November 17, 2005

Mr. D. M. Jamil
Vice President
Catawba Nuclear Station
Duke Energy Corporation
4800 Concord Road
York, SC 29745

SUBJECT: CATAWBA NUCLEAR STATION, UNITS 1 AND 2 RE: ISSUANCE OF AMENDMENTS (TAC NOS. MC5117 AND MC5118)

Dear Mr. Jamil:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 228 to Renewed Facility Operating License NPF-35 and Amendment No. 223 to Renewed Facility Operating License NPF-52 for Catawba Nuclear Station, Units 1 and 2. The amendments consist of changes to the Technical Specifications (TSs) in response to your application dated November 16, 2004, as supplemented by letters dated May 3, July 6, September 13, October 6, October 24, and November 15, 2005.

The proposed changes would modify the Catawba TS, on a one-time basis, to allow the nuclear service water system headers for each unit to be taken out of service for up to 14 days each for system upgrades.

A copy of the related Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

/RA/

Farideh Saba, Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-413 and 50-414

Enclosures:
1. Amendment No. 228 to NPF-35
2. Amendment No. 223 to NPF-52
3. Safety Evaluation

cc w/encls: See next page

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cc w/encls: See next page
DISTRIBUTION: See next page
Package Number: ML053250141
Amendment Number: ML053250121
Tech Spec Number: ML053250376 NRR-058

OFFICE	NRR/LPLC/PM	NRR/LPLC/PM	NRR/LPLC/LA	ITSB/SC	OGC	NRR/LPLC/BC
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DATE	11/15/05	11/15/05	11/15/05	11/10/05	11/09/05	11/16/05

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SUBJECT: CATAWBA NUCLEAR STATION, UNITS 1 AND 2 RE: ISSUANCE OF AMENDMENTS (TAC NOS. MC5117 AND MC5118)

Date: November 17, 2005

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SALUDA RIVER ELECTRIC COOPERATIVE, INC.

DOCKET NO. 50-413

CATAWBA NUCLEAR STATION, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 228
Renewed License No. NPF-35

1. The Nuclear Regulatory Commission (the Commission) has found that:

A.The application for amendment to the Catawba Nuclear Station, Unit 1 (the facility) Renewed Facility Operating License No. NPF-35 filed by the Duke Energy Corporation, acting for itself, North Carolina Electric Membership Corporation and Saluda River Electric Cooperative, Inc. (licensees), dated November 16, 2004, as supplemented by letters dated May 3, July 6, September 13, October 6, October 24, and November 15, 2005, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as set forth in 10 CFR Chapter I;

B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;

D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-35 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 228, which are attached hereto, are hereby incorporated into this license. Duke Energy Corporation shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA CGratton for/

Evangelos C. Marinos, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Technical Specification
Changes

Date of Issuance: November 17, 2005

DUKE ENERGY CORPORATION

NORTH CAROLINA MUNICIPAL POWER AGENCY NO. 1

PIEDMONT MUNICIPAL POWER AGENCY

DOCKET NO. 50-414

CATAWBA NUCLEAR STATION, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 223
Renewed License No. NPF-52

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment to the Catawba Nuclear Station, Unit 2 (the facility) Renewed Facility Operating License No. NPF-52 filed by the Duke Energy Corporation, acting for itself, North Carolina Municipal Power Agency No. 1 and Piedmont Municipal Power Agency (licensees), dated November 16, 2004, as supplemented by letters dated May 3, July 6, September 13, October 6, October 24, and November 15, 2005, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-52 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 223, which are attached hereto, are hereby incorporated into this license. Duke Energy Corporation shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA CGratton for/

Evangelos C. Marinos, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Technical Specification
Changes

Date of Issuance: November 17, 2005

ATTACHMENT TO LICENSE AMENDMENT NO. 228

FACILITY OPERATING LICENSE NO. NPF-35

DOCKET NO. 50-413

AND LICENSE AMENDMENT NO. 223

RENEWED FACILITY OPERATING LICENSE NO. NPF-52

DOCKET NO. 50-414

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove	Insert
3.5.2-1	3.5.2-1
3.6.6-1	3.6.6-1
3.6.17-1	3.6.17-1
3.7.5-1	3.7.5-1
3.7.7-1	3.7.7-1
3.7.8-1	3.7.8-1
3.7.10-1	3.7.10-1
3.7.12-1	3.7.12-1
3.8.1-1	3.8.1-1
3.8.1-3	3.8.1-3

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 228 TO RENEWED FACILITY OPERATING

LICENSE NPF-35 AND

AMENDMENT NO. 223 TO RENEWED FACILITY OPERATING LICENSE NPF-52

DUKE ENERGY CORPORATION, ET AL.

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-413 AND 50-414

1.0 INTRODUCTION

By letter dated November 16, 2004 (Ref. 1), as supplemented by letters dated May 3, July 6, September 13, October 6, October 24, and November 15, 2005 (Refs. 2 through 6), Duke Energy Corporation, et al. (the licensee), submitted a request for changes to the Catawba Nuclear Station (CNS), Units 1 and 2, Technical Specifications (TS) to the Nuclear Regulatory Commission (NRC). The purpose of the changes to the TS would be to allow refurbishment and repair of the shared "A" and "B" nuclear service water system (NSWS) headers for CNS. To accomplish this, the licensee is planning to remove each header from service in back-to-back outages for up to 14 days each. The licensee plans to perform this work while both of the CNS units operating in Mode 1. The current CNS TS requirements for the NSWS only permit an allowed outage time (AOT), or completion time (CT), of 72 hours for taking a header out of service whenever a unit is operating in Modes 1 through 4. The terms AOT and CT are used interchangeably in this discussion. Also, because the NSWS is a support system for many of the other plant safety systems, the TS AOTs for those systems are similarly affected. Therefore, in order to facilitate refurbishment of the NSWS "A" and "B" headers, the licensee has requested a one-time change to extend the AOTs for the affected systems to 14 days (336 hours) to be applied on two separate occasions (once during each of the NSWS header outages). The following increased CTs would only be applicable during NSW system upgrades. The licensee requested that this one-time extension of the AOT be applied to the following TS requirements:

Condition A of TS 3.5.2, "Emergency Core Cooling System (ECCS)" Applicable in Modes 1-3; is revised to change the CT from the current 72 hours to 14 days (336 hours) for restoring an inoperable train to operable status before initiating the station shutdown action requirements.

Condition A of TS 3.6.6, "Containment Spray System (CSS)" Applicable in Modes 1-4, for the CSS is revised to change the CT from the current 72 hours to 14 days for restoring an inoperable train to operable status before initiating the station shutdown action requirements.

ENCLOSURE

Condition A of TS 3.6.17, "Containment Valve Injection Water System (CVIWS)," Applicable in Modes 1-4, for the CVIWS is revised to change the CT from the current 7 days to 14 days for restoring an inoperable train to operable status before initiating the station shutdown action requirements.

Condition B of TS 3.7.5, "Auxiliary Feedwater (AFW) System," Applicable in Modes 1-4 for the AFW system, is revised to change the CT from the current 72 hours to 14 days for restoring an inoperable train to operable status before initiating the station shutdown action requirements, and from 10 days to 14 days for discovery of failure to meet the limiting conditions for operation (LCO).

Condition A of TS 3.7.7, "Component Cooling Water (CCW) System," Applicable Modes 1-4 for the CCW system, is revised to change the CT from the current 72 hours to 14 days for restoring an inoperable train to operable status before initiating the station shutdown action requirements.

Condition A of TS 3.7.8, "Nuclear Service Water System (NSWS)," Applicable in Modes 1-4 for the NSWS, is revised to change the CT from the current 72 hours to 14 days for restoring an inoperable train to operable status before initiating the station shutdown action requirements.

Condition A of TS 3.7.10, "Control Room Area Ventilation System (CRAVS)," Applicable in Modes 1-6 for the CRAVS, is revised to change the CT from the current 7 days to 14 days for restoring an inoperable train to operable status before initiating the station shutdown action requirements.

Condition A of TS 3.7.12, "Auxiliary Building Filtered Ventilation Exhaust System (ABFVES)," Applicable in Modes 1-4 for the ABFVES, is revised to change the CT from the current 7 days to 14 days for restoring an inoperable train to operable status before initiating the station shutdown action requirements.

