

Under the NUMARC EAL, the emergency would be declared if the level of toxic gases were "life threatening to plant personnel." Under the licensees' EAL the emergency would be declared for "life threatening concentrations that will affect the safe operation of the plant." Life threatening levels to plant personnel would likely affect safe operations since the EAL is meant to exclude (see basis discussion) buildings or areas not contiguous or adjacent to plant vital areas. The presence of toxic or flammable gas in or near vital areas (the potential to affect) should warrant an Alert declaration. It may be difficult to determine how the life threatening levels to personnel would affect operation.

Revised this EAL to be consistent with NUMARC guidance or provide justification for this deviation from the NUMARC/NESP-007 guidance.

In addition, the following definition of "TOXIC" from Licensee Change Submittal, DRE-93-03, for the Dresden Facilities, i.e. *TOXIC - Exposure to the worker in excess of the limits specified in 29 CFR 1910.1000. In practice, this should be considered for concentrations which are capable of producing incapacitation of the worker*, should be included in the basis for this EAL or justification should be provided for not including this definition.



UNITED STATES NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR REACTOR REGULATION DIVISION OF RADIATION SAFETY AND SAFEGUARDS EMERGENCY PREPAREDNESS BRANCH

**RE: REQUEST FOR ADDITIONAL INFORMATION ON PROPOSED
EMERGENCY ACTION LEVEL CHANGES IN REVISION BRW-93-01
OF THE BRAIDWOOD EMERGENCY PLAN**

TAC NOs: M87325 and M87326

The NRC has completed its initial review of the proposed emergency action levels (EALs) in Revision BRW-93-01 to the Braidwood Station Site Specific Generating Station Emergency Plan Annex. The proposed EALs were reviewed against the guidance in NUMARC/NESP-007, "Methodology for Development of Emergency Action Levels." NUMARC/NESP-007 has been endorsed by the NRC in Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors," 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.

Because of the staff's previous endorsement of 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 with NUMARC/NESP-007. Please provide this additional information as discussed below.

1. RG1 - 1 Rem Total Effective Dose Equivalent (tede) OR 5 Rem Committed Dose Equivalent (cde) to the Thyroid

Initiating Condition (IC) RG1 does not include the following note which is contained in the corresponding NUMARC/NESP 007 IC,

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.

Provide justification for this deviation from the NESP guidance.

2. RS1 - 100mRem Total Effective Dose Equivalent (tede) OR 500 mRem Committed Dose Equivalent (cde) to the Thyroid

IC RS1 does not include the following note which is contained in the corresponding NUMARC/NESP 007 IC,

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.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

3. RA2 - Release > 10 X ODCM limits for > 15 minutes

- a. IC RA2 does not include the following note which is contained in the corresponding NUMARC/NESP-007 IC,

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.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

- b. IC RA2 deviates from NUMARC/NESP-007 in that site specific liquid effluent monitors and readings are not specified in the EAL under this IC. The Braidwood EAL specifies *Liquid Releases: UNPLANNED Liquid Release \geq 10 X the ODCM maximum instantaneous release limit for \geq 15 minutes*. The corresponding NUMARC/NESP-007 EAL is *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 exceed the above criterion and indicates the need to assess the release with (site-specific procedure):*

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

- c. IC RA2 deviates from NUMARC/NESP-007 in that the EAL for liquid release is set at 10 x ODCM limits whereas NUMARC/NESP-007 specifies 200 times the radiological technical specifications as the threshold for this EAL (ODCM values can be used for sites that have eliminated radiological technical specifications). The basis for the Braidwood IC states that "The Alert value for gaseous effluents was reduced to 10 x ODCM to ensure sequential classifications." It is not clear from the information provided why this reduction is necessary.

Provide justification for this deviation from the NESP guidance.

4. RU2 - Release > 2X ODCM for > 60 minutes

IC RU2 deviates from NUMARC/NESP-007 in that site specific liquid effluent monitors and readings are not specified in the EAL under this IC. The Braidwood EAL specifies *Liquid Releases: UNPLANNED Liquid Release $\geq 2 X$ the ODCM maximum instantaneous release limit for ≥ 60 minutes.* The corresponding NUMARC/NESP-007 EAL is *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 exceed the above criterion and indicates the need to assess the release with (site-specific procedure):*

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

5. MA11 - Major Fuel Damage OR Fuel Uncovery Outside the Reactor Vessel
MA12 - Uncontrolled Loss of Refueling Cavity Volume

ICs MA11 and MA12 deviate from the corresponding NUMARC/NESP-007 IC (AA2) in that EALs contained in NUMARC/NESP-007 are not included. In particular the following NUMARC/NESP-007 example EALs for IC AA2 are not included:

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.*

Provide justification for this deviation from the NESP guidance.

6. 1.b - Containment Critical Safety Function

EAL 1.b, entitled "Containment Critical Safety Function" deviates from the corresponding NUMARC/NESP-007 EAL, *Containment pressure greater than containment depressurization system setpoint with less than one full train of depressurization equipment operating* in that the Braidwood EAL includes the condition of *No Containment Spray Available*. It is not clear why the term "available" was substituted for the phrase "less than full train of depressurization equipment operating" for this EAL.

Provide justification for this deviation from the NESP guidance.

7. CONTAINMENT 1.a - Containment Radiation

The basis for this EAL contains the following statement;

POTENTIAL LOSS -This value corresponds to 20% clad damage and represents a direct (uncorrected) value which is conservative for up to 4 hours after reactor shutdown. A 4 hour time is used to provide reasonable assurance that the Technical Support Center (TSC) would be available to provide evaluation to determine if clad damage has exceeded 20%.

This statement can be read as directing the licensee staff to delay classifying events on Containment Radiation indications until 4 hours after the initiation of the event.

Revise this statement to clarify its intent or provide additional information justifying retaining the basis in its present form.

8. FUEL CLAD 2.c - Containment Radiation

The basis for this EAL contains the following statement;

LOSS -The value of represents a direct (uncorrected) value which is conservative for up to 4 hours after reactor shutdown. A 4 hour time is used to provide reasonable assurance that the Technical Support Center (TSC) personnel would be available to provide evaluation to determine if clad failure has exceeded 5%.....

This statement can be read as directing the licensee staff to delay classifying events on Containment Radiation indications until 4 hours after the initiation of the event.

Revise this statement to clarify its intent or provide additional information justifying retaining the basis in its present form.

9. Braidwood Station Fission Product Barrier Matrix

The Braidwood fission product barrier matrix did not contain an EAL which corresponds to NUMARC fission product barrier EALs contained under the heading of *Emergency Director Judgement*.

Provide justification for this deviation from the NESP guidance.

10. MU1, Loss of All Offsite Power for \geq 15 minutes

This IC contains the following EAL, *ESF busses are energized*. It is not clear whether including the general term "ESF busses" in this EAL is adequate to ensure accurate classification.

Provide information regarding the adequacy of the general term "ESF busses" in this EAL.

11. MA2, Loss of All Offsite and Onsite AC Power \geq 15 minutes

This IC contains the following EAL, *Failure of ...ESF busses*. It is not clear whether including the general term "ESF busses" in this EAL is adequate to ensure accurate classification.

