December 24, 2013

MEMORANDUM TO: Robert J Pascarelli, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

FROM: Jacob I. Zimmerman, Chief ***/RA/***
Electrical Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation

SUBJECT: OCONEE NUCLEAR STATION UNITS 1, 2, AND 3 – SAFETY EVALUATION INPUT REGARDING TEMPORARY TECHNICAL SPECIFICATION CHANGE REQUEST TO EXTEND THE COMPLETION TIME FOR AN INOPERABLE KEOWEE HYDRO UNIT (TAC NOS. ME9021, ME9022, ME9023)

By letter dated June 27, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12181A312), as supplemented by letters dated December 14, 2012 (ADAMS Accession No. ML12359A039), May 28, 2013 (ADAMS Accession No. ML13151A023), July 26, 2013 (ADAMS Accession No. ML13214A384), November 26, 2013, (ADAMS Accession No. ML13337A170), December 6, 2013 (ADAMS Accession No. ML13346A020), and December 11, 2013 (ADAMS Accession No. ML13349A002), Duke Energy Corporation (the licensee) submitted an amendment request to change the Oconee Nuclear Station (ONS) Units 1, 2, and 3 Operating License. The proposed changes to the Technical Specifications (TS) would revise TS 3.8.1, "AC Sources – Operating", Required Action C.2.2.5, that would allow a temporary one-time Completion Time extension of 62 days to restore an inoperable Keowee Hydro Unit (KHU) due to generator field pole rewinds, to be used once for each KHU.

The Electrical Engineering Branch (EEEB) has reviewed the proposed license amendment request and the supplemental response to the staff's request for additional information under the subject TAC numbers. Based on its review, EEEB concludes that the proposed TS changes are acceptable as discussed in the enclosed safety evaluation. This memorandum and the enclosed safety evaluation complete our review and evaluation efforts for TAC Nos. ME9021, ME9022, ME9023.

Attachment:
Safety Evaluation

CONTACT: S. Som, NRR/DE/EEEB
(301) 415-8491

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DATE	12/17/2013	12/17/2013	12/24/2013

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
OCONEE NUCLEAR STATION, UNIT NOS. 1, 2 & 3
TEMPORARY TECHNICAL SPECIFICATION CHANGE REQUEST TO EXTEND THE COMPLETION TIME FOR AN INOPERABLE KEOWEE HYDRO UNIT
(TAC NOS. ME9021, ME9022, ME9023)

1.0 INTRODUCTION

By letter dated June 27, 2012 (Agencywide Documents Access and Management System (ADAMS)) Accession No. ML12181A312), as supplemented by letters dated December 14, 2012 (ADAMS Accession No. ML12359A039), May 28, 2013 (ADAMS Accession No. ML13151A023), July 26, 2013 (ADAMS Accession No. ML13214A384), November 26, 2013, (ADAMS Accession No. ML13337A170), December 6, 2013 (ADAMS Accession No. ML13346A020), and December 11, 2013 (ADAMS Accession No. ML13349A002), Duke Energy Corporation (the licensee) submitted an amendment request to change the Oconee Nuclear Station (ONS) Units 1, 2, and 3 Operating License. The proposed changes to the Technical Specifications (TS) would revise TS 3.8.1, "AC Sources – Operating", Required Action (RA) C.2.2.5, that would allow a temporary one-time Completion Time (CT) extension of 62 days with 80 hours of dual Keowee Hydro Unit (KHU) outage to restore an inoperable KHU due to generator field pole rewinds, to be used once for each KHU.

The licensee submittal for CT extension is based on deterministic assessment perspectives only and no detailed probabilistic risk assessment perspectives were provided. This safety evaluation is based on the deterministic perspective only.

2.0 BACKGROUND OF TS CHANGE

In the License Amendment Request (LAR) and in the letter dated November 26, 2013, the licensee stated that the Keowee Hydroelectric Station was commissioned in 1971, with the last major overhaul performed in 2004 for KHU-1 and 2005 for KHU-2. The overhaul included refurbishment of each unit's turbines and replacement of the governor, voltage regulator, and batteries. During an inspection in March 2009, the licensee identified a need for major refurbishment work within the generator, including generator field pole rewinds. The licensee stated in their June 27, 2012 LAR that they planned to perform this work in April 2013 and July 2013, for each KHU. However, in letter dated December 14, 2012, the licensee stated that their planned schedule for work on the KHUs has been delayed and the new schedule is January and July of 2014, and will expire in January 1, 2015.