Condition B of TS 3.8.1, "AC Sources - Operating," Applicable in Modes 1-4 for AC Sources - Operating, is revised to change the CT from the current 72 hours to 14 days for restoring an inoperable diesel generator to operable status before initiating the station shutdown action requirements, and from 6 days to 14 days for discovery of failure to meet the LCO.

The proposed change would be implemented by making reference to the following (or similar) note for each affected TS CT:

> *For each Unit, the Completion Time that one **[affected system train or component]** can be inoperable as specified by Required Action **[item citation]** may be extended beyond the **[existing CT]** up to 336 hours as part of the NSWS system upgrades. System upgrades include activities associated with cleaning, inspecting, and coating of NSWS piping welds, and necessary system repairs, replacement, or modifications. Upon completion of the system upgrades and system restoration, this footnote is no longer applicable and if not used, will expire at midnight on December 31, 2006.

The last sentence of the footnote was modified by the September 13, 2005, supplement in response to an NRC staff request in order to establish a time limit for when the note would no longer apply.
This requested one-time TS change is sought to allow for implementation of the first phase of the CNS NSWS improvement plan. The increased CT is necessary to accommodate system cleaning, inspection, and coating of piping welds, as well as any necessary system repairs, replacements, or modifications. Similar prior amendment requests have been granted for NSWS cleaning and inspections, and for pipe replacements. Based on the results of these activities, a CNS NSWS improvement plan has been developed by the licensee.

Implementation of this plan is intended to improve the reliability of the NSWS. As part of the planned activities during these outages, modifications are being performed to permit future NSWS improvements to be performed within the existing TS CTs, obviating the need for further one-time temporary TS changes.

2.0 REGULATORY EVALUATION

Plant Systems

The licensee, in Section 5.2 of Enclosure 1 of its submittal, identified regulatory requirements and criteria that are applicable to the systems that are affected by the proposed one-time TS changes. However, the proposed changes pertain to TS AOTs and do not really pertain to the specific regulatory requirements that apply to the affected systems. Consequently, the regulatory requirements that were cited by the licensee are not particularly relevant for judging the merits of the requested changes to the TS allowed outage times. The NRC staff's determination of regulatory requirements and/or criteria that apply more directly to risk-informed changes to TS requirements are discussed below.

The NRC staff performs its review of risk-informed changes to TS requirements in accordance with the guidance provided by Standard Review Plan (SRP) Chapter 16.1, "Risk-Informed Decisionmaking: Technical Specifications." SRP Chapter 16.1 refers to Regulatory Guide (RG) 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," as an acceptable approach for assessing proposed risk-informed changes to TS allowed outage times. Note that the phrase "completion time" used in the licensee's TS is equivalent to the phrase "allowed outage time" used in RG 1.177 and in this Safety Evaluation.

One acceptable approach for making risk-informed decisions about proposed TS changes, including both permanent and temporary TS changes, is to show that the proposed changes meet the five key principles stated in RG 1.177, Section B:

1. The proposed change meets the current regulations unless it is explicitly related to a requested exemption or rule change.

2. The proposed change is consistent with the defense-in-depth philosophy.

3. The proposed change maintains sufficient safety margins.

4. When proposed changes result in an increase in core-damage frequency (CDF) or risk, the increases should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.

5. The impact of the proposed change should be monitored using performance measurement strategies.

The first three principles pertain to traditional engineering considerations and are evaluated in Section 3.0, below; whereas the last two principles involve risk considerations and are evaluated in Section 5.0. Another traditional engineering consideration that is listed in Sections II.A and III.A of SRP Chapter 16.1, and is addressed in Section 3.1 of this evaluation, is the need for and adequacy of the proposed change.

Electrical Engineering

Title 10 of the *Code of Federal Regulations* (10 CFR 50) Part 50, Appendix A, General Design Criterion (GDC) 17 requires that an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system shall provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences, and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents.

Criterion 18, "Inspection and Testing of Electric Power Systems," requires that electric power systems that are important to safety must be designed to permit appropriate periodic inspection and testing.

10 CFR 50.36(b), "Technical Specification," requires that a licensee's TS be derived from the analyses and evaluation included in the safety analysis report.

Risk Assessment

The regulatory guidelines on which the NRC staff based its acceptance are:

- RG 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," describes a risk-informed approach, acceptable to the NRC, for assessing the nature and impact of proposed permanent licensing-basis changes by considering engineering issues and applying risk insights. This regulatory guide also provides risk acceptance guidelines for evaluating the results of such evaluations.

- RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," describes an acceptable risk-informed approach specifically for assessing proposed permanent TS changes in allowed outage times. (Note that the phrase "completion time" used in the licensee's TS is equivalent to the phrase "allowed outage time" used in RG 1.177). This regulatory guide also provides risk acceptance guidelines for evaluating the results of such evaluations.

One acceptable approach to making risk-informed decisions about proposed TS changes is to show that the proposed changes meet the five key principles stated in RG 1.174, Section 2 and RG 1.177, Section B, as listed above.

For permanent TS changes, RG 1.174 and RG 1.177 provide numerical risk acceptance guidelines that are helpful in determining whether or not the fourth key principle has been satisfied. These guidelines are not to be applied in an overly prescriptive manner; rather, they provide an indication, in numerical terms, of what is considered acceptable. The intent in comparing risk results with the risk acceptance guidelines is to demonstrate with reasonable assurance that the fourth key principle has been satisfied.

For temporary TS changes, examination of the risk metrics identified in RG 1.174 and RG 1.177 provides insight about the potential risk impacts, even though neither of these RGs provide numerical risk acceptance guidelines for evaluating temporary TS changes against the fourth key principle. It can be demonstrated with reasonable assurance that a temporary TS change meets the fourth key principle if its associated risk metrics:

- Satisfy the risk acceptance guidelines in RG 1.174 and RG 1.177, or

- Are not substantially above the risk acceptance guidelines in RG 1.174 and RG 1.177 and effective compensatory measures to maintain lower risk are implemented while the temporary TS change is in effect.

3.0 TECHNICAL EVALUATION - TRADITIONAL PLANT SYSTEMS ENGINEERING CONSIDERATIONS

As discussed above, this evaluation pertains to the traditional plant systems engineering considerations that are referred to in SRP, Chapter 16.1 and RG 1.177. In completing this evaluation, the NRC staff considered the information that was provided by the licensee's amendment request dated November 16, 2004, as supplemented by letters dated May 3, September 13, and October 6, 2005.

3.1 Description of the Proposed Change

The proposed change is described above in Section 1.0. Based on a review of the information that was provided, it is the NRC staff's conclusion that the proposed change will eliminate the regulatory burden of requiring both CNS units to be shutdown during the NSWS refurbishment activity. This consideration is consistent with the objectives of the Commission's PRA Policy Statement and it establishes a suitable basis for proposing a risk-informed change to the CNS TS requirements.

3.1.1 Justification for Requesting a "One-Time" Change

The NRC tends to discourage the indiscriminate use of one-time changes to TS requirements and expects licensees to propose permanent changes to the extent possible in order to establish TS requirements that best accommodate the needs of operating power reactors while at the same time maintaining reactor safety. While the licensee has previously requested

similar one-time changes to the CNS TS requirements to facilitate inspection and repair of the NSWS, the information provided in the October 6, 2005, letter (response to Plant Systems Question 1.a) indicates that additional "one-time" TS changes should not be needed for future NSWS refurbishment activities. Once the work that is planned for the current NSWS refurbishment has been completed, the licensee indicated that the installed modifications will allow for continued implementation of NSWS crossover modifications to be completed during either online or outage time frames without the need for any additional one-time changes to the CNS TS completion times. Pending the completion of all of the required NSWS modification work, the licensee anticipates submitting a request for a permanent change to the CNS TS requirements to allow an extended completion time for single NSWS header operation to facilitate any future maintenance and repair of these headers that may be needed.

The reason that the licensee currently seeks NRC approval of this proposed one-time TS change for the NSWS and supported systems is to allow refurbishment of the shared NSWS headers while both CNS units are operating at full power. The affected TS requirements typically only allow 72 hours for completing on-line repairs and both of the CNS units would have to be shut down in order to complete this work. The extent and nature of compensatory measures that are needed in order to minimize exposure to risk and reductions in defense in depth make it difficult to justify the proposed change on a permanent basis, and the staff does not consider this to be a viable option. Therefore, the licensee has adequately justified the need for this proposed one-time TS change for implementation of the planned modifications to the NSWS. The adequacy of the proposed change in terms of nuclear safety is assessed based on traditional engineering considerations and an assessment of risk. This evaluation only considers the traditional engineering considerations and assessment of risk aspects is considered in section 5.0 below.

