



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

April 25, 2010

Christopher L. Burton, Vice President  
Shearon Harris Nuclear Power Plant  
Carolina Power & Light Company  
Post Office Box 165, Mail Zone 1  
New Hill, NC 27562-0165

SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1 – CHANGES TO THE  
EMERGENCY ACTION LEVEL SCHEME (TAC NO. ME1227)

Dear Mr. Burton:

By letter dated April 30, 2009, as supplemented by letters dated July 1, 2009, and January 21, 2010, Carolina Power & Light Company (the licensee), now doing business as Progress Energy Carolinas, Inc., submitted a request for review and approval of proposed changes to the Emergency Action Levels (EALs) at the Shearon Harris Nuclear Power Plant, Unit 1 (HNP), to bring them into alignment with the guidance provided by Nuclear Energy Institute 99-01, "Methodology for Development of Emergency Action Levels," Revision 5. HNP currently uses an EAL scheme based on NUREG-0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants."

The U.S. Nuclear Regulatory Commission (NRC) staff performed a review of the proposed changes to the licensee's EALs as directed by Appendix E to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section IV.B.(1). The NRC staff determined that incorporation of the proposed changes meets the standards in 10 CFR.50.47(b) and the requirements of Appendix E to 10 CFR Part 50, and provides reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. Therefore, the NRC staff concludes that the licensee's proposed changes to the EALs for HNP, as outlined in the application and supplements noted above, are acceptable.

The licensee will implement the EALs, including implementing the EAL technical bases document, prior to Refueling Outage 16 that is currently scheduled for fall 2010. If, prior to implementation, the licensee makes changes in accordance with 10 CFR 50.54(q) to the EALs approved by the enclosed safety evaluation, the licensee shall provide the changes to the NRC during the next emergency preparedness baseline inspection.

C. Burton

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If you have any questions, please contact Ms. Marlayna Vaaler, the NRC Project Manager for HNP, at (301) 415-3178, or by e-mail to [marlayna.vaaler@nrc.gov](mailto:marlayna.vaaler@nrc.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "E. J. Leeds". The signature is fluid and cursive, with the first name "E." and last name "Leeds" clearly distinguishable.

Eric J. Leeds, Director  
Office of Nuclear Reactor Regulation

Docket No. 50-400

Enclosure:  
As stated

cc w/enclosure: ListServ



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

SAFETY EVALUATION BY  
THE OFFICE OF NUCLEAR REACTOR REGULATION  
CHANGES TO THE EMERGENCY ACTION LEVEL SCHEME  
CAROLINA POWER & LIGHT COMPANY  
SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1  
DOCKET NO. 50-400

1.0 INTRODUCTION

By application dated April 30, 2009 (Reference 1), as supplemented by letters dated July 1, 2009, and January 21, 2010 (References 2 and 3, respectively), Carolina Power & Light Company (the licensee), now doing business as Progress Energy Carolinas, Inc., requested prior U.S. Nuclear Regulatory Commission (NRC) approval for proposed changes to the emergency action levels (EALs) at the Shearon Harris Nuclear Power Plant, Unit 1 (HNP).

The licensee's requested changes to the EALs support a conversion from the current EAL scheme to a scheme based on Nuclear Energy Institute (NEI) 99-01, "Methodology for Development of Emergency Action Levels," Revision 5, dated February 2008 (Reference 4). HNP currently uses an EAL scheme based on NUREG-0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants" (Reference 5).

2.0 REGULATORY EVALUATION

The NRC staff reviewed the proposed EAL revisions against the regulations and guidance described below.

2.1 Regulations

Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(q) establishes that all holders of a nuclear power reactor operating license must follow and maintain in effect emergency plans which meet the standards in Section 50.47(b) and the requirements in Appendix E to 10 CFR Part 50. Section 50.47 of 10 CFR, "Emergency plans," sets forth emergency plan requirements for nuclear power plant facilities. Paragraph 50.47(a)(1)(i) of 10 CFR states, in part, that "no initial operating license for a nuclear power reactor will be issued unless a finding is made by the NRC that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency."

Enclosure

Section 50.47(b) of 10 CFR establishes the standards that the onsite and offsite emergency response plans must meet in order for the NRC staff to make a positive finding that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. One of these standards, 10 CFR 50.47(b)(4), states that emergency plans include a standard emergency classification and action level scheme.