The current TS 3.8.1 RA C.2.2.5 requires the KHU and its required overhaul emergency power path to be restored to operable status within 45 days of discovery of an initial inoperability, when Condition C is entered due to an inoperable KHU if not used for that KHU in the previous 3 years. The licensee stated that this 45-day time period is not sufficient to allow the KHU generator field pole rewinding to be performed without the three ONS units being in a shutdown condition. In the LAR dated June 27, 2012, as supplemented by letter dated December 14, 2012, the licensee proposed a third completion time for TS 3.8.1 RA C.2.2.5 of 75 days. In letter dated November 26, 2013, the licensee proposed to reduce the original CT extension request to 62 days. The proposed TS changes provided in the licensees' letters dated November 26, 2013, and December 11, 2013, are provided below:

The following new note will be added to TS 3.8.1 RA C.2.2.3:

> ------NOTE------------
> Not applicable to remaining KHU and its required underground emergency power path or LCO 3.3.21 when in Condition H to perform generator field pole rewind work.

New notes will be added to TS 3.8.1 RA 2.2.5 Completion Times.

For the “28 days when Condition due to an inoperable Keowee main step-up transformer” completion time the following three notes will be added.

> ------NOTE------------
> Note 1: Not to exceed 45 days cumulative per rolling 3-year time period for each KHU.
> Note 2: Not applicable during generator field pole rewind work.
> Note 3: Not applicable until 1 year after the KHU is declared OPERABLE following generator field pole rewind work.

For the “45 days from discovery of initial inoperability when Condition due to an inoperable KHU” the following will be added.

> AND
>
> Note 1: No discretionary maintenance or testing allowed on the SSF [Standby Shutdown Facility] , EFW [Emergency Feed Water System], and essential AC [Alternating Current] Power Systems.
>
> Note 2: Only applicable one time for each KHU due to generator field pole rewind work and expires on January 1, 2015.
>
> Note 3: Only applicable if the SSF and EFW are administratively verified OPERABLE prior to entering the extended Completion Time.
>
> 62 Days from initial inoperability when Condition due to an inoperable KHU to perform generator field pole rewind work.

The RA C.2.2.3 will be modified to add the following note to allow entry into the 60-hour dual unit outage to reassemble the refurbished KHU and return it to functional condition prior to declaring the refurbished KHU operable.

> Note under C2.2.3: Not applicable to remaining KHU and its required underground emergency power path or LCO [Limiting Condition for Operation] 3.3.21 when in Condition H to perform generator field pole rewind work.

The above note is added to avoid using up the 45 days Completion Time concurrent with the new 62-day Completion Time and will provide some time to allow the licensee to perform emergent maintenance work should the need arise after a one year waiting period.

Also an administrative change is proposed to TS 3.8.1, C.2.1, and RA Completion Time to delete a note that is no longer applicable

> Delete: An additional 96 hours can be added to the following completion times. This expires on August 27, 2005 @1058 hours.

3.0 REGULATORY REQUIREMENTS

The principal design criteria for ONS Units 1, 2, and 3 were developed in consideration of the General Design Criteria (GDC) for Nuclear Power Plant Construction Permits proposed by the Atomic Energy Commission (AEC) in a proposed rule-making published for Title 10 of the Code of Federal Regulations (CFR) Part 50 in the Federal Register on July 11, 1967. The construction permits for all three ONS units were issued by the AEC on November 6, 1967. The operating licenses were issued on February 6, 1973 for Unit 1, October 6, 1973 for Unit 2, and July 19, 1974 for Unit 3. The plant GDC are listed in the Final safety Analysis Report (FSAR), Chapter 3.1, "Conformance with the U.S. Nuclear Regulatory Commission (NRC) General Design Criteria," with more details given in the applicable updated FSAR (UFSAR) sections. In accordance with the NRC Staff Requirements Memorandum from S.J. Chilk to J. M. Taylor, "SECY-92-223 – Resolution of Deviations Identified during The Systematic Evaluation Program," dated September 18, 1992 (ADAMS Accession No. ML003763736), the Commission approved the staff proposal to apply the 10 CFR Part 50, Appendix A, GDC to plants with construction permits issued prior to May 21, 1971. Therefore, the GDC that constitute the licensing bases for ONS Units 1, 2, and 3, are those specified in the UFSAR. The staff identified the following AEC GDC as being applicable to the proposed amendment.