The November 16, 2004, submittal, as clarified by the additional information that was provided by the September 13, 2005, letter (response to Plant Systems Branch Question 1) and the October 6, 2005, letter (response to Plant Systems Branch Question 1.b), discussed the licensee's rationale for proposing a one-time TS change for performing the NSWS refurbishment on-line instead of combining this activity with a concurrent refueling outage. In general, the NRC staff agrees that refurbishing the NSWS headers concurrent with refueling activities that are being performed on one or both of the CNS units could be contrary to safety if not properly managed and coordinated. However, the NRC staff concluded that the licensee's contentions in the October 6, 2005, letter (i.e., it is in the best interest of nuclear safety to perform the planned NSWS refurbishment with both units operating at full power and that the planned refurbishment cannot be performed under the existing TS requirements without the need for an allowed outage time extension) are only valid for the specific refurbishment options and assumptions that were presented, but these contentions are not valid for all of the NSWS repair strategies that are available. Because this is not a consideration for judging the acceptability of risk-informed changes to TS requirements, it is simply noted as a point of clarification.

3.2 Traditional Plant Systems Engineering Evaluation

The traditional engineering evaluation presented below addresses the first three key principles of the NRC staff's philosophy of risk-informed decisionmaking, which concern compliance with current regulations, evaluation of safety margins, and evaluation of defense-in-depth.

3.2.1 Compliance with Current Regulations

The licensee does not propose to deviate from existing regulatory requirements and compliance with existing regulations is maintained by the proposed one-time change to the TS requirements. Therefore, with respect to compliance with current regulations, the NRC staff considers the proposed one-time TS change to be acceptable.

3.2.2 Evaluation of Safety Margins

Design basis analyses and system design criteria are not impacted by the proposed change and consequently, safety margins are not affected.

3.2.3 Evaluation of Defense-in-Depth Attributes

The NRC staff requested that the licensee fully address the defense-in-depth attributes in accordance with the guidance that is specified by RG 1.177 for making risk-informed changes to TS requirements. The licensee responded to the NRC staff's request by letter dated May 3, 2005, and additional supporting information was provided by letters dated September 13 and October 6, 2005. The NRC staff has reviewed the information that was provided in this regard and evaluation of the defense-in-depth attributes is provided below.

- A reasonable balance among prevention of core damage, prevention of containment failure, and consequence mitigation is preserved.

  The proposed change involves an extension of the current TS allowed outage times for systems that are impacted by the NSWS refurbishment project. The systems that are affected during a particular NSWS header outage are all associated with the train that corresponds to the affected NSWS header, leaving one train of safety equipment fully operable and capable of performing its safety functions. Consequently, the balance among the prevention of core damage, prevention of containment failure, and consequence mitigation is unaffected by the proposed change.

- Over-reliance on programmatic activities to compensate for weaknesses in plant design is avoided.

  The proposed change involves an extension of the current TS AOTs for systems that are impacted by the NSWS refurbishment project. The systems that are affected during a particular NSWS header outage are all associated with the train that corresponds to the affected NSWS header, leaving one train of safety equipment fully operable on each of the CNS units and capable of performing its safety functions. The proposed extension of the AOT by more than 350 percent (in some cases) results in a corresponding increase in the amount of time that the redundancy that is normally afforded by the other (inoperable) train will not be available, thereby increasing the amount of time that safety systems are vulnerable to single failures. Enclosure 2 of the November 16, 2004, letter as modified by Attachment 2 of the May 3, 2005, letter provided licensee commitments to implement certain contingencies in order to provide increased assurance that the operable train of safety equipment will not be unnecessarily challenged or compromised during each of the NSWS header outages.

In response to questions that were raised by the NRC staff, additional discussion and clarification of the contingencies being implemented were provided by letters dated September 13 and October 6, 2005. Some of the contingencies that have been identified do include programmatic activities, such as protecting the other (operable) train of safety equipment by deferring to the extent possible the performance of any maintenance or testing related to the operable train of equipment, providing operator training in certain areas that are impacted, establishing enhanced monitoring to address flooding considerations, and stationing a dedicated operator in the safe shutdown facility during the extended outage period. However, because this is a one-time change of limited duration, the NRC staff considers the programmatic activities to be appropriate and necessary for minimizing the risks involved and for maintaining defense-in-depth.

- System redundancy, independence, and diversity are preserved commensurate with the expected frequency, consequences of challenges to the system, and uncertainties (e.g., no risk outliers).

  The operable train of safety equipment will continue to be capable of performing the necessary assumed safety functions consistent with accident analysis assumptions. The licensee has confirmed in Attachment 1 of the May 3, 2005, letter that the NSWS headers that are being refurbished continue to satisfy the plant design criteria, including the criteria for seismic qualification . Also, as discussed in Enclosure 2 of the November 16, 2004, letter and modified by Attachment 2 of the May 3, 2005, letter and as clarified by the September 13 and October 6, 2005, letters (responses to NRC staff questions) the licensee has committed to implement certain contingencies in order to assure the availability and capability of the operable train of safety equipment while operating in the allowed outage period, including (for example) avoiding severe weather situations and periods of grid instability, and establishing measures to minimize the likelihood of internal flooding events. The contingencies will also maintain to some extent the functional capability of the other (inoperable) train of safety equipment, such as the emergency diesel generator and the emergency core cooling system equipment. Procedure changes are also being made to assure the capability of the operable auxiliary feedwater trains and the component cooling water pumps of the inoperable train to perform their safety functions during certain risk-significant scenarios (Attachment 1 of the September 13, 2005, letter; response to Plant Systems Branch Question 3). The safe shutdown facility and the turbine-driven auxiliary feedwater pump provide alternate means of providing reactor coolant makeup and for removing reactor decay heat if there should be a complete loss of the NSWS function or if a station blackout event should occur, and the contingencies being established by the licensee provide additional assurance that these alternate capabilities will be maintained while in the allowed outage period. Given these considerations, the NRC staff agrees that sufficiently redundant, independent, and diverse capabilities will be maintained for performing critical safety functions during the proposed allowed outage time.

- Defenses against potential common cause failures are preserved and the potential for the introduction of new common cause failure mechanisms is assessed.

  As discussed in the previous bullet, the licensee has established contingencies to assure the availability and capability of redundant, independent, and diverse means of

accomplishing critical safety functions during the proposed allowed outage time. The contingencies include avoiding (to the extent possible) severe weather conditions and periods of grid instability when in the proposed allowed outage time, and measures to minimize the likelihood of internal flooding have been established. The licensee has determined that postulated fire events will not affect both the protected primary and backup means of achieving and maintaining safe shutdown conditions (October 6, 2005, letter; response to Probabilistic Risk Assessment (PRA) Question 2), and limiting the extent that maintenance can be performed during the proposed allowed outage time will minimize the likelihood of fires occurring. Based on the information that was provided, the NRC staff finds that the licensee has taken appropriate measures to preserve defenses against potential common cause failures and the introduction of new common cause failure mechanisms has been adequately assessed and none have been identified.

- Independence of barriers is not degraded.

  As discussed above in the third and fourth bullets, both primary and backup means of achieving and maintaining safe shutdown conditions will be maintained during the proposed allowed outage time. These means are independent, redundant, and diverse and consequently, they should prevent any undue challenges to the fuel cladding, reactor coolant pressure boundary, and containment from occurring. Additionally, refurbishment of the NSWS does not directly impact these barriers or otherwise cause them to be degraded. Therefore, the NRC staff finds that the independence of barriers will not be degraded by the proposed allowed outage time or by the NSWS refurbishment activities.

- Defenses against human errors are preserved.

  As discussed in the third bullet above, the licensee has established contingencies for assuring that critical safety functions will be maintained during the proposed allowed outage time. The contingencies include focused operator training and briefings to assure that operators are fully aware of the plant configuration and actions that may be needed in order to respond to problems that could arise during the proposed allowed outage time for performing NSWS refurbishment activities. Administrative controls have been established and procedure changes have been made to facilitate implementation of these contingency measures. Also, contingencies to prohibit discretionary maintenance and to otherwise minimize reactor trip hazards and challenges to critical safety systems will help prevent operator distractions from occurring. Therefore, the NRC staff finds that defenses against human errors will be adequately preserved during the proposed allowed outage time.