Provide information regarding the adequacy of the general term "ESF busses" in this EAL.

12. MA3, Auto Trip NOT Successful

- a. This IC deviates from NUMARC/NESP-007 in that the condition that *a unit shutdown has commenced* is included in the Braidwood EAL under this IC.

NUMARC/NESP 007 Example EAL #1 for Initiating Condition SA2 states the following:

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 Braidwood EALs for Initiating Condition MA3 on page 5.1-40 state the following:

1. *A Reactor Protection System actuation signal was received AND automatic Reactor trip did not occur.*
AND
2. *A successful MANUAL TRIP occurred OR a unit shutdown has commenced.*

Revise this IC to delete the condition that *a unit shutdown has commenced* or provide addition justification for this deviation from the NUMARC/NESP-007 guidance.

13. MS4, Loss of Vital 125 Volt DC Power > 15 minutes

The EAL for this IC deviates from the corresponding NUMARC/NESP-007 EAL in that a site-specific bus voltage indication was not included in the Braidwood EAL.

NUMARC/NESP-007 Example EAL #1 for Initiating Condition SS3 states the following:

1. *Loss of All Vital DC Power based on (site-specific) bus voltage indications for greater than 15 minutes.*

The corresponding Braidwood EAL for Initiating Condition MS4 states the following:

Loss of all 125V DC power to a unit's ESF busses for \geq 15 minutes.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

14. MU4, Unplanned Loss of 125V DC Power for > 15 minutes

The EAL for this IC deviates from the corresponding NUMARC/NESP-007 EAL in that a site-specific bus voltage indication was not included in the Braidwood EAL.

NUMARC/NESP Example EAL #1 for Initiating Condition SU7 states the following:

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 with 15 minutes from the time of loss.*

The corresponding Braidwood EALs for Initiating Condition MU4 on page 5-1.42 state the following:

1. *Loss of all 125V DC power to a Unit.*

AND

2. *Failure to restore power to at least one ESF DC bus within 15 minutes from the time of loss.*

Provide justification for this deviation from the NESP guidance.

15. MS5, Loss of Hot Shutdown Capability

This IC deviates from the corresponding NUMARC/NESP-007 IC in that the condition of *Inadequate Shutdown Margin* is "anded" with the other condition specified in this EAL, i.e. *Loss of all effective means required for Hot Shutdown provided in BwOA PRI-10, Table A.*

NUMARC/NESP-007 Example EAL #1 for Initiating Condition SS4 states the following:

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

The corresponding Braidwood EAL for Initiating Condition MS5 on page 5.1-43 states the following:

1. *Loss of all effective means required for Hot Shutdown provided in BwOA PRI-10, Table A.*

AND

2. *Inadequate Shutdown Margin*

Provide justification for this deviation from the NUMARC/NESP-007 guidance. In addition provide procedure BwOA PRI-10.

16. MU7, Fuel Clad Degradation

This IC deviates from the NUMARC/NESP-007 guidance in that site specific radiation monitor readings are not provided in the EALs for this IC.

NUMARC/NESP 007 Example EALs #1 and #2 for Initiating Condition SU4 state the following:

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

The corresponding Braidwood EAL for Initiating Condition MU7 on page 5-1.52 states the following:

VALID 1RE PRO06B OR 2RE PRO006B radiation monitor readings indicating fuel clad degradation > Technical Specification allowed limits.

OR

Coolant activity value requiring implementation of an action statement in Technical Specification 3/4 4.8.

Revise this EAL to conform with the NUMARC/NESP-007 guidance or provide justification for this deviation from the NESP guidance.

17. HA1, Security Event in the Protected Area

This IC deviates from the NUMARC/NESP-007 guidance in that the following EAL is included, *A bomb device is discovered inside the vital area.* This EAL is indicative of a security event in a vital area and should therefore be included under Braidwood IC HS1 "Security Event in a Vital Area" which corresponds to NUMARC/NESP-007 IC HS1 "Security Event in a Vital Area."

Revise this IC and IC HS1 to be consistent with NUMARC/NESP-007 guidance or provide justification for this deviation from the NESP guidance.

18. HA1, Security Event in the Protected Area

This IC does not contain a list of (site-specific) security events.

NUMARC/NESP 007 Example EAL #2 for Initiating Condition HA4 states the following:

2. *Other security events as determined from (site-specific) Safeguards Contingency Plan.*

The corresponding Braidwood Threshold Value #3 for Initiating Condition HA1 on page 5.1-62 states the following:

3. *A security event of increasing severity that persists for \geq 30 minutes.*

Revise the EAL to define and/or list specific security events that warrant classification or provide justification for maintaining this IC in its present form.

19. HS1, Security Event in a Plant Vital Area

The EAL for this IC does not contain a list of (site-specific) security events.

NUMARC/NESP 007 Example EAL #2 for Initiating Condition HS1 states as follows:

2. *Other security events as determined from (site-specific) Safeguards Contingency Plan.*

The corresponding Braidwood EAL for Initiating Condition HS1 on page 5.1-61 states the following:

2. *A security event which results in the loss of control of any vital area (other than the Control Room).*

Revise the EAL to define and/or list specific security events that warrant classification or provide justification for maintaining this IC in its present form.

20. HS3, Control Room Evacuated AND CONTROL NOT established at remote locations in the plant in \leq 15 minutes.

The Braidwood EAL Threshold Value #2 on page 5.1-70 for Initiating Condition HS3, Evacuation of the Control Room AND CONTROL NOT established at remote locations in the plant in \leq 15 minutes, states the following:

2. *CONTROL of the plant cannot be established per BwOA PRI-5 in \leq 15 minutes.*

The licensees' basis information on page 5-1.70 for HS3 states:

Control - Control is defined as having placed all local control switches in local control necessary for operation from remote panels.

The criteria defining control is incomplete. Placing local control switches in local does not ensure control. This may be especially true considering the varied scenarios that may require control room evacuation (e.g., fire, electrical, security, sabotage, etc.). Placing local control switches in local should transfer control if all systems, controls, and interconnecting wiring are functional. The definition of "Control" should include a condition that functional control has been established per the identified procedure, BwOA PRI-5, not just switch positions changed.

Revise the EAL include a condition that functional control is established or provide justification for maintaining this EAL in its present form.

21. HA4, Natural or Destructive Phenomena Inside a Vital Area.

This IC deviates from the NUMARC/NESP-007 guidance in that site specific areas, structures and buildings have not been identified.

NUMARC/NESP 007 Example EAL # 3 and #6 for Initiating Condition HA1 state the following:

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 Room
- Other (Site-Specific) Structures

6. Turbine failure generated missiles result in any visible structural damage to or penetration of any of the following plant areas: (Site-Specific) list.

The corresponding Braidwood EAL for Initiating Condition HA4 on page 5-1.72 state the following:

4. Report of visible structural damage to a structure (Building, tanks, etc.) affecting operations of systems required to establish or maintain Cold Shutdown.
6. Main Turbine rotating component failure which penetrates the casing and generates missiles causing damage to structures containing safety related equipment.

Revise the EAL to include specific areas, structure, and buildings or provide justification for this deviation from the NESP guidance.