ONS UFSAR, Chapter 3, AEC GDC 24, "Emergency Power for Protection System," states that in the event of loss of all offsite power, sufficient alternate sources of power shall be provided to permit the required functioning of the protection systems. The facility is supplied with normal and emergency power to provide for the required functioning of the protection system. In the event of a reactor and turbine trip, emergency power is supplied by a set of redundant emergency onsite power source for the ONS.

ONS UFSAR, Chapter 3, AEC GDC 39, "Emergency Power for Engineered Safety Features (ESF)," states that alternate power systems shall be provided and designed with adequate independency, redundancy, capacity, and testability to permit the functioning required of the ESF. As a minimum, the onsite power system and offsite power system shall each, independently provide this capacity assuming a failure of a single active component in each power system.

The NRC staff also used the following regulations and guidance documents to review this LAR.

10 CFR 50.63, "Loss of all alternating current power," requires, in part, that all nuclear power plants have the capability to withstand a loss of all AC power (station blackout) for an established period of time, and to recover there from. ONS Units 1, 2, and 3 are in compliance with 10 CFR 50.63 as per UFSAR Section 8.3.2.2.4, "Station Blackout Analysis."

10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," includes the requirements that preventive maintenance activities must not reduce the overall availability of systems, structures, and components to perform its intended functions.

The licensing basis for the KHUs is provided in the ONS, Unit 1 AEC safety evaluation (SE) dated December 29, 1970. Section 8.0 of the ONS, Units 2 and 3 licensing SE dated July 6, 1973, extends the above Unit 1 SE to ONS, Units 2 and 3. Section 8.4 of that SE states:

> Onsite power is provided by two 87.5-MVA [mega-volt-amperes] hydroelectric generators. This power is available either through the 230 kV [kilo-volt] switchyard and the 45/60 MVA Unit 1 startup transformers or through the 13.8 kV underground feeder which utilizes its own 12/16/20 MVA transformer. The maximum emergency power demand upon initiation of accident conditions would be 4.8 MVA. Each hydro unit has capacity well in excess of this 4.8 MVA requirement, via either circuit, for operation of the engineered safety loads.
>
> Section 8.4 describes additional sources of power for Oconee, including one of three gas turbines located 30 miles away at Lee Steam Station via an independent overhead 100 kV transmission system. With regard to the gas turbine the SE states:
>
> In evaluating these power sources, we have considered the gas turbine as a temporary substitute power source for use primarily during the periods when the hydro units are not available. The applicant has estimated these periods to be approximately 24 hours each year plus 4 days once every 10 years when the common penstock will be drained for inspection and maintenance. During these periods the gas turbine will be run at rated speed, with no load, and will be directly connected through the Oconee 100 kV switchyard over the isolated line, to the standby buses for automatic selection in the event that the 230 kV power is lost.

4.0 TECHNICAL EVALUATION

4.1. Description of the Oconee Offsite Power System

As stated in the UFSAR Chapter 8, an off-site power system (preferred power) and an onsite power system are provided for each ONS unit to supply the unit auxiliaries during normal operation and the Reactor Protection System and Engineered Safeguards (ES) Protection Systems during abnormal and accident conditions. Each ONS unit has six available sources of power to the ES Protection Systems. These include:

- 230 kV transmission system and/or the 525 kV transmission system
- Two Keowee Hydroelectric Units
- 100 kV transmission system supplied electrical power from two combustion turbines at Lee Steam Station
- Two other ONS nuclear units

