January 15, 1997

Mr. H. B. Barron
Vice President, McGuire Site
Duke Power Company
12700 Hagers Ferry Road
Huntersville, NC 28078-8985

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SUBJECT: REQUEST FOR ADDITIONAL INFORMATION REGARDING EMERGENCY ACTION LEVEL REVISION TO NUMARC/NESP-007 METHODOLOGY

Dear Mr. Barron:

The U.S. Nuclear Regulatory Commission (NRC) has completed its initial review of the proposed emergency action levels (EALs) in your December 27, 1995, submittal for the William B. McGuire Nuclear Station, Units 1 and 2.

The December 27, 1995, submittal consisted of: (a) the revised Section D from the McGuire Emergency Plan, which discussed the emergency classification system; (b) a table containing a cross-reference between NUMARC EALs and corresponding McGuire EALs; (c) concurrence letters from the offsite emergency management agencies within the McGuire emergency planning zone that approved the revised EALs; and (d) procedure RP/0/A/5700/00, which contained the EALs, their technical bases, a list of definitions and acronyms, and guidelines for declaration of emergency events.

The proposed EALs were reviewed against the guidance in NUMARC/NESP-007, Revision 2. This document has been endorsed by the NRC in Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors," Revision 3, as an alternative means by which licensees can meet the requirements in 10 CFR 50.47(b)(4) and Appendix E to 10 CFR Part 50.

Since the staff has previously endorsed the guidance in NUMARC/NESP-007, the review focused on those EALs that deviated from the guidance and those EALs that required the development of site-specific thresholds. As a result of reviews of the material submitted, a number of EALs were identified that required additional information. Please inform me when you will provide this additional information as noted in the Enclosure.

Sincerely,

Original signed by:

Victor Nerses, Senior Project Manager
Project Directorate II-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket Nos. 50-369 and 50-370

Enclosure: As stated

cc w/encl: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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Division of Reactor Projects - I/II
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Docket Nos. 50-369 and 50-370

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cc w/encl: See next page

cc:

Mr. Paul R. Newton
Legal Department, (PB05E)
Duke Power Company
422 South Church Street
Charlotte, North Carolina 28242-0001

County Manager of Mecklenburg County
720 East Fourth Street
Charlotte, North Carolina 28202

Mr. J. E. Snyder
Regulatory Compliance Manager
Duke Power Company
McGuire Nuclear Site
12700 Hagers Ferry Road
Huntersville, North Carolina 28078

J. Michael McGarry, III, Esquire
Winston and Strawn
1400 L Street, NW.
Washington, DC 20005

Senior Resident Inspector
c/o U. S. Nuclear Regulatory Commission
12700 Hagers Ferry Road
Huntersville, North Carolina 28078

Mr. Peter R. Harden, IV
Account Sales Manager
Westinghouse Electric Corporation
Power Systems Field Sales
P. O. Box 7288
Charlotte, North Carolina 28241

Dr. John M. Barry
Mecklenberg County
Department of Environmental Protection
700 N. Tryon Street
Charlotte, North Carolina 28202

Mr. T. Richard Puryear
Owners Group (NCEMC)
Duke Power Company
4800 Concord Road
York, South Carolina 29745

Ms. Karen E. Long
Assistant Attorney General
North Carolina Department of Justice
P. O. Box 629
Raleigh, North Carolina 27602

Mr. G. A. Copp
Licensing - EC050
Duke Power Company
526 South Church Street
Charlotte, North Carolina 28242

Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
101 Marietta Street, NW. Suite 2900
Atlanta, Georgia 30323

Elaine Wathen, Lead REP Planner
Division of Emergency Management
116 West Jones Street
Raleigh, North Carolina 27603-1335

Mr. Dayne H. Brown, Director
Division of Radiation Protection
North Carolina Department of Environmental Health and Natural Resources
P. O. Box 27687
Raleigh, North Carolina 27611-7687

NUMARC Recognition Category A
Abnormal Rad Levels/Radiological Effluent

Issue No. 1

NUMARC EAL AU1.1 states:

> *AU1.1.* *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.

A. McGuire EALs 4.3.U.1.1, 4.3.U.1-2 and 4.3.U.1-3 correspond to this EAL, but they do not contain any provisions for performing an assessment of the dose impact of the monitor reading. Performance of this assessment is important to verify that the actual offsite consequences of the release of radioactive material can be accurately determined.

B. This same issue exists for NUMARC EAL AA1.1 (McGuire EALs 4.3.A.1-1 and 4.3.A.1-2.)

Revise this EAL to be consistent with the NUMARC guidance or provide additional information that justifies the departure from the guidance.