22. HA2, Fire or Explosion Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown.

This IC deviates from the NUMARC/NESP-007 guidance in that site specific areas, structures and buildings have not been identified.

NUMARC/NESP 007 Example EAL # 1.a for Initiating Condition HA2 states the following:

1. The following Conditions exist:
 - a. Fire or explosion in any of the following (Site-Specific) areas:
 - (Site specific) list

Corresponding Braidwood EAL #1 for Initiating Condition HA5 on page 5-1.76 states the following:

1. *Fire OR EXPLOSION affecting operability of safety systems required to establish or maintain Cold Shutdown*

Revise the EAL to include specific areas, structure, and buildings or provide justification for this deviation from the NESP guidance.

23. 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.

This IC deviates from the NUMARC/NESP-007 guidance in that the following condition was added to the EAL associated with this IC, *toxic gases in life threatening concentrations that will affect the safe operation of the plant.*

NUMARC/NESP 007 Initiating Condition HA3, example EAL #1 states:

1. *Report or detection of toxic gases within a Facility Structure in concentrations that will be life threatening to plant personnel.*

The licensees' corresponding Initiating Condition HA6, EAL Threshold Value 1 on page 5.1-80 states:

1. *Report or detection of toxic gases within a Facility Structure in life threatening concentrations that will affect the safe operation of the plant.*

Under the NUMARC EAL, the emergency would be declared if the level of toxic gases were "life threatening to plant personnel." Under the licensees' EAL the emergency would be declared for "life threatening concentrations that will affect the safe operation of the plant." Life threatening levels to plant personnel would likely affect safe operations since the EAL in meant to exclude (see basis discussion) buildings or areas not contiguous or adjacent to plant vital areas. The presence of toxic or flammable gas in or near vital areas (the potential to affect) should warrant an Alert declaration. It may be difficult to determine how the life threatening levels to personnel would affect operation.

Revised this EAL to be consistent with NUMARC guidance or provide justification for this deviation from the NESP guidance.

In addition, the following definition of "TOXIC" from Licensee Change Submittal, DRE-93-03, for the Dresden Facilities, i.e. *TOXIC - Exposure to the worker in excess of the limits specified in 29 CFR 1910.1000. In practice, this should be considered for concentrations which are capable of producing incapacitation of the worker*, should be included in the basis for this EAL or justification should be provided for not including this definition.



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

**OFFICE OF NUCLEAR REACTOR REGULATION
DIVISION OF RADIATION SAFETY
AND SAFEGUARDS
EMERGENCY PREPAREDNESS BRANCH**

**RE: REQUEST FOR ADDITIONAL INFORMATION ON PROPOSED
EMERGENCY ACTION LEVEL CHANGES IN REVISION BYR-93-01
OF THE BYRON EMERGENCY PLAN**

TAC NOs: M87327 and M87328

The NRC has completed its initial review of the proposed emergency action levels (EALs) in Revision BYR-93-01 to the Bryon Station Site Specific Generating Station Emergency Plan Annex. The proposed EALs were reviewed against the guidance in NUMARC/NESP-007, "Methodology for Development of Emergency Action Levels." NUMARC/NESP-007 has been endorsed by the NRC in Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors," 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.

Because of the staff's previous endorsement of 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 with NUMARC/NESP-007. Please provide this additional information as discussed below.

1. RG1 - 1 Rem Total Effective Dose Equivalent (tede) OR 5 Rem Committed Dose Equivalent (cde) to the Thyroid

Initiating Condition (IC) RG1 does not include the following note which is contained in the corresponding NUMARC/NESP-007 IC,

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.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

2. RS1 - 100mRem Total Effective Dose Equivalent (tede) OR 500 mRem Committed Dose Equivalent (cde) to the Thyroid

IC RS1 does not include the following note which is contained in the corresponding NUMARC/NESP-007 IC,

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.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

3. RA2 - Release > 10 X ODCM limits for > 15 minutes

- a. IC RA2 does not include the following note which is contained in the corresponding NUMARC/NESP-007 IC,

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.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

- b. IC RA2 deviates from NUMARC/NESP-007 in that site specific liquid effluent monitors and readings are not specified in the EAL under this IC. The Bryon EAL specifies *Liquid Releases: UNPLANNED Liquid Release \geq 10 X the ODCM maximum instantaneous release limit for \geq 15 minutes.* The corresponding NUMARC/NESP-007 EAL is *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 exceed the above criterion and indicates the need to assess the release with (site-specific procedure):*

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

- c. IC RA2 deviates from NUMARC/NESP-007 in that the EAL for liquid release is set at 10 x ODCM limits whereas NUMARC/NESP-007 specifies 200 times the radiological technical specifications as the threshold for this EAL (ODCM values can be used for sites that have eliminated radiological technical specifications). The basis for the Bryon IC states that "The Alert value for gaseous effluents was reduced to 10 x ODCM to ensure sequential classifications." It is not clear from the information provided why this reduction is necessary.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

4. RU2 - Release > 2X ODCM for > 60 minutes

IC RU2 deviates from NUMARC/NESP-007 in that site specific liquid effluent monitors and readings are not specified in the EAL under this IC. The Bryon EAL specifies: *Liquid Releases: UNPLANNED Liquid Release $\geq 2 X$ the ODCM maximum instantaneous release limit for ≥ 60 minutes.* The corresponding NUMARC/NESP-007 EAL is *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 exceed the above criterion and indicates the need to assess the release with (site-specific procedure):*

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

5. MA11 - Major Fuel Damage OR Fuel Uncovery Outside the Reactor Vessel
MA12 - Uncontrolled Loss of Refueling Cavity Volume

ICs MA11 and MA12 deviate from the corresponding NUMARC/NESP-007 IC (AA2) in that EALs contained in NUMARC/NESP-007 are not included. In particular the following NUMARC/NESP-007 example EALs for IC AA2 are not included:

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.*

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

6. 1.b - Containment Critical Safety Function

EAL 1.b, entitled "Containment Critical Safety Function" deviates from the corresponding NUMARC/NESP-007 EAL, *Containment pressure greater than containment depressurization system setpoint with less than one full train of depressurization equipment operating* in that the Bryon EAL includes the condition of *No Containment Spray Available*. It is not clear why the term "available" was substituted for the phrase "less than full train of depressurization equipment operating" for this EAL.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

7. CONTAINMENT 1.a - Containment Radiation

The basis for this EAL contains the following statement;

POTENTIAL LOSS -This value corresponds to 20% clad damage and represents a direct (uncorrected) value which is conservative for up to 4 hours after reactor shutdown. A 4 hour time is used to provide reasonable assurance that the Technical Support Center (TSC) would be available to provide evaluation to determine if clad damage has exceeded 20%.

This statement can be read as directing the licensee staff to delay classifying events on Containment Radiation indications until 4 hours after the initiation of the event.

Revise this statement to clarify its intent or provide additional information justifying retaining the basis in its present form.

8. FUEL CLAD 2.c - Containment Radiation

The basis for this EAL contains the following statement;

LOSS -The value of represents a direct (uncorrected) value which is conservative for up to 4 hours after reactor shutdown. A 4 hour time is used to provide reasonable assurance that the Technical Support Center (TSC) personnel would be available to provide evaluation to determine if clad failure has exceeded 5%.....