- The intent of the GDC in Appendix A to 10 CFR Part 50 is maintained.

  The proposed change involves an extension of the current TS allowed outage times for systems that are impacted by the NSWS refurbishment project. The systems that are affected during a particular NSWS header outage are all associated with the train that corresponds to the affected NSWS header, leaving one train of safety equipment fully operable and capable of performing its safety functions. The proposed change does not

> modify the plant design bases or the design criteria that were applied to structures, systems, and components during plant licensing. Consequently, the plant design with respect to the general design criteria is not affected by the proposed change.

Based on the above review of defense-in-depth attributes, the NRC staff finds that defense-in-depth will be adequately maintained during the one-time AOT extension that is proposed for the NSWS and supported systems.

3.3 Summary

The NRC staff has reviewed the traditional plant system engineering aspects of the licensee's evaluation related to the one-time proposed extension of the AOT to 14 days for the NSWS and supported systems as defined in Section 1.0 of this Safety Evaluation. Based on the results of the evaluation performed above in Section 3.0, the NRC staff finds that the proposed changes are acceptable.

4.0 TECHNICAL EVALUATION - TRADITIONAL ELECTRICAL ENGINEERING CONSIDERATIONS

4.1 TS 3.8.1 "AC Sources - Operating"

The following footnote will be added for the emergency diesel generators (EDGs) to temporarily allow one train of NSWS to be inoperable for up to 14 days:

> *For each Unit, the Completion Time that one EDG can be inoperable as specified by Required Action B.4 may be extended beyond the "72 hours and 6 days from discovery of failure to meet the LCO" up to 336 hours as part of the NSWS system upgrades. System upgrades include activities associated with cleaning, inspection, and coating of NSWS piping welds, and necessary system repairs, replacement, or modifications. Upon completion of the system upgrades and system restoration, this footnote is no longer applicable and if not used, will expire at midnight on December 31, 2006.

The licensee stated that EDGs provide essential auxiliary power to supply the Class 1E loads required to safely shut down the plant following a design basis accident. Each EDG is capable of supplying its associated 4.16 kilo-volt (kV) blackout switchgear through a connection with the 4.16 kV essential switchgear. Each EDG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective engineered safety feature (ESF) bus on detection of bus undervoltage. Each EDG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses. The EDG engine cooling water system for each diesel includes a jacket water-intercooler water heat exchanger located within the diesel room, which is supplied with cooling water from the NSWS. The EDG engine cooling water system is designed to maintain the temperature of the EDG engine within an optimum operating range during standby and during full-load operation in order to assure its fast starting and load-accepting capability and to reduce thermal stresses. The system is also designed to supply cooling water to the engine lube oil cooler, the combustion air aftercoolers, and the governor lube oil cooler.

4.2 Contingency Measures

The licensee stated that the following contingency measures will be implemented to enhance the safety of the operation during each 14 day period:

1. During each 14-day period when operating with only one operable NSWS header, no major maintenance or testing shall be planned on the remaining operable NSWS header. In addition, during each 14-day period, no major maintenance or testing shall be planned on the operable equipment that relies upon NSWS as a support system. To the maximum extent practicable, routine tests (e.g. quarterly pump tests) and preventive maintenance work (e.g. motor checks) will be scheduled prior to or following each 14-day period. Certain tests may have to be performed during each 14-day period.

2. Diesel Generator Jacket Water Heat Exchanger - A temporary engineering change will be installed on each train of EDGs on both units to maintain the inoperable EDG capable of being manually started while the normal NSWS supply piping is out of service. This will be accomplished by using water from the fire protection system.

3. Diesel Generator Starting Air - An engineering change will be installed on each train of EDGs on both units to maintain the cooling water to the diesel generator starting air system aftercoolers while the normal NSWS supply piping is out of service. This will be accomplished by using drinking water to supply the aftercooler. This cooling water flow rate is adequate to maintain the non-safety-related function of the starting air compressors.

4. No major maintenance or testing shall be planned on the operable offsite power sources during each 14 day period. Switchyard activities will be coordinated to ensure that the operable offsite power supply and main transformer on both units are protected to the maximum extent practicable.

5. Appropriate training will be provided to operations personnel on this TS change, contingency measures to be implemented during each 14 day period, and actions to be taken in the event of flooding in the turbine building. Also, operations will review the loss of NSWS and loss of CCW procedures as well as perform extra surveillance rounds on the CCW system.

6. During each 14-day period, no major maintenance or testing will be planned on the Standby Shutdown Facility (SSF). To the maximum extent practicable, routine tests and preventive maintenance work for the SSF will be scheduled prior to or following each 14-day period.

7. During each 14-day period, no major maintenance or testing will be planned on the operable trains of ECCS, CSS, CVIWS, AFW, CCW, CRAVS, ABFVES, and EDG. Routine tests and preventive maintenance work for these systems will be scheduled prior to or following each 14-day period. These items are being done to ensure the operable trains are protected to the maximum extent practicable.

8. During each 14-day period that a NSWS header is out of service, the operable trains remaining in service will be considered protected trains. Operations will increase their routine monitoring of these trains to help ensure their operability. This increase in routine monitoring will also include the Turbine Building to ensure no flooding in this area.

9. Plant procedures will be used to cross tie selected CCW system loads during the time period a CCW heat exchanger will be out of service during the NSWS pipe replacement.

10. An action taken by CNS to reduce the likelihood of an operator failing to get to the SSF and performing the required actions is to station an individual in the SSF continuously. This individual is trained on how to operate the SSF diesel generator and the standby makeup pump to establish an alternate method of reactor coolant pump (RCP) seal injection. This will provide additional assurance that the SSF will be available during the NSWS pipe replacement project.

11. An operator will be assigned to control the Unit 1 and Unit 2 auxiliary feedwater flow control valves in the event that flow control is lost following a loss of offsite power (LOOP) on Unit 1 or Unit 2 as applicable. One of the more important operator actions as identified in the PRA is manually throttling the auxiliary feedwater flow to the steam generators following a turbine building flood or LOOP. Improved operator awareness of the importance of this action and improved operator response to these events results in a reduction of risk over that identified in the PRA.

In Request for Additional Information No. 1 (RAI - 1), the NRC staff requested clarification of what is meant by major maintenance. On September 13, 2005, the licensee clarified that major maintenance is discretionary maintenance under CNS control. The NRC staff finds the licensee's response to be acceptable. In RAI - 2, the NRC staff asked the licensee to provide details about increase monitoring. In its response, the licensee stated that operations will develop and implement one focused increased surveillance round each shift that will focus on the protected equipment and protection tools employed. The NRC staff finds the licensee's response to be acceptable.

In RAI - 3, the NRC staff requested information regarding whether any maintenance will be performed on electrical distribution system during each 14-day period of NSWS project. In its response, the licensee stated that CNS does not plan to perform any discretionary maintenance on the following electrical systems for the protected train and the following equipment that will receive CCW cooling when the CCW system is in cross train alignment:

- 4160 volt safety-related electrical busses,
- 600 volt safety-related load centers,
- 600 volt safety-related motor control centers,
- 125 volt vital DC busses, batteries, and battery chargers, and
- 120 volt instrument busses and associated vital inverters.

The licensee stated that these systems will be added to the list of compensatory measures. On the basis of its review, the NRC staff finds the licensee's response to be acceptable.

In RAI - 4, the NRC staff indicated that "Contingency Measures" does not seem comprehensive in nature. The following regulatory commitments have been typically provided for the past EDG AOT extension requests. The NRC staff requested the licensee to explain why its contingency measures, as stated below, are adequate.

A. The local area weather conditions will be evaluated prior to entering the extended EDG AOT for voluntary planned maintenance. An extended EDG AOT will not be entered for voluntary planned maintenance purposes if weather forecasts for the local area are predicting severe weather conditions that could affect the switchyard or offsite power supply during the AOT.

B. The condition of the switchyard, offsite power supply, and the grid will be evaluated prior to entering the extended AOT for elective maintenance. An extended EDG AOT will not be entered to perform elective maintenance when grid stress conditions are high such as during extreme summer temperatures and/or high demand.