Issue No. 2

NUMARC EAL AA2.4 states:

> *Water level less than (site-specific) feet for the Spent Fuel Pool and Fuel Transfer Canal that will result in irradiated fuel uncovering.*

McGuire EAL 4.3.A.2-2 is listed as being equivalent to the above NUMARC EAL and states:

> *Plant personnel report that water level drop in reactor refueling cavity, spent fuel pool, or fuel transfer canal has or will exceed makeup capacity such that irradiated fuel will become uncovered.*

A. The McGuire EAL does not list a site-specific level for the spent fuel pool by which operators either locally at the pool or in the control room can conclude that the EAL is being exceeded. Without being able to compare the observed level to an explicit threshold, the personnel classifying the event must base their conclusions on subjective observations only.

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

Issue No. 3

NUMARC EAL AA3.1 states:

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

A. McGuire EAL 4.3.A.3-1, listed as equivalent to this EAL, is similarly worded but does not contain the site-specific monitor designations to be used in the determination.

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

Issue No. 4

McGuire EAL 4.3.A.3-2 provides for declaration of an Alert condition based on abnormal radiation levels in the plant. It reads as follows:

Valid radiation monitor reading of > 5 R/hr in a plant vital area.

A. The basis for this EAL does not describe how this value of 5 R/hr was determined.

Provide a description of the methodology by which the above radiation level was selected.

Issue No. 5

McGuire EALs 4.3.S.1-1 and 4.3.G.1-1 list gaseous effluent monitor thresholds for releases of radioactive materials that yield site boundary doses that approach EPA protective action guidelines for protection of the general public. Notes contained in these EALs describe the methodology for the selection of the monitor thresholds, but do not list the source term assumptions used in their derivation.

Provide detailed derivation calculations for the monitor thresholds for both of these EALs, including source term assumptions used for both.

NUMARC Recognition Category H
Hazards and Other Conditions
Affecting Plant Safety

Issue No. 6

McGuire Initiating Condition (IC) 4.6.U.1 reads as follows:

Fire or Explosion Within Protected Area Boundary Not Extinguished Within 15 Minutes of Detection.

A. The wording of this IC is such that a classifying official, referring to the IC only, would be led to believe that an explosion that did not last 15 minutes would not be a classifiable event. McGuire EAL 4.6.U.1-2 actually does prescribe the declaration of an Unusual Event for any unanticipated explosion within the protected area, regardless of duration.

Provide additional information that justifies the wording of this IC and that assures how all unanticipated explosions will be considered for classification, regardless of duration.

Issue No. 7

McGuire IC 4.7.A.1 states:

Natural and Destructive Phenomena Affecting the Plant Vital Area.

McGuire EAL 4.7.A.1-2 addresses this IC and states:

Tornado striking plant structures within the vital area
OR
sustained winds ≥60 mph for >15 minutes.

A. This IC and EAL combination do not define the term "the (plant) vital area", and they are not consistent with other ICs and EALs, such as 4.6.S.1-1, which uses the term "A Vital Area" and lists the specific plant areas to which the EAL refers.

Provide additional information that describes how the term "Plant Vital Area" will be interpreted by classifying officials and why this term is inconsistent with other EALs that are more descriptive.

Issue No. 8

NUMARC EAL HA1.3 reads as follows:

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 basis for EAL HA1.3 states:

EAL (HA1.)3 should specify (site-specific) structures containing systems and functions required for safe shutdown of the plant.

McGuire EAL 4.7.A.1-3, which corresponds to this NUMARC EAL, reads as follows:

Turbine failure generated missiles, vehicle crashes or other catastrophic events causing visible structural damage on any of the following plant structures:

- *Reactor Building*
- *Auxiliary Building*
- *Refueling Water Storage Tank (FWST)*
- *Diesel Generator Rooms*
- *Control Room*
- *Safe Shutdown Facility (SSF)*
- *Doghouses*
- *Central Alarm Station (CAS)*

The basis for EAL 4.7.A.1-3 states, in part:

This EAL is intended to address the threat to safety related structures or equipment from uncontrollable and possibly catastrophic events. This list of areas includes areas containing safety-related equipment, their controls, and their power supplies.

A. It is unclear why this EAL does not list areas such as the intake structure or the ultimate heat sink, since these structures would be necessary for safe shutdown of the plant and contain safety-related equipment.

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

Issue No. 9

NUMARC EAL HA1.1 reads as follows:

> *(Site-specific) method indicates seismic event greater than Operating Basis Earthquake (OBE).*

McGuire EAL 4.7.A.1-1, listed as equivalent to NUMARC EAL HA1.1, lists the acceleration values that constitute an operating basis earthquake, but the McGuire EAL does not specify the instrumentation from which the readings are to be taken. These instruments are specified in McGuire EALs 4.7.U.1-1 and 4.7.U.1-2, which are used to classify less severe earthquakes.