The ONS design is unique because it has two redundant emergency KHUs to supply emergency AC power for all three units instead of dedicated diesel generators for each unit. As described in the UFSAR, the KHUs are the onsite standby power sources, rated at 13.8 kV, 87.5 MVA each, and are designed to supply the required ES loads of one unit and safe shutdown loads of the other two units. The repair process of the KHUs is also unique. The KHU turbine generators are powered through a common intake (penstock) by water taken from Lake Keowee. To isolate one KHU from the common intake for major maintenance activities, both KHUs must be removed from service. The common penstock must be de-watered to allow the unit designated for

maintenance to be sealed. After sealing the unit designated for maintenance, the common penstock is then re-watered allowing the designated operating unit to be returned to service. Each KHU is individually sealed at its wicket gates (which are internal to the machine) prior to the maintenance. If two KHUs are under maintenance, the de-watering, re-watering, and sealing processes will be repeated, one at a time.

Upon loss of power from the ONS generating units and the 230 kV switchyard, power is supplied to the standby buses from both KHUs through two separate and independent routes. One route is via an underground feeder line through the transformer CT-4. The other route is via the overhead emergency power line through the start-up transformer. The standby buses can also receive power from the two combustion turbine generators at Lee Steam Station via a 100 kV transmission line and transformer CT-5.

UFSAR Section 8.2.2, "Analysis of the Offsite Power System," states that the probability of loss of more than one source of 230 kV or 525 kV power from a credible fault is low. However, in the event of an occurrence causing loss of all 230 kV and 525 kV connections, the ONS is supplied from one or more of six power sources (i.e., three nuclear units, two KHU hydro units or the 100 kV line supplied by either the Lee combustion turbines or the Central Tie Substation. Therefore, with the two KHUs out of service for planned maintenance activities, additional electrical power sources are available to provide power to the SSF and thus maintain hot shutdown conditions for each ONS unit. The SSF is capable of maintaining all three units in a safe shutdown condition, for a period of 72 hours following a fire, turbine building flood, sabotage, or tornado missile events and station blackout.

4.2. Back-up Power Sources for Emergency Power System to maintain Defense-in-depth of Electrical System

As described above, the ONS plant can receive offsite AC power from multiple sources. In addition, either of the two Lee Combustion Turbines (LCTs) can provide sufficient power to the safety-related electrical buses. The LAR credits a LCT as a back-up power source to the inoperable KHU to support the field pole rewind CT.

In letter dated December 14, 2012, in response to staff's question to determine the current status of LCT availability, reliability, and capability, the licensee stated that new LCTs were placed in service in January 2007. The staff noted that since that time, a number of failures have occurred that resulted in a Maintenance Rule Functional Failure (MRFF) of an individual LCT. The staff noted that out of the two LCTs, LCT 7C had two failures and LCT 8C had six failures. The licensee stated that the LCTs are maintained with high reliability and availability using their preventive maintenance program and they have addressed all of the performance issues through their corrective action program.

Since the 100 kV transmission line to ONS is a single line connecting the Lee Steam Station and Central Tie Substation to the plant standby buses through a single transformer (CT-5) for all three ONS units, the staff asked the licensee to explain the operational readiness of this power source to perform its intended design function during the dual KHU unit outage. In its May 28, 2013 response, the licensee stated that since January 2007 when the new LCTs were placed in service, two failures have occurred that resulted in MRFF of the Lee/Central Power (LCP) System path.

In addition, the licensee stated that another failure occurred in April 28, 2012, due to fiber optic cable damage and a circuit switcher failure associated with the LCP System path. The Transmission Control Center (TCC) is used to control the circuit switcher remotely to align a LCT to ONS. Because of the circuit switch failure it could not operate automatically. When remote control is lost, manual control is provided locally at the Circuit Switcher. However, an LCT is required to be aligned on a dedicated path within 1 hour, which could not be facilitated. The licensee stated that they changed the operating procedure to notify the TCC to immediately dispatch a technician if local operation is required. The licensee stated that both LCTs and the power path were available, only the requirement to be aligned within 1 hour was challenged, and therefore they corrected this issue by revising the LCT operating procedure.

The licensee clarified in its letter dated December 14, 2012, that the LCTs have a preventive maintenance program and that these were not common mode failures. In addition, routine preventive maintenance was performed on the gas turbine-generators, the 100 kV transmission line, and transformer CT-5. The licensee stated that the corrective actions addressed all of the LCT performance issues and their operational readiness was verified via inspections and testing.