In its response, the licensee, on September 13, 2005, stated that operations will evaluate the local area weather conditions prior to entering each extended NSWS train outage for voluntary planned maintenance. Each extended NSWS train outage will not be entered for voluntary planned maintenance purposes if weather forecasts for the local area predicting severe weather conditions that could affect the switchyard or offsite power supply during the AOT.

Additionally, the licensee will monitor the national weather service reports prior to commencing and for the duration of each NSWS header outage. This will be done to ensure, to the extent practicable, that any potential outbreaks of severe weather are factored into the schedule and if severe weather should occur that appropriate personnel are notified and appropriate actions taken. The peak season for tornadoes tends to be in the spring and the peak season for thunderstorms tends to be in the summer. Since the incidence of severe weather would be greater than at other times of the year, the risk of a LOOP during these time periods is also greater. The NSWS piping AOTs are scheduled to be performed during a time of the year when severe weather is not normally an issue; hence, the risk of a severe weather-related LOOP is minimized.

The operations personnel will evaluate the condition of the switchyard, offsite power supply, and the grid prior to entering each extended NSWS train outage for elective maintenance. An extended NSWS train outage will not be entered to perform elective maintenance when grid stress conditions are high.

Additionally, the NRC staff asked the licensee about the performance of real-time contingency analysis by the transmission system operator (TSO) to determine grid conditions that would make the offsite system inoperable in the event of various contingencies and what action would be taken if the offsite system becomes inoperable during the 14-day AOT. In its response, the licensee, on October 6, 2005, stated that the condition of the electrical grid is routinely evaluated by the TSO (Duke Power Company - Power Delivery) through a real time contingency analysis program. This is a computer program that runs every 15 minutes and is monitored by the Transmission Control Center (TCC). If grid conditions deteriorate, the TCC operator alerts the

nuclear facility control room and the appropriate abnormal operating procedure is entered. This information can be obtained manually by the TCC and is performed more frequently whenever the system configuration changes. Once the degraded condition is known, it can be compared with the other out-of-service risk significant components as required under this AOT, and the LOOP vulnerability can be analyzed with ORAM-Sentinel (an electronic risk assessment tool).

Each NSWS train will be taken out of service independently to allow one train per unit to be operable at all times during the AOT. Should the offsite power system become lost during this 14-day AOT, the diesel generators for each unit that are not associated with the inoperable NSWS train will be fully operable. These diesel generators will retain automatic start capability. They would be used to power the 4.16 kV safety busses for their respective trains until the grid could be restored. The diesel generators for each unit associated with the NSWS train that is inoperable will be available for use as well. Modifications will be put in place (in advance of the 14-day AOT) to allow those diesel generators with inoperable NSWS cooling supplies to be cooled from the fire protection system by manual valve realignment. The diesel generators may then be manually started upon grid unavailability to supply their respective busses. Thus, it is planned that both 4.16 kV safety busses per unit will be powered by their respective diesel generators if offsite power is lost during the planned 14-day AOT.

The CNS TS would be utilized to determine the Required Actions if the offsite power system were to become inoperable during this 14-day AOT. There are two possible cases:

1. Both offsite power sources inoperable: CNS enters TS LCO 3.0.3 because both trains of NSWS, Auxiliary Building Filtered Ventilation Exhaust System, Control Room Area Ventilation System, and Control Room Area Cooling Water System will be inoperable. Additionally, CNS enters LCO 3.8.1, Condition C because both offsite power sources would be inoperable, which normally allows 24 hours to restore one offsite circuit to operable status. CNS also enters LCO 3.8.1, Condition H in this case, because three or more AC sources would be inoperable (including the single inoperable diesel generator). This requires entry into LCO 3.0.3 as well. LCO 3.0.3 is the most limiting TS in this case.

2. One offsite power source inoperable: The operable NSWS train will remain operable if the inoperable offsite power source is the opposite train's power supply. However, CNS will have a 12-hour Completion Time to restore the offsite power source to operable status. This is because one diesel generator is already inoperable due to the 14-day AOT (refer to LCO 3.8.1, Condition D). If the single inoperable offsite power source applies to only one unit, and offsite power is available for that train on the other unit, it is possible to use the shared auxiliary transformers "A" or "B" (SATA or SATB) to restore power to the inoperable circuit from the other unit. Utilizing SATA and SATB is not an option if both units have lost an offsite power source. If the inoperable offsite power source is on the same train as the inoperable NSWS train, CNS still enters LCO 3.8.1, Condition D (which allows 12 hours to restore the offsite power source to operable status). This TS requirement applies if either offsite power source and either diesel generator are inoperable.

The NRC staff asked the licensee to discuss how the grid stability will be maintained during the

14-day AOT. In its reply, the licensee, on October 6, 2005, stated that the grid stability will be maintained throughout the 14-day AOT by the established processes and procedures in use by the TCC and Grid Operations on a continual basis.

Finally, the NRC staff requested information regarding notification of a degraded grid condition to the plant operator and what action would be taken if a degraded grid condition occurred. The licensee's October 6, 2005, response stated that the Service Level Agreement requires Power Delivery (TCC) to notify Nuclear Generation (Operations) when the transmission power supply is degraded to a degree that it may impact operations in the switchyard or the nuclear station. Notification is provided as soon as possible and, in any event, within 30 minutes of the initial identification of a condition or alarm typical of a potential degraded condition.

Additionally, joint unit commitment meetings are held twice daily between representatives from Grid Operations and representatives from Nuclear Generation and Fossil Generation on the status of the load situation over the next 72 hours. Nuclear Generation has individuals within the Nuclear General Office assigned as the Duty Engineer and Duty Coordinator. Either the Duty Coordinator and/or the Duty Engineer will attend the joint unit commitment meetings. The meeting is intended for Nuclear Generation to provide nuclear system status to the System Operations Center (SOC) and to receive information from the SOC concerning system load and operating conditions, as well as the status of the Fossil/Hydro system. As part of this meeting, the projected power supply is obtained for the next 72 hours from the SOC Lead Coordinator. Depending upon how the projected power supply system is categorized by the SOC, the Nuclear Generation Duty Engineer will initiate Degraded Power Supply Notifications to the station as required per established written procedures. The goal of the meetings and the Degraded Power Supply Notifications is to provide the most lead time possible in communicating potential/actual degraded power supply conditions that could lead to grid instabilities.

For weekends and holidays, the Nuclear Generation Duty Engineer will contact the SOC operator on the board to provide and receive the information that is covered in the normal joint unit meetings.

In emergency situations when there is no time to contact the Nuclear Generation Duty Engineer, the SOC will contact the Senior Reactor Operator in the Catawba control room. The SOC has a dedicated automatic ring down phone line to CNS to facilitate rapid communications between the control room operators and the SOC.

The TCC also has two sets of low voltage alarms to monitor CNS switchyard voltage. The normal low voltage setpoint is set at the minimum switchyard voltage plus a margin for a unit trip contingency. The emergency low voltage setpoint is set at the minimum switchyard voltage for the nuclear plant. These setpoints are listed and described in the "TCC/SOC Nuclear Plant Grid Voltage Requirements " guideline that is part of the TCC Work Practice Manual. The TCC will notify the Senior Reactor Operator in the control room if the normal low voltage setpoint is reached and conditions continue to worsen such that violation of the minimum switchyard voltage is imminent. The TCC has a dedicated automatic ring down phone line to CNS to facilitate rapid communications between the control room operators and the TCC.

CNS has a 2-out-of-3 (2/3) degraded voltage relay logic for monitoring its essential busses. The operators will receive an alarm in the control room (after a short time delay) when this 2/3

degraded voltage logic is satisfied. If the degraded voltage logic still exists after 10 minutes have passed, separation from the offsite power grid and connection to the diesel generator will automatically occur for the train that is considered operable at that time during the AOT. The diesel generators serving the train with inoperable NSWS cooling during this AOT are available (though not operable), as discussed earlier. They would be manually started to supply their respective emergency busses after diesel generator cooling is aligned to the fire protection system.

In addition, procedures are in place at the TCC for notifying the control room if unacceptable results are verified by using Real Time Contingency Analysis Program and other means.

On the basis of the above information, the NRC staff finds that the licensee has adequately addressed the NRC staff's concern.