This statement can be read as directing the licensee staff to delay classifying events on Containment Radiation indications until 4 hours after the initiation of the event.

Revise this statement to clarify its intent or provide additional information justifying retaining the basis in its present form.

9. Bryon Station Fission Product Barrier Matrix

The Bryon fission product barrier matrix did not contain an EAL which corresponds to NUMARC fission product barrier EALs contained under the heading of *Emergency Director Judgement*.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

10. MU1, Loss of All Offsite Power for \geq 15 minutes

This IC contains the following EAL, *ESF busses are energized*. It is not clear whether including the general term "ESF busses" in this EAL is adequate to ensure accurate classification.

Provide information regarding the adequacy of the general term "ESF busses" in this EAL.

11. MA2, Loss of All Offsite and Onsite AC Power \geq 15 minutes

This IC contains the following EAL, *Failure of ...ESF busses*. It is not clear whether including the general term "ESF busses" in this EAL is adequate to ensure accurate classification.

Provide information regarding the adequacy of the general term "ESF busses" in this EAL.

12. MA3, Auto Trip NOT Successful

- a. This IC deviates from NUMARC/NESP-007 in that the condition that *a unit shutdown has commenced* is included in the Bryon EAL under this IC.

NUMARC/NESP-007 Example EAL #1 for Initiating Condition SA2 states the following:

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 Bryon EALs for Initiating Condition MA3 on page 5.1-40 state the following:

1. *A Reactor Protection System actuation signal was received AND automatic Reactor trip did not occur.*

AND

2. *A successful MANUAL TRIP occurred OR a unit shutdown has commenced.*

Revise this IC to delete the condition that *a unit shutdown has commenced* or provide addition justification for this deviation from the NUMARC/NESP-007 guidance.

13. MS4. Loss of Vital 125 Volt DC Power > 15 minutes

The EAL for this IC deviates from the corresponding NUMARC/NESP-007 EAL in that a site-specific bus voltage indication was not included in the Bryon EAL.

NUMARC/NESP-007 Example EAL #1 for Initiating Condition SS3 states the following:

1. *Loss of All Vital DC Power based on (site-specific) bus voltage indications for greater than 15 minutes.*

The corresponding Bryon EAL for Initiating Condition MS4 states the following:

Loss of all 125V DC power to a unit's ESF busses for \geq 15 minutes.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

14. MU4. Unplanned Loss of 125V DC Power for > 15 minutes

The EAL for this IC deviates from the corresponding NUMARC/NESP-007 EAL in that a site-specific bus voltage indication was not included in the Bryon EAL.

NUMARC/NESP Example EAL #1 for Initiating Condition SU7 states the following:

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 with 15 minutes from the time of loss.*

The corresponding Bryon EALs for Initiating Condition MU4 on page 5-1.42 state the following:

1. *Loss of all 125V DC power to a Unit.*

AND

2. *Failure to restore power to at least one ESF DC bus within 15 minutes from the time of loss.*

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

15. MS5, Loss of Hot Shutdown Capability

This IC deviates from the corresponding NUMARC/NESP-007 IC in that the condition of *Inadequate Shutdown Margin* is "anded" with the other condition specified in this EAL, i.e. *Loss of all effective means required for Hot Shutdown provided in BOA PRI-10, Table A.*

NUMARC/NESP-007 Example EAL #1 for Initiating Condition SS4 states the following:

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

The corresponding Bryon EAL for Initiating Condition MS5 on page 5.1-43 states the following:

1. *Loss of all effective means required for Hot Shutdown provided in BOA PRI-10, Table A.*

AND

2. *Inadequate Shutdown Margin*

Provide justification for this deviation from the NUMARC/NESP-007 guidance. In addition provide procedure BOA PRI-10.

16. MU7, Fuel Clad Degradation

This IC deviates from the NUMARC/NESP-007 guidance in that site specific radiation monitor readings are not provided in the EALs for this IC.

NUMARC/NESP-007 Example EALs #1 and #2 for Initiating Condition SU4 state the following:

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

The corresponding Bryon EAL for Initiating Condition MU7 on page 5-1.52 states the following:

VALID 1RE PRO06B OR 2RE PRO006B radiation monitor readings indicating fuel clad degradation > Technical Specification allowed limits.

OR

Coolant activity value requiring implementation of an action statement in Technical Specification 5/4 4.8.

Revise this EAL to conform with the NUMARC/NESP-007 guidance or provide justification for this deviation from the NUMARC/NESP-007 guidance.

17. HA1, Security Event in the Protected Area

This IC deviates from the NUMARC/NESP-007 guidance in that the following EAL is included, *A bomb device is discovered inside the vital area.* This EAL is indicative of a security event in a vital area and should therefore be included under Bryon IC HS1 "Security Event in a Vital Area" which corresponds to NUMARC/NESP-007 IC HS1 "Security Event in a Vital Area."

Revise this IC and IC HS1 to be consistent with NUMARC/NESP-007 guidance or provide justification for this deviation from the NUMARC/NESP-007 guidance.

18. HA1, Security Event in the Protected Area

This IC does not contain a list of (site-specific) security events.

NUMARC/NESP-007 Example EAL #2 for Initiating Condition HA4 states the following:

2. *Other security events as determined from (site-specific) Safeguards Contingency Plan.*

The corresponding Bryon Threshold Value #3 for Initiating Condition HA1 on page 5.1-62 states the following:

3. *A security event of increasing severity that persists for ≥ 30 minutes.*

Revise the EAL to define and/or list specific security events that warrant classification or provide justification for maintaining this IC in its present form.

19. HS1, Security Event in a Plant Vital Area

The EAL for this IC does not contain a list of (site-specific) security events.

NUMARC/NESP-007 Example EAL #2 for Initiating Condition HS1 states as follows:

2. *Other security events as determined from (site-specific) Safeguards Contingency Plan.*

The corresponding Bryon EAL for Initiating Condition HS1 on page 5.1-61 states the following:

2. *A security event which results in the loss of control of any vital area (other than the Control Room).*

Revise the EAL to define and/or list specific security events that warrant classification or provide justification for maintaining this IC in its present form.

20. HS3, Control Room Evacuated AND CONTROL NOT established at remote locations in the plant in ≤ 15 minutes.

The Bryon EAL Threshold Value #2 on page 5.1-70 for Initiating Condition HS3, Evacuation of the Control Room AND CONTROL NOT established at remote locations in the plant in ≤ 15 minutes, states the following:

2. *CONTROL of the plant cannot be established per BOA PRI-5 in ≤ 15 minutes.*

The licensee's basis information on page 5-1.70 for HS3 states:

Control - Control is defined as having placed all local control switches in local control necessary for operation from remote panels.

The criteria defining control is incomplete. Placing local control switches in local does not ensure control. This may be especially true considering the varied scenarios that may require control room evacuation (e.g., fire, electrical, security, sabotage, etc.). Placing local control switches in local should transfer control if all systems, controls, and interconnecting wiring are functional. The definition of "Control" should include a condition that functional control has been established per the identified procedure, BOA PRI-5, not just switch positions changed.