However, the staff had concerns regarding the LCT availability, operation, and alignment within 1 hour to provide power to the safety-related buses during the dual KHU outage. To further address NRC concerns with the LCT availability during a dual KHU outage, the licensee established additional outage time-line restrictions and risk-reduction measures. In its letter dated November 26, 2013, the licensee stated that it would provide additional back-up power sources to maintain the defense-in-depth philosophy of the ONS electrical power system. The additional measures include the following:

- The licensee-owned Jocassee Hydroelectric Station, can be black started, aligned, and dedicated to ONS via a power path isolated from the grid. In accordance with an approved procedure, the alignment can be completed within approximately one hour. The licensee stated that in the unlikely event that all other power sources (e.g., offsite Grid, KHU overhead line, KHU underground line, transformer CT-5) are unavailable, and ONS is experiencing a Station Blackout, the Emergency Operating Procedure will be entered to take steps to provide the dedicated power path from Jocassee Hydroelectric Station to ONS.

- The licensee will provide a temporary diesel generator at the Keowee Station to enable the recovery of the remaining operable, but de-watered, KHU within 4 hours. The temporary diesel generator will provide a back-up power source to operate Keowee Station electrical auxiliaries, the intake gate hoist to provide water to the remaining operable KHU, and the powerhouse crane.

- Turbine-Driven Emergency Feedwater Pump capable of feeding each ONS unit's steam generator.

- Onsite temporary diesel-driven feedwater pump capable of feeding each ONS unit's steam generator.

- The Protected Service Water (PSW) is installed and capable of aligning the 100 kV line or a KHU to the SSF, should the SSF diesel generator fail to start and run.

Based on the above, the staff determined that there are multiple, diverse means of supplying electrical power to the safety buses to safely shutdown ONS units 1, 2, and 3, and remain in a cold shutdown condition until the offsite power is available or one of the KHUs is restored to operable condition.

4.3. Planned Major Maintenance Activities and Critical Activity Plan

The licensee stated in the LAR that the schedule for each KHU maintenance outage will include dewatering and watering the penstock, removal of all 56 field poles, asbestos abatement, complete generator rewinding, and reassembly. It would also include balance runs and balance shots for data acquisition, collection of data from the thermal curve to validate generator parameters, and post modification testing.

In its letter dated November 26, 2013, the licensee reduced the scheduled duration of a KHU outage from 75 days to 62 days after a re-evaluation of requisite tasks for the planned maintenance. The 13-day reduction in the KHU outage time was achieved by eliminating the need to de-water the KHU to add balance shots and decreasing the contingency time for the physical maintenance outage work. As a result, the planned dual KHU outage time was also reduced from 160 hours to 80 hours during the planned maintenance time.

The licensee stated that they will assess and manage the increase in risk that may result from the proposed maintenance outage activities in accordance with 10 CFR 50.65 (a) (4). The licensee's Risk Management Process requires a Critical Activity Plan (CAP) for the generator field pole rewind outages. The CAP will include multiple risk mitigation strategies as listed below as provided in letter dated November 26, 2013.

- ONS will not start the extended single KHU outage or a dual KHU outage if severe weather conditions are forecast.
- ONS will contact the system load dispatcher once per day to ensure no significant grid perturbations (high grid loading not able to withstand a single contingency of line or generation outage) are expected during extended TS completion time.
- ONS will control the steam-driven emergency feedwater pump on each ONS unit as "protected" equipment during the extended TS completion time, (The licensee stated in the LAR that "protected" means to ensure that no persons inadvertently enter the area of the equipment).
- ONS will continuously staff the SSF during the dual KHU outages.
- LCT and Central Tie Switchyard will be protected.
- Second LCT will be protected and available within one hour
- Prior to the start of each KHU outage, ONS will verify that the Jocassee Hydroelectric Station is available to be aligned to the ONS 230kV Yellow Bus within approximately one hour
- Temporary diesel generator will be located at Keowee Hydro Station with capability to restore the available KHU unit to operable status within 4 hours from the dual KHU outage
- Reduced reactor coolant system inventory will not be permitted during a dual KHU outage
- Temporary diesel-driven pump will be available to feed each unit's steam generators
- PSW equipment installed and capable of aligning the 100 kV line or a KHU to the SSF

In the licensee's letter dated December 14, 2012, it stated that the generator field pole rewind work will be performed in January and July of 2014, to avoid performing the work during the peak tornado months of March, April, May and June.

