



DUKE ENERGY CORPORATION  
Catawba Nuclear Station  
4800 Concord Rd.  
York, SC 29745

May 31, 2012

U. S. Nuclear Regulatory Commission  
Attn.: Document Control Desk  
Washington, DC 20555-0001

Subject: Duke Energy Carolinas, LLC (Duke)  
Catawba Nuclear Station, Units 1 and 2  
Docket Nos. 50-413, 50-414  
2011 10 CFR 50.59 Summary Report

Attached please find a report containing a brief description of changes, tests, and experiments, including a summary of the safety evaluation for each, for Catawba Nuclear Station, Units 1 and 2 for the year 2011. This report is submitted pursuant to the provisions of 10 CFR 50.59 (d) (2) and 10 CFR 50.4.

If there are any questions regarding this report, please contact A.F. Driver at (803) 701-3445.

Sincerely,

George T. Hamrick  
Site Vice President

Attachment

IEAT  
NRR

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xc (with attachment)

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Attachment

2011 10 CFR 50.59 Summary Report

**A/R Number:** 00329784  
**Facility:** CATAWBA NUCLEAR STATION  
**Unit(s):** 1  
**Activity Title:** Replacement Protective Relaying System for Unit 1 Zone G (Main Generator and PCBs)

#### Summary

The activity under evaluation here is a modification by which the Zone G protective relaying system for Catawba Nuclear Station Unit 1 is being replaced. For each unit, Zone G refers to the main generator as well as generator excitation, generator isolated phase bus, neutral grounding cubicles, and the generator power circuit breakers (PCBs). The replacement Zone G protective relaying system includes the following features:

- Two redundant trains of redundant protective relaying functions
- Preservation of the logic of the protective relaying schemes (most of which are 2/2)
- Use of multifunction microprocessor (digital) relays
- Addition of two new protective relaying functions (Inadvertent Energization and Out-of Step)

The failure modes of the Zone G protective relaying system (and associated design basis events) are as follows:

- Spurious actuation (potential to lead to loss of external load - LEL - or turbine trip - TT)
- Demand failure (potential to lead to loss of non emergency power to station auxiliaries - denoted as loss of offsite power or LOOP)

The replacement Zone G protective relaying system brings two potential failure causes as follows:

- Software error
- Electromagnetic interference (EMI)

It was determined that these failure causes do not add to or change the failure modes listed above. More to the point, it was determined, with use of the guidelines of NEI -01-01, that these failures were "of negligible risk." The replacement system is more reliable to initiate a protective function as needed. At worst, the frequency of spurious operation is "not more than minimal" with the modification. No safety related structures, systems, or components are modified or otherwise affected by the modification. The consequences of the associated design basis events as reported in the UFSAR remain unchanged with the modification.

The replacement Zone G protective relaying system may be installed at Catawba Unit 1 without prior approval from the NRC.

A/R Number: 00350149  
Facility: CATAWBA NUCLEAR STATION  
Unit(s): 1  
Activity Title: UFSAR Changes to Sections 9.1.5 and 9.1.6, Overhead Heavy Load Handling Systems

### Summary

#### Summary:

10 CFR 50.59 Summary for Annual Report

UFSAR Changes to Sections 9.1.5 and 9.1.6, Overhead Heavy Load Handling Systems

This activity is a change to the Catawba Nuclear Station (Catawba N. S.) UFSAR, sections 9.1.5 and 9.1.6. The changes add an additional option for conducting Reactor Vessel (RV) Head lifts in the refueling cavity. The existing requirements include filling the reactor cavity with water as the RV head is lifted and is referred to as the "medium present" in UFSAR section 9.1.5.4.2.1. The required medium (water) is an analysis assumption establishing boundary conditions for the currently required RV Head Load Drop Consequence Analysis. This is also reference #49 in section 9.1.6 of the UFSAR.

UFSAR 9.1.5 "Overhead Heavy Load Handling System" documents the history of NUREG-0612 "Control of Heavy Loads at Nuclear Power Plants" and its application at Catawba. Included are the various commitments made regarding Phase I and Phase II commitments and their disposition in the Safety Evaluation Report (SER) and its Supplements 1-6 which is NUREG-0954. The UFSAR has been updated to reflect these commitments and accurately represents the current license basis for Catawba.