Revise the EAL include a condition that functional control is established or provide justification for maintaining this EAL in its present form.

21. HA4, Natural or Destructive Phenomena Inside a Vital Area.

This IC deviates from the NUMARC/NESP-007 guidance in that site specific areas, structures and buildings have not been identified.

NUMARC/NESP-007 Example EAL # 3 and #6 for Initiating Condition HA1 state the following:

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 Room
 - Other (Site-Specific) Structures

6. *Turbine failure generated missiles result in any visible structural damage to or penetration of any of the following plant areas: (Site-Specific) list.*

The corresponding Bryon EAL for Initiating Condition HA4 on page 5-1.72 state the following:

4. *Report of visible structural damage to a structure (Building, tanks, etc.) affecting operations of systems required to establish or maintain Cold Shutdown.*

6. *Main Turbine rotating component failure which penetrates the casing and generates missiles causing damage to structures containing safety related equipment.*

Revise the EAL to include specific areas, structure, and buildings or provide justification for this deviation from the NUMARC/NESP-007 guidance.

22. HA2, Fire or Explosion Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown.

This IC deviates from the NUMARC/NESP-007 guidance in that site specific areas, structures and buildings have not been identified.

NUMARC/NESP-007 Example EAL # 1.a for Initiating Condition HA2 states the following:

1. *The following Conditions exist:*
 - a. *Fire or explosion in any of the following (Site-Specific) areas:
- (Site specific) list*

Corresponding Bryon EAL #1 for Initiating Condition HA5 on page 5-1.76 states the following:

1. *Fire OR EXPLOSION affecting operability of safety systems required to establish or maintain Cold Shutdown*

Revise the EAL to include specific areas, structure, and buildings or provide justification for this deviation from the NUMARC/NESP-007 guidance.

23. 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.

This IC deviates from the NUMARC/NESP-007 guidance in that the following condition was added to the EAL associated with this IC, *toxic gases in life threatening concentrations that will affect the safe operation of the plant.*

NUMARC/NESP-007 Initiating Condition HA3, example EAL #1 states:

1. *Report or detection of toxic gases within a Facility Structure in concentrations that will be life threatening to plant personnel.*

The licensees' corresponding Initiating Condition HA6, EAL Threshold Value 1 on page 5.1-80 states:

1. *Report or detection of toxic gases within a Facility Structure in life threatening concentrations that will affect the safe operation of the plant.*

Under the NUMARC EAL, the emergency would be declared if the level of toxic gases were "life threatening to plant personnel." Under the licensees' EAL the emergency would be declared for "life threatening concentrations that will affect the safe operation of the plant." Life threatening levels to plant personnel would likely affect safe operations since the EAL is meant to exclude (see basis discussion) buildings or areas not contiguous or adjacent to plant vital areas. The presence of toxic or flammable gas in or near vital areas (the potential to affect) should warrant an Alert declaration. It may be difficult to determine how the life threatening levels to personnel would affect operation.

Revised this EAL to be consistent with NUMARC guidance or provide justification for this deviation from the NUMARC/NESP-007 guidance.

In addition, the following definition of "TOXIC" from Licensee Change Submittal, DRE-93-03, for the Dresden Facilities, i.e. *TOXIC - Exposure to the worker in excess of the limits specified in 29 CFR 1910.1000. In practice, this should be considered for concentrations which are capable of producing incapacitation of the worker, should be included in the basis for this EAL or justification should be provided for not including this definition.*



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**OFFICE OF NUCLEAR REACTOR REGULATION
DIVISION OF RADIATION SAFETY
AND SAFEGUARDS
EMERGENCY PREPAREDNESS BRANCH**

**RE: REQUEST FOR ADDITIONAL INFORMATION ON PROPOSED
EMERGENCY ACTION LEVEL CHANGES IN REVISION DRE-93-03
OF THE DRESDEN EMERGENCY PLAN**

TAC NOs: M87329 and M87330

The NRC has completed its initial review of the proposed emergency action levels (EALs) in Revision DRE-93-03 to the Commonwealth Edison Generating Stations Emergency Plan (GSEP) Dresden Station Annex. The proposed EALS were reviewed against the guidance in NUMARC/NESP-007, "Methodology for Development of Emergency Action Levels." NUMARC/NESP-007 has been endorsed by the NRC in Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors," 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.

Because of the staff's previous endorsement of 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 with NUMARC/NESP-007. Please provide this additional information as discussed below.

A. GENERAL COMMENTS

The licensee did not include the NUMARC criteria relating to judgement of the Emergency Director for fission product barrier loss or potential loss in any of the fission product barrier EALs. These EALs should be incorporated into the emergency classification scheme or justification should be provided for their omission.

Definitions between the plants are not consistent. For example: Dresden defines Valid as "Reading are assumed valid unless circumstances cause the reading to be suspect." LaSalle and Quad Cities define Valid as "A reading confirmed by redundant measurement, instrumentation, local reading or grab sample." The licensee should use the same definitions at all the nuclear plants.

B. EAL SPECIFIC COMMENTS

Recognition Category R - Abnormal Rad Levels/Radiological Effluent

1. Subcategory RG1 - 1 Rem Total Effective Dose Equivalent (tede) OR 5 Rem Committed Dose Equivalent (cde) to the Thyroid

NUMARC AG1 - Abnormal Rad Levels/Radiological Effluent example EALs state:

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):*

(site-specific list)

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.

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]*
3. *Valid dose assessment capability indicates dose consequences greater than 1000 mR whole body or 5000 mR child thyroid.*
4. *Field survey results indicate site boundary dose rates exceeding 1000 mR/hr expected to continue for more than one hour; or analysis of field survey samples indicate child thyroid commitment of 5000 mR for one hour of inhalation.*

Dresden EAL Abnormal Rad Levels/Radiological Effluent RG1 threshold values state:

ONE of the following when Drywell Radiation level \geq 100 R/hr, or Reactor Vessel Level \leq -143 inches, or Radiation level \geq 1 R/hr on Refuel Floor indicating clad/core damage:

1. *The station total release as indicated by the SUM of VALID readings of Units 2 and 3 on the following monitors indicate the release has or is expected to exceed 1 Rem total effective dose equivalent (tede) OR 5*

Rem committed dose equivalent (cde) to the thyroid and indicates the need to assess the release with dose projection models.

The Sum of:

*2/3 Reactor Building SPING channel 3, 5, or 7, and
1 and 2/3 Chimney SPING channel 3, 5, or 7:*

$\geq 9.1E+06 \mu\text{Ci/sec}$ as determined by DOP 1700-10

2. *Dose assessment results indicate dose consequences of 1 Rem (tede), or Dose assessment results indicate dose consequences of 5 Rem (cde) to the thyroid.*
3. *RESTRICTED AREA BOUNDARY dose rates ≥ 1 R/hr expected to continue for ≥ 1 hour, or Analysis indicates 5 Rem (cde) to the thyroid at the RESTRICTED AREA BOUNDARY.*
4. *Valid A-model Effluent Release Report indicating a General Emergency*

COMMENT: The licensee inclusion of drywell radiation level, vessel level, and refuel floor radiation level is inconsistent with the guidance and potentially confusing. A valid (confirmed) stack monitor release in excess of the calculated threshold value is sufficient to classify the event. All reactor emergency events that cause a high release rate may not trigger one of the three entry level conditions. The similar EALs for CEC Co PWRs do not include this entry condition requirement. The licensee should eliminate these conditions in the EAL or provide justification on their benefit.