Section 1.8, "Conformance to NRC Regulatory Guides," of the HNP Final Safety Analysis Report (FSAR), confirms that the licensee will follow a format for emergency procedures in accordance with 10 CFR 50, Appendix E. Section IV.B of Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to 10 CFR Part 50, states, in part:

The means to be used for determining the magnitude of, and for continually assessing the impact of, the release of radioactive materials shall be described, including emergency action levels that are to be used as criteria for determining the need for notification and participation of local and State agencies, the Commission, and other Federal agencies, and the emergency action levels that are to be used for determining when and what type of protective measures should be considered within and outside the site boundary to protect health and safety. The emergency action levels shall be based on in-plant conditions and instrumentation in addition to onsite and offsite monitoring. These initial emergency action levels shall be discussed and agreed on by the applicant or licensee and state and local governmental authorities, and approved by the NRC. Thereafter, emergency action levels shall be reviewed with the State and local governmental authorities on an annual basis. A revision to an emergency action level must be approved by the NRC before implementation if:

1. The licensee is changing from one emergency action level scheme to another emergency action level scheme (e.g., a change from an emergency action level scheme based on NUREG-0654 to a scheme based upon [Nuclear Management and Resources Council, Inc./National Environmental Studies Project] NUMARC/NESP-007 or NEI-99-01);
2. The licensee is proposing an alternate method for complying with the regulations; or,
3. The emergency action level revision decreases the effectiveness of the emergency plan.

## 2.2 Guidance

As specified in Section IV.B of Appendix E to 10 CFR Part 50, if a licensee wishes to revise an entire EAL scheme from NUREG-0654 to another NRC-endorsed EAL scheme, the licensee must submit the change for prior NRC approval. The Statement of Considerations for the final rule amending the NRC's regulations related to NRC approval of EAL changes (70 FR 3591; January 26, 2005) states in part:

The Commission believes a licensee's proposal to convert from one EAL scheme (e.g., NUREG-0654-based) to another EAL Scheme (e.g., NUMARC/NESP-007

or NEI 99-01 based) ... is of sufficient significance to require prior NRC review and approval. NRC review and approval for such major changes in EAL methodology is necessary to ensure that there is reasonable assurance that the final EAL change will provide an acceptable level of safety.

NRC Regulatory Guide 1.101, Revisions 3 and 4, "Emergency Planning and Preparedness for Nuclear Power Reactors" (References 6 and 7, respectively), endorsed NUMARC/NESP-007 and NEI 99-01, Revision 4, EAL guidance, respectively, as acceptable alternatives to the guidance provided in NUREG-0654 for development of EALs to comply with 10 CFR 50.47 and Appendix E to 10 CFR Part 50. A change in an EAL scheme to incorporate the improvements provided in NUMARC/NESP-007 or NEI 99-01 would not decrease the overall effectiveness of the emergency plan; however, due to the potential safety significance of the change, the change needs prior NRC review and approval.

In a letter dated February 22, 2008 (Reference 8), the NRC staff concluded that the guidance contained in NEI 99-01, Revision 5, is an acceptable method to develop an EAL scheme that meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4).

In summary, the NRC considers the following methods acceptable for use in developing EALs that meet the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4):

- Appendix 1, "Emergency Action Level Guidelines for Nuclear Power Plants," to NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," dated November 1980;
- NUMARC/NESP-007, Revision 2, "Methodology for Development of Emergency Action Levels," dated January 1992;
- NEI 99-01, Revision 4, "Methodology for Development of Emergency Action Levels," dated January 2003; and
- NEI 99-01, Revision 5, "Methodology for Development of Emergency Action Levels," dated February 2008.

NRC Regulatory Issue Summary (RIS) 2003-18, with Supplements 1 and 2, "Use of NEI 99-01, Methodology for Development of Emergency Action Levels" (References 9, 10, and 11), also provides guidance for developing or changing a standard emergency classification and action level scheme. In addition, the RIS provides recommendations to assist licensees, consistent with Section IV.B of Appendix E to Part 50, in determining whether to seek prior NRC approval of deviations from the guidance.