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

Issue No. 10

NUMARC IC HA2 describes the condition of a fire or explosion affecting the operability of plant safety systems required to establish or maintain safe shutdown as an Alert condition. The NUMARC guidance lists this IC as applicable in all modes of operation. McGuire has divided this IC into two separate ICs, 4.6.A.1 for modes 1-4 and 4.6.A.2 for modes 5 and 6. Neither of these ICs specify the defueled condition as an applicable operating condition. The need to maintain a safe shutdown condition is applicable in the defueled condition also.

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

Issue No. 11

NUMARC EAL HA5.1 recognizes the initiation of control room evacuation as an Alert condition, and states:

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

McGuire EAL 4.7.A.3-1 is listed as equivalent to this EAL and states:

> *Evacuation of the control room and control is, or is in the process of being, established from the Auxiliary Shutdown Panel (ASP) or the SSF.*

A. While the NUMARC EAL calls for declaration of the Alert condition upon entry into the procedure for control room evacuation, the McGuire EAL further restricts the declaration of the event until after control at a remote location has been established or is being established. The wording of the McGuire EAL may cause a classifying official to delay unnecessarily in classifying the event until he/she is sure that control of the reactor from the remote location(s) is assured. The Alert condition may conceivably not be declared until after 15 minutes has progressed, thus necessitating the declaration of a Site Area Emergency under McGuire EAL 4.7.S.1. In such a case the Alert condition of McGuire EAL 4.7.A.3-1 would never be classified or reported.

B. The site-specific procedure to be used in establishing remote control of the reactor is not specified in the EAL. This comment applies to McGuire EAL 4.7.S.1, which also lacks the site-specific procedure number in the EAL.

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

Issue No. 12

NUMARC IC SU5, RCS Leakage, is listed as applicable in the power operation, hot standby and hot shutdown operating modes. The equivalent McGuire EAL, 4.2.U.4, is only listed as being applicable in Modes 2 (Startup), 3 (Hot Standby), and 4 (Hot Shutdown.) The McGuire EAL does not include Mode 1 (Power Operation) as an applicable mode.

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

Issue No. 13

NUMARC EAL SA1.2 states:

> *(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.*

McGuire EAL 4.4.A.1-1, listed as equivalent to the NUMARC guidance, states:

The following conditions exist:

a. Valid reactor trip signal received or required.

AND

b. Manual reactor trip from the control room is successful and reactor power is less than 5% and decreasing.

A. The McGuire EAL does not include the requirement that the automatic reactor trip function is not successful. This omission could lead to classification of an Alert in cases where a manual reactor trip pre-empted an automatic trip because it occurred prior to the action of the reactor protection system. An Alert condition would not exist in this case, because the reactor protection system is fully capable of effecting a reactor trip. In cases where an operator manually trips the reactor as a reactor protection system setpoint is being approached, the reactor may trip and the protection system setpoint may be exceeded after the trip has occurred. In such cases the McGuire EAL would be met, although no degradation of the reactor protection system exists. In such cases as are described above, a careful review of the sequence of events at the time of the trip is necessary before this type of event can be accurately classified. The wording of the McGuire EAL may preclude this review if the EAL appears to be met.

B. This same issue applies to McGuire EALs 4.4.S.1-1 and 4.4.G.1-1, which correspond to NUMARC EALs SS2.1 and SG2.1, respectively.

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

Issue No. 14

NUMARC EAL SA3.1 describes conditions that indicate an inability to maintain the plant in a cold shutdown condition and states:

The following conditions exist:

a. Loss of (site-specific) technical specification required functions to maintain cold shutdown.

AND

b. Temperature increase that either:

- *Exceeds technical specification cold shutdown temperature limit*

OR

- *Results in uncontrolled temperature rise approaching cold shutdown technical specification limit.*

McGuire EAL 4.4.A.2-1 corresponds to this EAL and states:

Total loss of Residual Heat Removal (ND) and/or Nuclear Service Water (RN) and/or Component Cooling (KC)

AND

Inability to maintain reactor coolant temperature below 200°F.

A. The McGuire EAL lacks the anticipatory provision of the NUMARC guidance by failing to provide for declaration of the event for an uncontrolled temperature rise approaching the cold shutdown technical specification limit.

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

Issue No. 15

NUMARC EAL SS3.1 describes an EAL that results in a Site Area Emergency declaration for loss of all vital DC power. It states:

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

McGuire EAL 4.5.S.2-1 is equivalent to the above guidance and states:

The following conditions exist:

a. Unplanned loss of both unit related EVDA and EVDD busses as indicated by bus voltage less than 110 VDC.

AND

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

The basis for the above McGuire EAL states:

Prolonged loss of all DC power will cause core uncovering and loss of containment integrity when there is significant decay heat and sensible heat in the reactor system.