The NRC has issued an SER formally endorsing the guidance of NEI 08-05, "Industry Initiative on Control of Heavy Loads". The UFSAR changes, which define this activity, incorporate provisions of this NRC endorsed guidance. The provisions provide an alternative to performing a RV Head Drop analysis if the polar crane can be claimed to be "single failure proof equivalent". NEI 08-05 contains the criteria on which this claim can be made.

This alternative approach results in a substitution of a more reliable polar crane in exchange for the requirement to postulate a drop of the RV head. Consistent with the guidance of NEI 96-07 rev 1, this is a new evaluation method in that "not postulating a drop precludes the need for an analysis". A 50.59 Screening was performed. The 50.59 Screening answered questions 1, 2, & 4 No, but answered the Methods question #3 Yes. Per NEI 96-07 rev 1, section 4.2.1.3 "Screening Changes to UFSAR Methods of Evaluation", changes to methods of evaluation only; do not require evaluation against the first seven criteria.

Substitution of a more reliable polar crane in exchange for the requirement to postulate a drop of the RV head results in an unchanged endpoint which maintains the UFSAR Design Functions of:

#### UFSAR 9.1.5.2

1. Assure that the potential for a load drop is extremely small
2. In the event of a postulated RV Head drop the core remains covered and cool

EC105034 performed modifications to the Unit 1 polar crane such that the claim can be made that it is "single failure proof equivalent". The proposed UFSAR changes, introduce an alternative approach that eliminates the need for a drop analysis.

Calculation CNC-1125-00-0003 rev 0 contains how Catawba N. S. fulfills each requirement.

Based on the discussion above the "constraints and restrictions" extracted from NEI 08-05 rev 0 have been met. Therefore, the conclusion can be made that no departure from a method of evaluation described in the UFSAR used in establishing the design bases or in the safety analyses has resulted from the proposed UFSAR changes. The application of the NEI 96-07 rev 1 guidance above makes the Generic SER applicable to Catawba Unit 1. As such, this sanctions the proposed UFSAR revisions as part of the Catawba N. S. Unit 1 licensing basis.

**A/R Number:** 00350386  
**Facility:** CATAWBA NUCLEAR STATION  
**Unit(s):** 1  
**Activity Title:** Catawba Unit 1 Cycle 20 (C1C20) Reload Design

#### Summary

This activity installs the core designed for Catawba Nuclear Station Unit 1 Cycle 20 (C1C20). The C1C20 Reload Design Safety Analysis Review (REDSAR), performed in accordance with Engineering Directives Manual EDM-501, "Engineering Change Program for Nuclear Fuel", and the C1C20 Reload Safety Evaluation confirm the UFSAR accident analyses remain bounding with respect to predicted C1C20 safety analysis physics parameters (SAPP) and fuel thermal and mechanical performance limits. The SAPP method is described in topical report DPC-NE-3001-PA, "Multidimensional Reactor Transients and Safety Analysis Physics Parameters Methodology."

The C1C20 core reload is similar to past cycle core designs, with a design generated using approved methods. The C1C20 Core Operating Limits Report (COLR) was prepared in accordance with Technical Specification 5.6.5. Additionally, applicable Technical Specifications and the UFSAR have been reviewed and no changes are required for the operation of C1C20. This 10CFR50.59 evaluation concluded that no prior NRC approval is necessary for C1C20 operation.

**A/R Number:** 00360873

**Facility:** CATAWBA NUCLEAR STATION

**Unit(s):** 1,2

**Activity Title:** Revision to SLCs 16.7-10 (Revision 3) and 16.11-7 (Revision 5) to eliminate requirement for EMF39 in NOMODE

### Summary

The proposed activity is a revision to SLC 16.7-10 (Radiation Monitoring for Plant Operations) and SLC 16.11-7 (Radioactive Gaseous Effluent Monitoring Instrumentation) as they relate to the Containment Atmosphere Noble Gas Monitor (1[2]EMF39). Presently 1[2]EMF39 is required to be functional at all times. The proposed change will require 1[2]EMF39 to be functional in Modes 1 through 6. In summary, the SLC revision will no longer require that 1[2]EMF39 be functional during NOMODE conditions.

During NO MODE conditions there is no fuel in containment. Therefore the potential for a fuel handling accident, and the release of radioactive gases contained in the fuel pins, to the containment atmosphere has been eliminated. In order to remove the fuel from the reactor vessel, the Reactor Coolant (NC) System has to be depressurized. In the process of depressurizing the NC System, entrained gases, including radioactive gases, come out of solution and are processed by the Waste Gas (WG) System. The fuel and the entrained radioactive gases in the NC system are the dominant sources of activity monitored by 1[2]EMF39. These sources have been eliminated when the unit is in the NO MODE condition.