### 3.0 TECHNICAL EVALUATION

In its application and supplemental letters, the licensee submitted the proposed EALs for HNP, the associated technical bases, a comparison matrix, the EAL numbering scheme, and an explanation for any differences or deviations from NEI 99-01, Revision 5 (henceforth referred to

as NEI 99-01), as outlined in RIS 2003-18. The comparison matrix provided a cross-reference relating the proposed EAL scheme to the EALs in NEI 99-01. The NRC staff has reviewed the technical bases for the proposed EALs, the differences or deviations from NEI 99-01, and the licensee's justifications for these differences and deviations as discussed below.

The NRC staff reviewed the proposed EAL scheme against the guidance in NEI 99-01, as endorsed by RG 1.101 (via the supplemental letter dated February 22, 2008), and further outlined in RIS 2003-18, to determine if the EALs for HNP, as provided in the licensee's application and supplemental letters, meet the guidelines of that document, as well as the regulatory requirements. The staff considered the following guidance during its review:

- consistency (i.e., the EALs would lead to similar decisions under similar circumstances at different plants)
- human engineering and user friendliness
- potential for classification upgrade only when there is an increasing threat to public health and safety
- ease of upgrading and downgrading
- thoroughness in addressing and disposing of the issues of completeness and accuracy raised regarding Appendix 1, "Emergency Action Level Guidelines for Nuclear Power Plants," to NUREG-0654, which will eliminate inconsistencies in classifying EALs and better align the overall EAL scheme with NRC guidance
- technical completeness for each classification level
- logical progression in classification for multiple events
- objective and observable values

The NRC staff reviewed the proposed EALs, and has determined that they are consistent with EALs implemented at similarly designed plants, that they use objective and observable values, and are in accordance with the intent of NEI 99-01, RG 1.101, RIS 2003-18, the standards of 10 CFR 50.47(b), and the requirements of Appendix E to 10 CFR Part 50 in these areas.

The NRC staff reviewed the proposed EALs to determine if they are worded in a manner that addresses human engineering and user friendliness concerns. The proposed EALs use procedure language, including specific tag numbers for instrument readings and alarms; in addition to the use of flow charts, critical safety function status trees, check lists, and combinations thereof. This approach is consistent with the types of suggestions contained in NEI 99-01 for addressing human factors concerns. Based on this review, the staff has determined that the proposed EALs meet the guidelines of NEI 99-01, RG 1.101, RIS 2003-18, the standards of 10 CFR 50.47(b), and the requirements of Appendix E to 10 CFR Part 50 in the areas of human engineering and user friendliness.

The NRC staff reviewed the proposed EAL sets (a group of EALs within a category related to a common concern; i.e., the Unusual Event, Alert, Site Area Emergency, and General Emergency EALs related to a failure of the plant to shutdown via an automatic scram would be considered an EAL set), for technical completeness and has determined that classification upgrades are based upon an increasing threat to public health and safety, that the EAL sets can effectively support upgrading and downgrading, and that they follow a logical progression for multiple events. The licensee's approach regarding each of these areas is consistent with the types of suggestions contained in NEI 99-01 for addressing these EAL characteristics. Based on this review, the NRC staff concludes that the EALs are in accordance with the intent of NEI 99-01, RG 1.101, RIS 2003-18, the standards of 10 CFR 50.47(b), and the requirements of Appendix E to 10 CFR Part 50 in these areas.

The NRC staff also reviewed the proposed EALs for technical completeness and accuracy for each classification level. The proposed EALs are based on a risk assessment to set the boundaries of the emergency classification levels and assure that all EALs that trigger that emergency classification are in the same range of relative risk. Precursor conditions of more serious emergencies also represent a potential risk to the public and are appropriately classified. The licensee's approach regarding each of these areas is consistent with the types of suggestions contained in NEI 99-01 for addressing these EAL characteristics. The staff has determined that the proposed EALs are consistent with the guidance of NEI 99-01, RG 1.101, RIS 2003-18, the standards of 10 CFR 50.47(b), and the requirements of Appendix E to 10 CFR Part 50 in the areas of technical completeness and accuracy.