A. Considering the statement in the basis above, it is unclear how the McGuire EAL can justify the use of the word "unplanned". As currently worded, this EAL will preclude the declaration of a Site Area Emergency for any planned loss of all vital DC power even without compensatory measures being taken to preclude the challenge to the fission product barriers.

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

Issue No. 16

NUMARC EAL SS4.1 describes symptoms of a complete loss of any site-specific function needed to achieve or maintain Hot Shutdown. The basis for this EAL states:

> *This EAL addresses complete loss of functions, including ultimate heat sink ... required for hot shutdown with the reactor at pressure and temperature. ... Escalation to General Emergency would be via ... Fission Product Barrier Degradation ICs.*

McGuire EALs 4.4.S.2-1, 4.4.S.2-2 and 4.4.S.2-3 are listed as equivalent to this EAL and read as follows:

> *4.4.S.2-1 Core Cooling CSF-RED*
> *4.4.S.2-2 Heat Sink CSF-RED*
> *4.4.S.2-3 Subcriticality CSF-RED*

A. The use of the above Critical Safety Function Status Tree (CSFST) red paths in the McGuire EALs fails to meet the intent of the NUMARC guidance; i.e., to describe complete losses of hot shutdown functions which are precursors to Fission Product Barrier challenges. By listing the affected Fission Product Barrier red paths, the McGuire EALs are listing conditions that are the consequences of the loss of such function(s) and, therefore, more appropriately a General Emergency condition as is discussed in the NUMARC basis.

B. It is unclear how the above CSFSTs address the loss of the ultimate heat sink, as is explicitly included in the NUMARC basis.

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

Issue No. 17

NUMARC IC SS6 describes conditions that indicate a failure to monitor a significant transient in progress. The EAL associated with this IC states:

The following conditions exist:

a. *Loss of (site-specific) annunciators associated with safety systems.*

AND

b. *Compensatory non-alarming indications are unavailable.*

AND

c. *Indications needed to monitor (site-specific) safety functions are unavailable.*

AND

d. *Transient in progress.*

The basis for this EAL contained in the NUMARC guidance states:

> *"Planned" actions are excluded from this EAL since the loss of instrumentation of this magnitude is of such significance during a transient that the cause of the loss is not an ameliorating factor.*

McGuire EAL 4.2.S.1-1 is listed as equivalent to this EAL and states:

The following conditions exist:

a. *Unplanned loss of most (>50%) annunciators associated with safety systems for greater than 15 minutes.*

AND

b. *A significant plant transient is in progress.*

AND

c. *Loss of the OAC.*

AND

d. *Inability to provide manual monitoring, independent of the OAC Critical Safety Function Status Tree program, of any one of the following Critical Safety Functions:*
   - *subcriticality*
   - *core cooling*
   - *heat sink*
   - *containment*

A. The inclusion of the word "unplanned" in part a. of the McGuire EAL is contrary to the guidance contained in the NUMARC basis.

B. The inclusion of a 15 minute grace period for recovery of the annunciators is also inconsistent with events of the severity level described above.

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

Issue No. 18

NUMARC EAL SG1.1 describes conditions that warrant a General Emergency declaration for a prolonged loss of all onsite and offsite AC power. This EAL states:

1. *Prolonged loss of all offsite and onsite AC power as indicated by:*

   a. *Loss of power to (site-specific) transformers.*

   AND

   b. *Failure of (site-specific) emergency diesel generators to supply power to emergency busses.*

   AND

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

      - *Restoration of at least one emergency bus within (site-specific) hours is NOT likely*

      OR

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

McGuire EAL 4.5.G.1-1 is listed as equivalent to the above NUMARC EAL and states:

Prolonged loss of all offsite and onsite AC power as indicated by:

a. *Loss of power on essential buses ETA and ETB for greater than 15 minutes.*

AND

b. Standby Shutdown Facility (SSF) fails to maintain hot standby

AND

c. At least one of the following conditions exists:

- *Restoration of at least one essential bus within 4 hours is NOT likely.*
- *Indication of continuing degradation of core cooling based on Fission Product Barrier monitoring.*

The basis for the McGuire EAL states:

> *The SSF is capable of providing the necessary functions to maintain a hot shutdown condition for up to 72 hours. No fission product barrier degradation would be expected if the SSF is functioning as intended.*

A. It is unclear how the classifying official would determine if and when part b. of the above McGuire EAL is met; i.e., how long the station blackout event would have to progress until the classifying official determined that the standby shutdown facility was not able to maintain hot standby. There are no specific criteria for making this determination in the EAL and there is no time limit by which this determination must be made. Failure to determine this condition quickly could delay both the classification of this event and the implementation of protective actions for the public.

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