RG1 does not include the following note which is contained in the corresponding NUMARC/NESP-007 IC,

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.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

The licensee basis for threshold value #4 states that the A-model reports at 1000 mRem/hr. No mention is made about the NUMARC criteria of 5000 mR child thyroid dose. Information should be provided on the capability of the A-model to assess thyroid dose.

2. Subcategory RS1 - 100 mRem Total Effective Dose Equivalent (tede) OR 500 mRem Committed Dose Equivalent (cde) to the Thyroid

NUMARC AS1 - Abnormal Rad Levels/Radiological Effluent example EALs state:

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):*

(site-specific list)

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.

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]*
3. *Valid dose assessment capability indicates dose consequences greater than 100 mR whole body or 500 mR child thyroid.*
4. *Field survey results indicate child indicate site boundary dose rates exceeding 100 mR/hr expected to continue for more than one hour; or analysis of field survey samples indicate child thyroid commitment of 500 mR for one hour of inhalation.*

Dresden EAL Abnormal Rad Levels/Radiological Effluent RS1 threshold values state:

ONE of the following when Drywell Radiation level \geq 100 R/hr, or Reactor Vessel Level \leq -143 inches, or Radiation level \geq 1 R/hr on Refuel Floor indicating clad/core damage:

1. *The station total release as indicated by the SUM of VALID readings of Units 2 and 3 on the following monitors indicate the release has or is expected to exceed 100 mRem total effective dose equivalent (tede) OR 500 mRem committed dose equivalent (cde) to the thyroid.*

The Sum of:

2/3 Reactor Building SPING channel 3, 5, or 7, and

1 and 2/3 Chimney SPING channel 3, 5, or 7:

$\geq 9.1E+05 \mu\text{Ci/sec}$ as determined by DOP 1700-10

2. Dose assessment results indicate dose consequences of 100 mRem (tede), or Dose assessment results indicate dose consequences of 500 mRem (cde) to the thyroid.
3. RESTRICTED AREA BOUNDARY dose rates $\geq 100 \text{ mR/hr}$ expected to continue for ≥ 1 hour, or Analysis indicates 500 mRem (cde) to the thyroid at the RESTRICTED AREA BOUNDARY.
4. Valid A-model Effluent Release Report indicating a SITE Emergency

COMMENT: The licensee inclusion of drywell radiation level, vessel level, and refuel floor radiation level is inconsistent with the guidance and potentially confusing. A valid (confirmed) stack monitor release in excess of the calculated threshold value is sufficient to classify the event. Furthermore, all reactor emergency events that cause a high release rate may not trigger one of the three entry level conditions. The similar EALs for CECOs PWRs do not include this entry condition requirement. The licensee should eliminate these conditions in the EAL or provide justification on their benefit.

RS1 does not include the following note which is contained in the corresponding NUMARC/NESP-007 IC,

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.*

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

The licensee basis for threshold value #4 states that the A-model reports at 100 mRem/hr. No mention is made about the NUMARC criteria of 500 mR child thyroid dose. Information should be provided on the capability of the A-model to assess thyroid dose.

3. Subcategory RA2 - Release $\geq 10 \times$ ODCM limits for ≥ 15 Minutes.

NUMARC AA1 - Abnormal Rad Levels/Radiological Effluent example EALs state:

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):*

(site-specific list)

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.

2. *Confirmed sample analysis for gaseous or liquid releases indicates concentrations or release rates in excess of (200 X site-specific technical specifications) for 15 minutes or longer.*
3. *A valid reading on perimeter radiation monitoring system greater than 10 mR/hr sustained for 15 minutes or longer. [for sites having telemetered perimeter monitors]*
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]*

Dresden EAL Abnormal Rad Levels/Radiological Effluent RA2 threshold values state:

ONE of the following when Drywell Radiation level < 100 R/hr, or Reactor Vessel Level > -143 inches, or Radiation level < 1 R/hr on Refuel Floor indicating no clad/core damage:

1. *The station total release as indicated by the SUM of VALID readings of Units 2 and 3 on the following monitors indicates that the release may have exceeded ≥ 10 X ODCM limits and indicates the need to assess the release:*

The Sum of Gaseous Releases:

*2/3 Reactor Building SPING channel 3, 5, or 7, and
1 and 2/3 Chimney SPING channel 3, 5, or 7:*

a. $\geq 8.5E+05$ μ Ci/sec as determined by DOP 1700-10

b. *Liquid Releases:*

UNPLANNED Liquid Releases $\geq 10 X$ the ODCM maximum instantaneous release limit.

2. *Grab sample indicate concentrations or release rates $\geq 10 X$ the ODCM maximum instantaneous release limit for ≥ 15 minutes.*
3. *RESTRICTED AREA BOUNDARY dose rates ≥ 10 mR/hr expected to continue for ≥ 15 minutes.*
4. *Valid A-model Effluent Release Report indicating an ALERT.*

COMMENT: The licensee inclusion of drywell radiation level, vessel level, and refuel floor radiation level is inconsistent with the guidance and potentially confusing. A valid (confirmed) stack monitor release in excess of the calculated threshold value is sufficient to classify the event. Furthermore, all reactor emergency events that cause a high release rate may not trigger one of the three entry level conditions. The similar EALs for CEC Co PWRs do not include this entry condition requirement. The licensee should eliminate these conditions in the EAL or provide justification on their benefit.

RA2 does not include the following note which is contained in the corresponding NUMARC/NESP-007 IC,

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.

Provide justification for this deviation from the NUMARC/NESP-007 guidance.

IC RA2 deviates from NUMARC/NESP-007 in that the EAL for releases is set at 10 x ODCM limits whereas NUMARC/NESP-007 specifies 200 times the radiological technical specifications as the threshold for this EAL (ODCM values can be used for sites that have eliminated radiological technical specifications). The basis for the Dresden IC states that "The Alert value for gaseous effluents was reduced to 10 x ODCM to ensure sequential classifications." It is not clear from the information provided why this reduction is necessary.

Provide justification for this deviation from the NESP guidance.

The licensee does not provide site specific monitor/s for a liquid release. If installed, the monitor/s should be specified and threshold values provided in the EAL/s.

4. Subcategory RU2 - Release $\geq 2 \times$ ODCM for ≥ 60 Minutes.

NUMARC AU1 - Abnormal Rad Levels/Radiological Effluent example EALs state:

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)

Note: If the monitor reading(s) is sustained for longer than 60 minutes and the required assessments cannot be completed within this period, then the declaration must be made based on the valid reading.