In addition to the above, the licensee stated in the LAR that the generator field pole rewind work will be controlled by a CAP, which requires Plant Operations Review Committee approval. In response to staff's questions regarding the plans for entering the dual KHU outage and for any immediate need to exit the dual KHU outage, in its letter dated December 14, 2012, the licensee stated the following broad activities for such work:

a. Written plan for accomplishing the activity
b. Completed activity coversheet
c. Contingency plans for problems that have a reasonable chance to occur
d. Clear criteria for aborting the activity (when appropriate)
e. When appropriate, identification of pre-determined critical step stopping points for the purpose of reviewing the work completed and questioning the work getting ready to be performed. The stopping points should be strategically selected to allow recovery prior to plant impact and expected actions to be performed prior to continuing should be specified (e.g., verification of pre-requisites, verification of contingency/compensatory actions, work group re-brief, review of procedure etc.)
f. Activity Manager's assignments include ownership of the plan and responsibility for aborting or initiating the contingency plan. An individual with these responsibilities will be on site during the entire activity
g. Need for just in time training evaluated and documented
h. Specified pre job briefing components and requirements for participation
i. Reviewed by a manager in the Operations organization
j. Plan reviewed and approved by a Group Superintendent (or designee)
k. Plan reviewed and approved by the Plant Operations Review Committee (PORC)

The licensee also stated that CAPs are created and approved by management in the weeks leading up to the outage, on average one to two months before the outage starts.

The licensee also stated that an addition to the 2014 CAP will ensure the Outage Command Center (OCC) at ONS is fully staffed for 24 hour continuous coverage and the CAP Manager, Outage Manager, and Technical Support positions will also provide 24 hour continuous coverage.

In addition, the licensee stated that Conditional Measures will instruct the Operations department to follow the ONS document AP/A/1700/006, "Natural Disaster," which initiates return of the KHUs to service in the event of severe weather. For other issues that may arise during the outage, the OCC in conjunction with the Operations Shift Manager will be used to determine the best course of action at that time.

The staff reviewed the above details and found that the licensee will have a CAP to ensure a 24-hour fully staffed continuous coverage for the generator field pole rewind task. The staff finds that the licensee has identified and planned the necessary actions to ensure that there will not be any discretionary maintenance performed on the protected equipment, including the 230 kV switchyard, main transformer yards, essential switchgear rooms, the EFW, SSF, and AC Power

Systems. These actions are identified by the licensee as regulatory commitments and are described Section 5.0 of this SE.

Although, this is not a risk-informed submittal, the licensee stated in the LAR that to supplement their deterministic evaluation and to gain insights concerning the proposed plant configuration, the licensee performed a risk assessment. The licensee further stated that the findings of the risk assessment confirm that the risk impact with adding an additional CT to restore an inoperable KHU due to generator field pole rewind work is insignificant. The insights from this risk analysis support the deterministic analysis showing that there is reasonable assurance of adequate protection of public health and safety by operation in the proposed manner of this LAR.

To understand the operating procedures established and training provided to the ONS operators for the proposed KHU outage, the staff requested an explanation of actions (manual and automatic) that must be taken to mitigate the consequence of an accident in one ONS unit and bring the other two ONS units to safe shut down conditions when both KHUs are inoperable during the 62-day KHU outage and the only power sources available are those not credited in the ONS accident analysis. In its letter dated December 6, 2013, the licensee stated that the LCT is not credited in UFSAR Chapter 15 accident analysis as an emergency power source. However, the ONS TS 3.8.1 Condition H allows both KHUs to be inoperable for a limited time period (60 hours) for planned reasons provided a LCT is energizing both standby buses via an isolated power path prior to entering the TS Condition. In this configuration, the LCT is serving as the ONS emergency power source. The capability of a LCT to power loss of coolant accident (LOCA) loads on one ONS unit and loss of offsite power (LOOP) loads on the other two ONS units is specifically addressed in UFSAR Chapter 8 (Section 8.2.1.4 and Table 8-1). With the standby buses continuously energized by a LCT, as required by TSs, the automatic actions of the emergency power switching logic (EPSL) as described in TS 3.3.17 Bases, Emergency Power Switching Logic (EPSL) Automatic Transfer Function, will seek out and align power from the charged standby buses to each unit's main feeder buses and associated required loads. Therefore, there are no manual actions required to power these loads on any of the ONS units. Also the licensee stated that operators are trained and the emergency operating procedures are in place to recognize that power may be supplied through transformer CT -4 or CT -5. For a LOCA/LOOP on one ONS unit and LOOP on the other two ONS units from full power operating conditions, there is no change in how the operator would respond with a KHU supplying power via transformer CT-4 or a LCT energizing the standby buses via transformer CT-5 prior to the event. Since the standby buses were energized prior to the event, there are no operator actions required to restore power to the main feeder buses on any of the ONS units.