4.3 SUMMARY

The NRC staff concludes that the deterministic evaluation supports the proposed extension of the AOT for the EDGs from the current period of 3 days to 14 days on a one-time basis and, therefore, the proposed change is acceptable. The NRC staff's conclusion is based on the following contingency measures: (1) the condition of the switchyard, offsite power supply, and the grid will be evaluated prior to entering AOT extension; (2) no discretionary maintenance would be planned on the operable offsite power sources during each 14 day period; (3) operations personnel will place their own lock on the switchyard entry gate to prevent unauthorized entry into the switchyard; (4) local area weather conditions will be evaluated prior to entering AOT extension; (5) no discretionary maintenance would be planned on the SSF; (6) SSF will be manned continuously during the AOT extension by a trained individual to operate SSF diesel generator; (7) inoperable EDGs will be capable of being manually started to perform its intended function because it will be supplied with an alternate non-safety related water supply; and (8) during each 14 day period, the operable trains remaining in service will be considered protected trains with increase focused operating staff monitoring.

5.0 TECHNICAL EVALUATION - RISK ASSESSMENT

5.1 Description of System/Component and Current Requirements

The key information used in the NRC staff's review of the risk evaluation is contained in Section 4 of the licensee's submittal (References 1 through 3), as supplemented by the licensee in response to staff questions (References 4, 5, and 6), and from information extracted from the licensee's reference to the CNS final safety analysis report. The description of the proposed CNS TS changes is provided in Section 1.0 above.

The NSW system provides a heat sink for the removal of process and operating heat from safety-related components during a design basis accident. During normal operation and during normal plant shutdowns, the NSW system also provides this function for various safety-related and non-safety-related components.

The NSW system consists of two independent trains (designated 'A' and 'B') of essential equipment. Each train contains two NSW pumps, each of which is provided backup emergency

power from a separate EDG. Each set of two pumps supplies two trains (Unit 1 - 1A and 1B, Unit 2 - 2A and 2B) of essential equipment via common discharge piping for each pair of pumps. While the pumps are unit designated, all pumps receive automatic start signals from a safety injection or blackout signal from either unit. Therefore, a pump designated to one unit is capable of supplying post-accident cooling to the equipment in that loop on both units. The NSW system also provides a safety-related source of water for the auxiliary feedwater system and to the containment valve injection water system.

5.2 Staff Review Methodology

As required by the SRP, Chapter 16.1, the NRC staff reviewed the submittal against the five key principles of the NRC staff's philosophy of risk-informed decisionmaking listed in RG 1.177, Section B. The NRC staff evaluation in this section addresses only the two of the five principles which involve the risk evaluation, as described below.

5.3 Comparison Against Regulatory Criteria/Guidelines

The NRC staff's comparison of the licensee's proposed license amendment for increasing the CT associated with the NSWS, and other impacted TS, to 14 days against the fourth and fifth key principles provided in RG 1.177 is presented in the following sections. The NRC staff's comparison against the first three principals is presented in the sections above.

5.4 Risk Evaluation

The risk evaluation presented below addresses the last two key principles of the NRC staff's philosophy of risk-informed decision-making, which concern changes in risk and performance measurement strategies. These key principles were evaluated by using the three-tiered approach described in Chapter 16.1 of the SRP and RG 1.177.

- Tier 1 - The first tier evaluates the licensee's PRA and the impact of the change on plant operational risk, as expressed by the change in CDF and the change in large early release frequency (LERF). The change in risk is compared against the acceptance guidelines presented in RG 1.174. The first tier also aims to ensure that plant risk does not increase unacceptably during the period when equipment is taken out of service per the license amendment, as expressed by the incremental conditional core damage probability (ICCDP) and incremental conditional large early release probability (ICLERP). The incremental risk is compared against the acceptance guidelines presented in RG 1.177.

- Tier 2 - The second tier addresses the need to preclude potentially high-risk plant configurations that could result if equipment, in addition to that associated with the proposed license amendment, is taken out of service simultaneously, or if other risk-significant operational factors, such as concurrent system or equipment testing, are also involved. The objective of this part of the review is to ensure that appropriate restrictions on dominant risk-significant plant configurations associated with the CT extension are in place.

- Tier 3 - The third tier addresses the licensee's overall configuration risk management program (CRMP) to ensure that adequate programs and procedures are in place for identifying risk-significant plant configurations resulting from maintenance or other operational activities and taking appropriate compensatory measures to avoid such configurations. The CRMP is to ensure that equipment removed from service prior to or during the proposed extended CT period will be appropriately assessed from a risk perspective.

5.4.1 Tier 1: PRA Capability and Insights

The Tier 1 NRC staff review involved two aspects: (1) evaluation of the validity of the PRA and its application to the proposed CT extension, and (2) evaluation of the PRA results and insights stemming from its application.

5.4.1.1 Evaluation of PRA Validity

To determine whether the PRA used in support of the proposed CT extension is of sufficient quality, scope, and level of detail, the NRC staff evaluated the relevant information provided by the licensee in their submittal, as supplemented, including applicable references. The NRC staff's review of the licensee's submittal focused on the validity of the licensee's PRA model to analyze the risks stemming from the proposed CT extension and did not involve an in-depth review of the licensee's PRA. The following excerpts from the licensee's submittal provided the basis for this portion of the NRC staff's review.

The CNS PRA is a full-scope PRA model including both internal and external events, except for seismic risk which is considered separately. The CNS PRA includes models for those systems needed to estimate CDF, including all major support systems as well as mitigating systems. These systems are generally modeled down to the component level (e.g., pumps, valves, and heat exchangers). There are no unit-specific differences that would impact the PRA model.

In response to an NRC question, the licensee clarified the scope and quality of the fire PRA models used to support this LAR. Fire initiating events were identified by a review of plant areas to evaulate the potential for a fire to cause an initiating event and to impact the capability for the plant to mitigate that initiating event. Such areas were then examined using event tree methodology to estimate the fire damage frequency. An area was screened from further consideration

- If the consequences of the fire were similar to another internal initiating event, but with a much smaller frequency compared to the frequency of the internal initiating event, using the fire-induced vulnerability evaluation methodology guidance, or

- If the core damage frequency was less than 1E-8 per year.

Further, CNS employs a dedicated SSF which can provide necessary functions required for safe shutdown using equipment which is independent from the equipment potentially impacted by most plant fires. As a result, the estimated contribution of fires to the plant configuration risk associated with each NSWS header outage is insignificant (less than 1 percent).

The licensee stated that it periodically evaluates changes to the plant with respect to the assumptions and modeling in the CNS PRA. The current revision (Revision 3) of the CNS PRA was completed in December of 2004 and is the basis for the risk evaluations supporting this TS amendment request. This revision provided necessary updates to reflect the plant physical configuration, operating procedures, maintenance practices, and recent plant operating experience. The licensee stated that PRA maintenance and update is governed by approved workplace procedures and that a formal process is in place to identify, track, and evaluate plant modifications and procedure changes that could require updates to the PRA model.

In response to an NRC question, the licensee identified only one outstanding plant modification that had not been fully incorporated into the PRA model. The modification involved installation of flood barriers in the basement of the turbine buildings of both units to protect 4160 VAC transformers and eliminate a dual unit loss of power as a consequence of internal flood scenarios. Neglecting the mitigation provided by these new barriers is considered conservative. No other plant changes were identified by the licensee that would impact the PRA model.

The licensee stated that the CNS PRA model has been reviewed under the auspices of the Westinghouse Owners' Group PRA certification program, conducted in March of 2002. During the CNS PRA update in 2004, 13 of 32 significant findings (i.e., designated as level B) from the peer certification review were resolved. The licensee identified five unresolved peer review items deemed potentially relevant to this license amendment request (Reference 2, Attachment 3), and provided a disposition that final resolution of each item would have a negligible impact on the risk analyses supporting the proposed TS changes.

Two of these unresolved items identified deficiencies in the PRA model which impacted the NSWS model. First, the reviewer identified a concern regarding the exposure times used in the analysis of common cause failures of NSWS pumps, one or more of which are normally operating. The licensee identified the use of a mean-time-to-repair as the basis for the required run time of the redundant pumps in calculating the probability of common cause failures. Further, the licensee identified that changes to this assumed time would not be expected to have a significant impact on the risk calculations in support the proposed TS changes. The second item involved the use of point estimates for the frequency of loss of NSWS as an initiating event, rather that providing a logic model. In response to an NRC question, the licensee identified the basis for determination of the loss of NSWS frequency, and further identified that the initiator frequency is adjusted accordingly to reflect the unavailability of one NSWS train, both in the calculations supporting the proposed TS changes, and in the configuration risk management program used by plant personnel to assess configuration risk during the proposed NSWS outages.