2. *Confirmed sample analysis for gaseous or liquid releases indicates concentrations or release rates with a release duration of 60 minutes or longer in excess of (2 X site-specific technical specifications).*
3. *A 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]*
4. *Valid indication on automatic real-time dose assessment capability greater than (site-specific value) for 60 minutes or longer. [for sites having such capability]*

Dresden EAL Abnormal Rad Levels/Radiological Effluent RU2 threshold values state:

ONE of the following when Drywell Radiation level < 100 R/hr, or Reactor Vessel Level > -143 inches, or Radiation level < 1 R/hr on Refuel Floor indicating no clad/core damage:

1. *The station total release as indicated by the SUM of VALID readings of Units 2 and 3 on the following monitors indicates that the release may have exceeded $\geq 2 \times$ ODCM limits.*

The Sum of Gaseous releases:

*2/3 Reactor Building SPING channel 3, 5, or 7, and
1 and 2/3 Chimney SPING channel 3, 5, or 7:*

a. $\geq 1.7E+05 \mu\text{Ci}/\text{sec}$ as determined by DOP 1700-10

b. *Liquid Releases:*

*UNPLANNED Liquid Releases $\geq 2 \times$ the ODCM maximum
instantaneous release limit for 60 minutes.*

2. *Grab sample indicate concentrations or release rates $\geq 2 \times$ the ODCM maximum instantaneous release limit for ≥ 60 minutes.*
3. *Valid A-model Effluent Release Report indicating an UNUSUAL EVENT.*

COMMENT: The licensee inclusion of drywell radiation level, vessel level, and refuel floor radiation level is inconsistent with the guidance and potentially confusing. A valid (confirmed) stack monitor release in excess of the calculated threshold value is sufficient to classify the event. Furthermore, all reactor emergency events that cause a high release rate may not trigger one of the three entry level conditions. The similar EALs for CECOs PWRs do not include this entry condition requirement. The licensee should eliminate these conditions in the EAL or provide justification on their benefit.

The licensee does not provide site specific monitor/s for a liquid release. If installed, the monitor/s should be specified and threshold values provided in the EAL/s.

Recognition Category F - Fission Product Barrier Degradation

5. Subcategory 1.a - Containment pressure

The NUMARC table 3, Primary Containment Barrier Example EALs, Loss example #1, Drywell Pressure states:

Rapid unexplained decrease following initial increase OR Drywell pressure response not consistent with LOCA conditions.

The Dresden EAL 1.a - Containment Pressure threshold value for loss states:

Rapid pressure decrease in containment after increase without containment spray.

COMMENT: The licensee omitted the NUMARC criteria, Drywell pressure response not consistent with LOCA conditions, from this EAL. However, the licensee does explain in the basis for this EAL that "Containment pressure should increase as a result of mass and energy release into the containment from a LOCA."

The licensee should revise this EAL to be consistent with the NUMARC EALs or provide a rationale in the basis for the variations.

6. Subcategory 1.c.2 - Containment Breached/Bypassed

The Dresden EAL 1.c.2 - Containment Breached/Bypassed threshold value for loss states:

UNISOLABLE breach of primary containment.

COMMENT: The licensee basis for this EAL basis states:

"UNISOLABLE - A breach that is not readily isolable OR attempts for immediate isolation of the breach have been made and were unsuccessful. Attempts for isolation should be made prior to the accident classification. LOSS - an unisolable breach implies that a breach is NOT readily isolable OR attempts for immediate isolation of the breach have been made and were unsuccessful. Attempts for isolation should be made prior to the accident classification. If isolable upon identification no declaration need be made under this EAL although other EALs may be applicable. A breach of primary containment refers to a loss of primary containment integrity as described in the Technical Specifications definitions or primary containment Limiting Conditions for Operation (LCO)."

The terms "readily" and "immediate" are not defined. The term "attempts" implies more than one try at isolation, but does not define the number of attempts. The wording "If isolable upon identification..." implies some time to identify the breach location, but no time period is provided. There is no NUMARC EAL that directly correlates to this licensee EAL.

The licensee should provide clear definition for the terms used in this EAL. The licensee should provide additional information for the inclusion of this EAL in the classification scheme.

7. Subcategory 1.d - Containment Radiation Monitors.

NUMARC Primary Containment Barrier, Example number 3, Significant Radioactive Inventory in Containment.

The Dresden basis for this parameter states:

The value of 7000 R/hr uncorrected is conservative up to 4 hours after shutdown. A four hour time is used to provide reasonable assurance that the Technical Support Center personnel would be available to provide an evaluation to determine if clad failure has exceeded 20%.

COMMENT: NUMARC does not discuss a 4 hour time for the corresponding EAL basis. The licensee use of a 4 hour window is potentially confusing. The licensee basis needs to be clear that the 4 hour time period does not delay the classification and that an assessment > 20% fuel clad will be treated as an equivalent threshold value.

8. Subcategory 2.c - Fuel Clad.

NUMARC Fuel Clad Barrier EAL example #3, Drywell Radiation Monitoring.

The Dresden basis for this parameter states:

1750 R/hr uncorrected is a value which is conservative up to 4 hours following a reactor shutdown. A four hour time is used to provide reasonable assurance that the Technical Support Center personnel would be available to provide an evaluation to determine if clad failure has exceeded 5%.

COMMENT: NUMARC does not discuss a 4 hour time for the corresponding EAL basis. The licensee use of a 4 hour window is potentially confusing. The licensee basis needs to be clear that the 4 hour time period does not delay the classification that an assessment > 5% fuel clad will be treated as an equivalent threshold value.

9. Subcategory 3.a.1 - RCS Leakrate

The NUMARC table 3, RCS Barrier Example EALs, Loss example #1, RCS Leak Rate states:

The "Loss" EAL is based on design basis accident analysis which show that even if MSIV closure occurs within design limits, dose consequences offsite from the "puff" release would be in excess of 10 millirem. Thus, this EAL is included for consistency with the Alert emergency classification.

The Dresden EAL 3.a.1 - RCS Leakrate threshold value for loss states:

LOSS: UNISOLABLE Main Steam Line Break.

POTENTIAL LOSS: UNISOLABLE.RCS Leakage \geq 50 GPM.

COMMENT: The licensee basis defines UNISOLABLE as: "A leak that is NOT readily isolable OR attempts for immediate isolation of the leak have been made and were unsuccessful. Attempts for Isolation should be made prior to accident classification." The licensee deals with unisolable primary system leakage outside the drywell in EAL #3.a.2. This EAL, #3.a.1, is directed to RCS leakage inside containment however, it does not specifically state inside containment. NUMARC, in table 3, uses the qualifier UNISOLABLE for leakage outside the drywell and specifically does not qualify leakage inside the drywell. Inclusion of the qualifier "UNISOLABLE" is not consistent with the NUMARC criteria.

The licensee provides for "attempts to isolate" before accident classification, but does not provide any time limit or number of attempt limits. The licensee does not define "immediate" or "readily."

The licensee should revise this EAL to be consistent with the NUMARC EALs or provide a rationale in the basis for the variations.

10. Subcategory 3.b - Drywell Pressure

The NUMARC table 3, RCS Barrier Example EALs, Loss example #2, Drywell Pressure states:

The (site-specific) drywell pressure is based on the drywell high pressure 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 Leak.

The Dresden EAL 3.b - Drywell Pressure threshold value for loss states:

Drywell Pressure \geq 2.0 PSIG (ECCS setpoint) due to reactor coolant leakage.