Based on its review of the proposed EALs for HNP, the NRC staff concludes that these EALs are consistent with the guidance in NEI 99-01, Revision 5, RG 1.101, RIS 2003-18, the standards of 10 CFR 50.47(b), and the requirements of Appendix E to 10 CFR Part 50 for all of the areas discussed above. Therefore, the staff further concludes that the proposed EALs meet NEI 99-01, which is an acceptable method for use in complying with the regulatory requirements listed in Section 2.0 of this safety evaluation.

#### 4.0 CONCLUSION

The NRC staff performed a technical and regulatory review of the proposed changes to the HNP EALs as directed by Appendix E to 10 CFR Part 50, Section IV.B.(1). The NRC staff has determined that incorporation of the proposed changes meets the standards in 10 CFR.50.47(b) and the requirements of Appendix E to 10 CFR Part 50, as well as the guidance in NEI 99-01, which is an acceptable alternative for development of an EAL scheme that meets the regulatory requirements. The staff further concludes that the proposed EALs provide reasonable assurance that adequate protective measures will be taken in the event of a radiological emergency. Therefore, the NRC staff concludes that the licensee's proposed changes to the EALs for HNP, as outlined in the application and supplements noted above, are acceptable.

#### 5.0 REFERENCES

1. Burton, Christopher L., Progress Energy Carolinas, Inc., Letter to the U.S. Nuclear Regulatory Commission, "Request for Review and Approval of Proposed Changes to Emergency Action Levels," dated April 30, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML091280271).

2. Burton, Christopher L., Progress Energy Carolinas, Inc., Letter to the U.S. Nuclear Regulatory Commission, "Supplement to Request for Review and Approval of Proposed Changes to Emergency Action Levels," dated July 1, 2009 (ADAMS Accession No. ML091890766).
3. Burton, Christopher L., Progress Energy Carolinas, Inc., Letter to the U.S. Nuclear Regulatory Commission, "Response to NRC Request for Additional Information re: Request for Review and Approval of Proposed Changes to Emergency Action Levels," dated January 21, 2010 (ADAMS Accession No. ML100261626).
4. Nuclear Energy Institute (NEI) 99-01, Revision 5, "Methodology for Development of Emergency Action Levels," February 2008 (ADAMS Accession No. ML080450149).
5. U.S. Nuclear Regulatory Commission/Federal Emergency Management Association, NUREG-0654/FEMA-REP-1, Revision 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," November 1980 (ADAMS Accession No. ML040420012).
6. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.101, Revision 3, "Emergency Planning and Preparedness for Nuclear Power Reactors," dated August 1992 (ADAMS Accession No. ML003740302).
7. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.101, Revision 4, "Emergency Planning and Preparedness for Nuclear Power Reactors," dated July 2003 (ADAMS Accession No. ML032020276).
8. Miller, Christopher G., U.S. Nuclear Regulatory Commission, Letter to Alan Nelson, Nuclear Energy Institute (NEI), "U.S. Nuclear Regulatory Commission Review and Endorsement of NEI 99-01, Revision 5, Dated February 2008," dated February 22, 2008 (ADAMS Accession No. ML080430535).
9. U.S. Nuclear Regulatory Commission, Regulatory Issue Summary 2003-18, "Use of NEI 99-01, 'Methodology for Development of Emergency Action Levels,' Revision 4, Dated January 2003," dated October 8, 2003 (ADAMS Accession No. ML032580518).
10. U.S. Nuclear Regulatory Commission, Regulatory Issue Summary 2003-18, Supplement 1, "Use of NEI 99-01, 'Methodology for Development of Emergency Action Levels,' Revision 4, Dated January 2003," dated July 13, 2004 (ADAMS Accession No. ML041550395).
11. U.S. Nuclear Regulatory Commission, Regulatory Issue Summary 2003-18, Supplement 2, "Use of NEI 99-01, 'Methodology for Development of Emergency Action Levels,' Revision 4, Dated January 2003," dated December 12, 2005 (ADAMS Accession No. ML051450482).

Principal Contributor: Don Johnson

Date: April 25, 2010

C. Burton

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If you have any questions, please contact Ms. Marlayna Vaaler, the NRC Project Manager for HNP, at (301) 415-3178, or by e-mail to [marlayna.vaaler@nrc.gov](mailto:marlayna.vaaler@nrc.gov).

Sincerely,

*/RA/*

Eric J. Leeds, Director  
Office of Nuclear Reactor Regulation

Docket No. 50-400

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