Based upon the above, the NRC staff finds that the PRA used in support of the proposed CT extension is of sufficient quality, scope, and level of detail, consistent with the guidance in RG 1.174 (Section 2.2.3), SRP 19 (Sections III.2.2.2, III.2.2.3, III.2.2.4 and Appendix A) and SRP 19.1.

5.4.1.2 Evaluation of PRA Results and Insights

The licensee provided results of the calculated increase in risk from additional online NSW train unavailability as a result of conducting planned NSWS upgrades for up to 14 consecutive days

for each train (11 days beyond the current CT). Consistent with their proposed configuration control compensatory measures during NSWS upgrade outages (Reference 2, Section 4.3), the risk calculations assumed no major maintenance or testing activies would be performed on the following systems and components:

- Operable NSWS header
- Equipment that relies upon the remaining operable NSWS as a support system
- Operable offsite power sources
- SSF

In response to an NRC question, the licensee further identified that the portions of the fire protection system and drinking water system, which are relied upon to provide backup cooling for the EDGs and the train 'A' charging pumps, were similarly assumed to be available for the risk calculations.

The licensee calculated the risk increase associated with each extension of the NSWS CT from the current 72 hours to 14 days in terms of ICCDP and ICLERP:

ICCDP - 5.8E-6
ICLERP - 1.9E-7

These compare with RG 1.177 limits for ICCDP and ICLERP of 5E-7 and 5E-8, respectively, applicable to permanent changes to TS.

The baseline CDF and LERF are 3.5E-5 per year and 2.6E-6 per year, respectively. During the year in which the NSWS train outages are conducted, the increase in CDF and LERF due to each NSWS train outage is equal to the ICCDP and ICLERP, respectively. Therefore, the CDF will not exceed 1E-4 per year, and LERF will not exceed 1E-5 per year, and so the calculated risk increases are within the Region II, "small," area of the RG 1.174 acceptance guidelines applicable to permanent changes to TS.

These results were exclusive of consideration of seismic risk. Seismic risk was separately assessed for the NSWS outage configuration and the change in core damage frequency was determined to be approximately 2 orders of magnitude lower than the non-seismic risk.

The risk calculations above credit two unique CNS features:

(1) The inoperable EDGs on each unit are provided with backup cooling from the plant fire protection system, and the starting air compressors are provided with backup cooling from the drinking water system. Therefore, the affected EDGs are considered functional during the corresponding train NSW header outage.

(2) The 'A' charging pump on each unit is provided with backup cooling from the drinking water system. Therefore, this pump on each unit is considered functional during the corresponding train NSWS header outage.

In response to an NRC question, the licensee confirmed assumptions with regards to the capability of these non safety-related systems to provide these support functions during postulated transient and accident conditions.

The licensee identified two precedent licensing actions previously approved for extension of completion times for the CNS for NSWS outages (References 7 and 8). These prior TS amendments identified risk reductions credited for plant enhancements based on (1) refill of the refueling water storage tank for mitigation of small loss-of-coolant accidents, and (2) installation of high temperature seals on the RCPs.

The above information provided added confidence in the efficacy of the licensee's risk assessment.

The calculated increase in risk is greater than the guidance provided in RG 1.177 applicable to permanent changes. The licensee identified non-quantifiable risk reduction factors applicable to the proposed amendment request:

10. During the NSWS outages, a substantial portion of the accident sequences which contribute to the risk increase involve the NSWS, CCW system, or the 4160 volts alternating current (Vac) power system. Operators will review plant procedures which apply to loss of these systems, and conduct additional observations of the CCW system during the NSWS outages.

11. The peak season for severe weather tends to be the spring (tornadoes) and summer (thunderstorms), and so the frequency of loss of offsite power is greater during these periods compared to the average annual frequency for loss of offsite power used in the PRA model. The NSWS outages are scheduled to be performed during winter, when severe weather is not normally an issue. CNS will monitor National Weather Service reports prior to commencing and for the duration of each NSWS outage, and has contingency plans to react to unforseen weather changes. CNS will not commence the NSWS outages if severe weather is forecast for the site area which could challenge the reliability of offsite power sources (i.e., greater than 50 mile per hour winds winds, or greater than .25 inch icing conditions).

12. Operation of the shutdown cooling system requires cooling from the CCW system and NSWS for decay heat removal. Risk associated with plant shutdown and operation on shutdown cooling during the NSWS outages is averted by remaining at power.

13. Prohibiting maintenance and testing activities on the offsite AC power system (i.e., switchyard) reduces the likelihood of losing offsite power.

14. Turbine building flooding is identified as a contributor to risk during the NSWS outages. Operations personnel will be specifically trained on the actions to be taken in the event of such a flood, as part of the training for the NSWS outages. In addition, CNS has installed permanent flood protection barriers in the turbine building to mitigate such flood events, and will increase routine monitoring of the areas. These actions increase the time to react to internal flooding transients, thereby reducing risk.

15. A qualified plant staff member is continuously stationed at the SSF to provide additional assurance of the availability of the backup diesel genertaor and standby makeup pump for reactor coolant pump seal injection.

Considering the information presented above, the NRC staff concludes that the risk impact of the proposed NSWS upgrades conducted during two separate 11-day extensions of the TS CT represents an acceptable increase in risk, given that it is a one-time request, and is consistent with the NRC's safety goal policy statement.

Therefore, the NRC staff finds that the licensee's first tier risk evaluation is acceptable.

5.4.2 Tier 2: Avoidance of Risk-Significant Plant Configurations

The second tier evaluates the capability of the licensee to recognize and avoid risk-significant plant configurations that could result if equipment, in addition to that associated with the proposed license amendment, is taken out of service simultaneously or if other risk-significant operational factors, such as concurrent system or equipment testing, are also involved.

The licensee identified that the large scope of work for the NSWS upgrade project requires direct management involvement, as well as proper review, representation, and planning from appropriate on-site groups prior to execution of work, and step-by-step directions for the project.

The licensee stated that key safety significant systems impacted by the proposed TS change are within the scope of the CNS maintenance rule program and, therefore, have availability and reliability criteria established to monitor performance.

The licensee has identified specific compensatory measures related to configuration control applicable to both units during the NSWS outages:

- No major maintenance or testing will be planned for the remaining operable NSWS header, nor on operable equipment (ECCS, CSS, CVIWS, AFW, CCW, CRAV system, ABFVES, and the EDGs) that relies on the NSWS as a support system. To the maximum extent practicable, routine tests and preventive maintenance work will be scheduled prior to or following the NSWS outage.

- No major maintenance or testing will be planned on the operable offsite power sources during each NSWS outage. Switchyard activities will be coordinated to ensure that the operable offsite power supply and main transformer on both units are protected to the maximum extent practicable.

- No major maintenance or testing will be planned on the SSF. Routine tests and preventive maintenance work for the facility will be scheduled prior to or following each NSWS outage to the maximum extent practicable.

- No major maintenance or testing will be planned on the portions of the fire protection system and drinking water system that are relied upon to provide backup cooling to the EDGs and the 'A' charging pumps.

- The remaining operable train of safety systems relying upon the single operable NSWS loop will be considered protected trains, and routine monitoring will be increased, to help ensure their continued operability during the NSWS outage.

- A significant contributor to risk from turbine building flooding scenarios involves failures during condenser water box maintenance. No major maintenance or testing will be planned on the condenser circulating water system.

The information provided by the licensee indicates the capability of the licensee to recognize and avoid risk-significant plant configurations that could result if equipment, in addition to that associated with the proposed license amendment, is taken out of service simultaneously or if other risk-significant operational factors, such as concurrent system or equipment testing, are also involved. Therefore, the NRC staff finds that the licensee's second tier risk evaluation is acceptable.

5.4.3 Tier 3: Risk-Informed Configuration Risk Management

The third tier assesses the licensee's program to ensure that the risk impact of out of service equipment is appropriately evaluated prior to performing any maintenance activity. The need for this third tier stems from the difficulty of identifying all possible risk-significant configurations under the second tier that could ever be encountered.