COMMENT: The NUMARC criteria suggests the selection of the drywell high pressure alarm setpoint or a higher value may be used if 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 licensee selected the ECCS setpoint. It is not clear that the ECCS setpoint is the same as the high pressure alarm setpoint or is equivalent to 50 gpm system leak.

The licensee basis for the selected value is not sufficient to determine if the conservative NUMARC criteria is met.

The licensee should provide additional information before acceptance of this EAL.

Recognition Category M - System Malfunctions

11. Subcategory NUMARC SS4 - Complete Loss of Function Needed to Achieve or Maintain Hot Shutdown example EAL number 1. states:

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

COMMENT: There is no licensee EAL that specifically addresses loss of hot shutdown function.

In the October 1, 1993 Revision package (attachment C) under NUMARC EAL SS4, CECo makes the statement "Not applicable to BWRs. Hot Shutdown is defined for BWRs as having the mode switch in shutdown with all control rods inserted and temperature > 212 °F. If these conditions are not met, an ATWS has occurred and the ATWS EALs cover the situation." While the reviewer would agree that the "reactivity control" function of this EAL is adequately addressed for BWRs in the ATWS EALs (because of no need to borate or maintain boration once the rods are inserted), the Heat Sink function still needs to be addressed.

The licensee should address the loss of hot shutdown function as suggested by the NUMARC criteria.

12. Subcategory MS4 - Loss of 125 VDC Power \geq 15 minutes.

The NUMARC SS3 example EAL #1 states:

Loss of all DC Power based on (site-specific) bus voltage indications for greater than 15 minutes.

The Dresden EAL MS4 EAL threshold value #1 states:

CONFIRMED loss of all VITAL 125 VDC power for \geq 15 minutes.

COMMENT: The licensee does not provide a specific meter/s or control panel indication/s for use with this EAL. No minimum safe bus voltage is specified to ensure adequate voltage is supplied to vital DC equipment.

The licensee should consider providing a specific meter/s or control panel indication/s that can be used to determine the power status of the DC buses.

13. Subcategory MU4 - UNPLANNED Loss of 125 VDC Power \geq 15 minutes.

The NUMARC SU7 example EAL #1 states:

a. *UNPLANNED Loss of all 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 Dresden EAL MU4 EAL threshold values state:

1. *UNPLANNED loss of all 125 VDC buses is CONFIRMED. AND*

2. *Failure to restore power to at least one 125 VDC bus in < 15 minutes from the time of loss.*

COMMENT: The licensee does not provide a specific meter/s or control panel indication/s for use with this EAL. No minimum safe bus voltage is specified, as required by the NUMARC criteria, to ensure adequate voltage is supplied to vital DC equipment.

The licensee should provide a specific meter/s or control panel indication/s that can be used to determine the power status of the DC buses.

14. Subcategory MU7 - Fuel Clad Degradation

The NUMARC SU4 example EAL 1. states:

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

The Dresden EAL MU7 - Fuel Clad Degradation EAL threshold value 1. states:

Offgas system isolation has occurred on a VALID Offgas radiation monitor high trip.

COMMENT: It is assumed that the high trip is from the Post-Treatment monitor. The Post-Treatment monitor reading versus coolant activity are dependent on the adsorber bed line up and hold up time. The licensee should

consider use of other indications such as pre-treatment monitors and main steam line monitors. The licensee selection of the trip setpoint might not be as conservative as suggested by the NUMARC criteria "radiation monitor readings."

The licensee should provide information that the selected threshold value meets the NUMARC conservative criteria.

15. Subcategory MU8 - RCS leakage.

The NUMARC SU5 example EAL 1. states:

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

The Dresden EAL MU8 - RCS leakage EAL threshold value states:

*1. UNIDENTIFIED RCS leakage into the primary containment \geq 10 gpm.
OR 2. Total (IDENTIFIED + UNIDENTIFIED) RCS leakage into the primary containment \geq 35 gpm.*

COMMENT: The licensee use of total leakage is not consistent with the NUMARC criteria.

The licensee should revise this EAL to be consistent with the NUMARC EALs or provide a rationale in the basis for the variations.

16. Subcategory MA11 - Major Fuel Damage OR Fuel Uncovery Outside the Reactor Vessel.

The NUMARC AA2 example EAL 1. states:

A (site-specific set point) alarm on one or more of the following radiation monitors:

*Refuel Floor Area Radiation Monitor
Fuel Handling Building Ventilation Monitor
Fuel Bridge Area Radiation Monitor*

The Dresden EAL MA11 - Major Fuel Damage OR Fuel Uncovery Outside the Reactor Vessel EAL threshold value number 1 states:

Valid reading of \geq 100 R/hr on refuel floor radiation monitor.

COMMENT: The licensee selected value ≥ 100 R/hr seems high for this threshold value. The licensee should identify the specific radiation monitor/s.

The licensee should confirm that the selected value is the alarm setpoint or provide a rationale in the basis for use of the ≥ 100 R/hr value.

17. Subcategory MA12 - UNCONTROLLED Loss of Refueling Cavity Volume.

The NUMARC initiating condition states:

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

The Dresden MA12 - UNCONTROLLED Loss of Refueling Cavity Volume initiating condition states:

Damage to spent fuel OR loss of water level such that irradiated fuel will become uncovered.

COMMENT: The licensee initiating condition indicates damage to spent fuel. However, no specific criteria is presented to define what is meant by damage. Only uncovering is presented as EAL threshold values.

The licensee should consider including a definition of damage to spent fuel in this EAL.

Recognition Category H - Hazards and Other Conditions.

18. Subcategory HS1 - Security Event in a Vital Area.

The NUMARC HS1 example EAL #2 states:

Other security events as determined from (site-specific) Safeguards Contingency Plan.

The Dresden basis for HS1 states:

A security event is as defined in the security plan, section 1.

COMMENT: The licensee reference to a separate document, security plan, for the definition of a security event places an unnecessary burden on the Emergency Director. The licensee should include those defined security events that result in emergency classification in the EAL threshold value section.

19. Subcategory HA4 - Natural OR destructive phenomena inside Vital Area.

The NUMARC HA1 example EALs state:

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

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 Room
Other (site-specific) Structures.*

The Dresden HA4 - Natural OR destructive phenomena inside Vital Area EAL threshold value states:

2. *Tornado strike within the Protected Area which affects equipment or structures within a vital area.*

3. *Sustained high winds \geq 90 mph on A-model report, computer point OR meter reading.*

4. *Report of visible structural damage to a structure (building, tanks, etc) affecting operations of systems required to establish or maintain Cold Shutdown.*

COMMENT: The licensee use of the terms "affects" and "affecting" places a qualifying condition on these events that is not present in the NUMARC EALs. The NUMARC criteria only provides for tornado, high winds or report of visible structural damage (structure specific). Affecting operation of equipment is not part of the NUMARC criteria. The NUMARC basis for structure damage states that the EAL should specify a site-specific list of structures containing systems and functions required for safe shutdown of the plant. The licensee does not provide a complete list of specific structures.

The licensee should revise this EAL to be consistent with the NUMARC EALs or provide a rationale in the basis for the variations.

James E. Dyer

October 27, 1993

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