The Design Basis Specification (DBD) for the Radiation Monitoring (EMF) System provides the following functions for EMF39:

- Signals are provided to both trains of SSPS to initiate containment purge ventilation (VP) isolation and a containment air addition and release (VQ) isolation.
- Containment Evacuation alarm is activated, unless the source range trip is blocked.
- Isolate VP without going through SSPS.

During outages the Solid State Protection System (SSPS) is placed in TEST (system is defeated). Therefore input from the Containment Atmosphere Noble Gas Monitor (1[2]EMF39) to the SSPS is no longer required. The monitor also provides for actuation of the Containment Evacuation alarm. But with the source of activity removed from containment, the reliance is on Electronic Dosimeters worn by personnel in the Radiation Control Area (RCA) to provide personnel protection. Lastly the Containment Purge (VP) System is utilized during fuel movement. In NOMODE fuel movement in containment does not take place, thus the need for 1[2]EMF39 to isolate releases via VP is not required.

Based on the evaluation, it is concluded that removing the requirement for 1[2]EMF39 to be functional during NO MODE is acceptable and does not require prior NRC approval.

**A/R Number:** 00363709  
**Facility:** CATAWBA NUCLEAR STATION  
**Unit(s):** 2  
**Activity Title:** Unit 2 Main Generator Protective Relaying System Digital Upgrade (EC89965)

#### Summary

The activity under evaluation here is a modification by which the Zone G protective relaying system for Catawba Nuclear Station Unit 2 is being replaced. For each unit, Zone G refers to the main generator as well as generator excitation, generator isolated phase bus, neutral grounding cubicles, and the generator power circuit breakers (PCBs). The replacement Zone G protective relaying system includes the following features:

- Two redundant trains of redundant protective relaying functions
- Preservation of the logic of the protective relaying schemes (most of which are 2/2)
- Use of multifunction microprocessor (digital) relays
- Addition of two new protective relaying functions (Inadvertent Energization and Out-of Step)

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The replacement Zone G protective relaying system brings two potential failure causes as follows:

- Software error
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It was determined that these failure causes do not add to or change the failure modes listed above. More to the point, it was determined, with use of the guidelines of NEI 01-01, that these failures were "of negligible risk." The replacement system is more reliable to initiate a protective function as needed. At worst, the frequency of spurious operation is "not more than minimal" with the modification. No safety related structures, systems, or components are modified or otherwise affected by the modification. The consequences of the associated design basis events as reported in the UFSAR remain unchanged with the modification.

The replacement Zone G protective relaying system may be installed at Catawba Unit 2 without prior approval from the NRC.



**A/R Number:** 00374866

**Facility:** CATAWBA NUCLEAR STATION

**Unit(s):** 1 & 2

**Activity Title:** Updates to UFSAR 9.3.2.2.1 & 9.4.3.2.7 - Designation of the YN System as a Contaminated System

### Summary

The activity under evaluation here is the designation of the Auxiliary Building Cooling Water (YN) System at Catawba Nuclear Station as contaminated. This designation is made in the form of a set of updates to UFSAR 9.3.2.2.1 and 9.4.3.2.7. A leak in one of the Nuclear Sampling System heat exchangers permitted radioactive contaminants to enter the YN System. The heat exchanger was replaced, but after several attempts to decontaminate the YN System, the decision was made to designate it as contaminated. No other real or virtual change is made either to any plant system, structure, component (SSC) at Catawba, or to the control or operation of any SSC at Catawba.

The isotopic radioactivity levels in the YN System have been determined. An analysis was completed to show that a complete release of all YN contaminants in liquid or gaseous form would at worst result in offsite radiation doses well under the limits of 10 CFR 20, 10 CFR 50 Appendix I, and 40 CFR 190. These are limits associated with normal plant operations, not with any design basis accident. There is no change in either the likelihood or consequences of either any accident or malfunction of equipment important to safety in association with this activity. No fission product barrier is impacted. Finally, the analysis was completed using the method described in the UFSAR (the Offsite Dose Calculation Manual).

The updates written to designate the YN System as contaminated may be inserted into the UFSAR without prior NRC approval.