The licensee identified administrative controls in effect at CNS that ensure risk-significant configurations are avoided. The existing plant programs for configuration management use a blended approach of quantitative and qualitative evaluation of each configuration. An on-line computerized risk tool considers both internal and external initiating events (exclusive of seismic events). The output of this tool provides a prioritized listing of equipment to return to service, a prioritized list of equipment to remain in service, and potential contingency considerations. Further, prior to the release of work for execution, Operations personnel consider the effects of severe weather and grid instabilities on plant operations using a qualitative evaluation. CNS complies with 10 CFR 50.65 (a)(4), which requires that risk assessments be performed on safety-related systems and other systems important to the safe operation of the plant as part of the maintenance process. The requirements for complying with 10 CFR 50.65 (a)(4) apply to the NSW system and its supported systems. The key safety systems impacted by this LAR are within the scope of the maintenance rule program, and hence, are within the scope of the configuration risk management assessment. The CNS CRMP uses an on-line level one internal and external events risk assessment. Emergent items are evaluated and screened by plant staff to identify any issues that warrant inclusion into the risk management process. The CNS CRMP is controlled by site procedures and directives.

The licensee stated that prior NSWS outages were performed safely with no licensee event reports submitted. In response to an NRC question, the licensee confirmed that these prior outages had been completed without identification of any configuration control issues or unplanned outages of other equipment which would require a plant shutdown. Further, the licensee identifed that no emergent issues occurred which required additional compensatory actions to mitigate risk.

Based on the licensee's description of their program for complying with paragraph (a)(4) of

10 CFR 50.65, the NRC staff finds that the licensee's third tier risk evaluation is acceptable.

5.5 NRC Staff Findings

In summary, the NRC staff finds that the licensee's proposed change to revise the TS to extend the CT for an NSWS loop from 72 hours to 14 days, and to similarly revise the TS of those systems supported by NSWS, is acceptable because the applicable risk-related principles of risk-informed decisionmaking identified in RG 1.174 and RG 1.177 have been satisfied.

5.6 REGULATORY COMMITMENTS

The licensee identified the following commitments to be put into effect upon implementation of the requested license amendment:

1. The proposed changes to the CNS TS will be implemented within 60 days of NRC approval.

2. The contingency items identified in Section 4.3 of Enclosure 1 of the submittal (Reference 3), as supplemented by response to NRC questions (Reference 4), will be implemented during the extended allowed outage times for both the 'A' and 'B' NSWS train outages; specifically:

   - No major maintenance or testing will be planned on the remaining operable NSWS header, or on the operable equipment (ECCS, CSS, CVIWS, AFW, CCW, CRAVS, ABFVES, and the EDGs) that relies upon NSWS as a support system. Routine tests and preventive maintenance work will be scheduled prior to or following each NSWS outage to the maximum extent practicable.

   - No major maintenance or testing will be planned on the SSF. Routine tests and preventive maintenance work for the facility will be scheduled prior to or following each NSWS outage to the maximum extent practicable.

   - No major maintenance or testing will be planned on the portions of the fire protection system and drinking water system that are relied upon to provide backup cooling to the EDGs and the 'A' charging pumps.

   - No major maintenance or testing will be planned on the condenser circulating water system.

   - The remaining operable train of safety systems relying upon the single operable NSWS loop remaining in service will be considered protected trains, and Operations will increase their routine monitoring of these trains to help ensure their continued operability. In addition, this increase in routine monitoring will also include the turbine building to ensure no flooding in this area.

   - No major maintenance or testing will be planned on the operable offsite power sources. Switchyard activities will be coordinated to ensure that the operable offsite

power supply and main transformer on both units are protected to the maximum extent practicable.

- A temporary engineering change will be installed on each train of EDGs on both units to provide cooling water from the fire protection system to the jacket water heat exchangers, and from the drinking water system to the starting air system aftercoolers, to permit the EDGs to be manually started and operated with the NSWS unavailable.

- Training for Operations personnel will be provided to address: this TS change, contingency measures to be implemented during each NSWS outage, and actions to be taken in the event of flooding in the turbine building. Operations will also review procedures for loss of NSWS and loss of CCW system as well as perform extra rounds on the CCW system.

- Permanent flood protection barriers in the turbine building are in place, and operators will review actions to be taken in the event of flooding in the turbine building.

- Plant procedures will be used to cross-tie selected CCW system loads during the time period a CCW heat exchanger will be out of service due to unavailability of NSWS.

- An individual, trained to operate the diesel generator and standby makeup pump as an alternate method of RCP seal injection, will be continuously stationed at the SSF.

- Procedure changes will be in place to control Unit 1 and Unit 2 auxiliary feedwater flow control valves following a loss of 4160 Vac power.

- Procedure changes will be in place to provide CCW system cross-train alignment. Operators would be instructed to align the available CCW pumps in the maintenance train through the CCW heat exchanger corresponding to the train without power, if the operable 4160 AC bus is lost.

3. The licensee will monitor the National Weather Service reports prior to and throughout the NSWS outages to ensure, to the maximum extent practicable, that any potential outbreaks of severe weather are factored into the schedule, and if severe weather should occur, that appropriate personnel are notified and appropriate actions taken. If either sustained high winds (greater than 50 miles per hour for greater than 15 minutes) or ice accumulation (greater than .25 inches) is forecast to occur during the planned NSWS outage periods, then implementation of the planned outage would be delayed until such time that favorable weather conditions are forecast.

5.7 Summary - Risk Assessment

Based on the evaluations discussed in this Safety Evaluation, the NRC staff finds that the licensee's proposed change to revise the TS to extend the CT for an NSWS loop from 72 hours to 14 days, and to similarly revise the TS of those systems supported by NSWS, is acceptable

because the applicable risk-related principles of risk-informed decision making identified in RG 1.174 and RG 1.177 have been satisfied.

6.0 STATE CONSULTATION

In accordance with the Commission's regulations, the South Carolina State official was notified of the proposed issuance of the amendments. The State official had no comments.

7.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and change surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (70 FR 21454). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

8.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

9.0 REFERENCES

1. Letter from Dhiaa Jamil, Duke Energy Corporation, to U.S. Nuclear Regulatory Commission, “Catawba Nuclear Station, Units 1 and 2, Docket Numbers 50-413 and 50-414, Proposed Technical Specification Amendment Technical Specification 3.5.2, Emergency Core Cooling System, 3.6.6, Containment Spray System, 3.6.17, Containment Valve Injection Water System, 3.7.5, Auxiliary Feedwater System, 3.7.7, Component Cooling Water System, 3.7.8, Nuclear Service Water System, 3.7.10, Control Room Area Ventilation System, 3.7.12, Auxiliary Building Filtered Ventilation Exhaust System, & 3.8.1, AC Sources - Operating,” November 16, 2004 (ADAMS Accession number ML043240367).

2. Letter from Dhiaa Jamil, Duke Energy Corporation, to U.S. Nuclear Regulatory Commission, same subject, May 3, 2005 (ADAMS ML0513101990).

3. Letter from Dhiaa Jamil, Duke Energy Corporation, to U.S. Nuclear Regulatory Commission, same subject, July 6, 2005 (ADAMS ML0519203580).

4. Letter from Dhiaa Jamil, Duke Energy Corporation, to U.S. Nuclear Regulatory Commission, same subject, September 13, 2005 (ADAMS ML0525902450).

5. Letter from Dhiaa Jamil, Duke Energy Corporation, to U.S. Nuclear Regulatory Commission, same subject, October 6, 2005. (ADAMS ML052920034)

6. Letter from Dhiaa Jamil, Duke Energy Corporation, to U.S. Nuclear Regulatory Commission, same subject, October 24, 2005.

7. U. S. Nuclear Regulatory Commission to G. R. Peterson, "Catawba Nuclear Station, Units 1 and 2 RE: Issuance of Amendments (TAC Nos. MA9067 and MA9068), October 4, 2000 (ADAMS ML0037581590).

8. U. S. Nuclear Regulatory Commission to G. R. Peterson, "Catawba Nuclear Station, Units 1 and 2 RE: Issuance of Amendments (TAC Nos. MB6311 and MB6312), January 7, 2003 (ADAMS ML030070375).

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