The staff reviewed the above details and determined that the licensee has established procedure and training to align the LCT by automatic actions of the emergency power switching logic (EPSL) as described in TS 3.3.17.

The NRC staff has conducted numerous discussions with the licensee over a year regarding this LAR. The staff had concerns primarily associated with the simultaneous outage of both KHUs.

The NRC staff was concerned that severe weather events (tornadoes, earthquake, ice storms, hurricanes, and snow) could cause the failure of all overhead power sources, leaving only the SSF and EFW systems available to the three ONS units to mitigate the design basis events and accidents. The licensee added a number of additional compensatory measures in response to these concerns. The compensatory measures that will be contained in the TS and in Regulatory

Commitments provide reasonable assurance that the safety of the ONS will not be unduly affected by the planned KHU maintenance outages for the generator field pole rewinds.

On the basis of its review, the staff finds that the licensee has adequately addressed the staff's concerns and that the LAR is acceptable based on the deterministic evaluation.

5.0 REGULATORY COMMITMENTS

The licensee provided the following Regulatory Commitments, provided in letters dated December 14, 2012, May 28, 2013 and November 26, 2013:

Commitment		Completion Date
From licensee letter dated December 14, 2012:		
1	No discretionary maintenance or testing on the offsite power system (230 kV Switchyard) will be performed	During 62-day CT for TS 3.8.1 RA C.2.2.5
2	Operability of required offsite circuits should be maintained at all times	During 62-day CT for TS 3.8.1 RA C.2.2.5
From Licensee letter dated May 28, 2013:		
1	Duke Energy will take the necessary steps to ensure the PSW tie-in work and the generator pole rewind work will not impact or conflict with each other. Note: This does not preclude performing the work concurrently (As of November 15, 2013, PSW tie-in to Keowee is complete)	During each KHU generator field pole rewind outage: expires on 1/1/2015
2	Duke Energy will use a Critical Activity Plan for the Keowee generator pole replacement outages for risk mitigation purposes. This plan will include similar risk mitigation strategies to those that are currently used in the Critical Activity Plans for scheduled Dual Unit Outages as described in the response to EEEB RAI 7 in the enclosure to this letter [May 28, 2013]. The Critical Activity Plan will include requirements to notify the TCC and System Operating Center to take action to ensure grid reliability and minimize risks	During each KHU generator field pole rewind outage: expires on 1/1/2015
From November 13, 2013 Duke/Energy/NRC Meeting and November 26, 2013 submittal:		
1	ONS will not start the extended single KHU outage or a dual KHU outage if severe weather conditions are forecast	During KHU generator field pole rewind outages
2	ONS will contact the system load dispatcher once per day to ensure no significant grid perturbations (high grid loading not able to withstand a single contingency of line or generation outage) are expected during extended TS completion time.	During KHU generator field pole rewind outages

3	ONS will control the steam-driven emergency feedwater pump on each ONS unit as "protected" equipment during the extended TS completion time	During KHU generator field pole rewind outages
4	ONS will continuously staff the SSF during the dual KHU outages	During KHU generator field pole rewind outages
5	Critical Activity Plan will include the following risk reduction measures: a) LCT and Central Switchyard protected rewind outages b) 2nd LCT protected and available within one hour c) Verify Jocassee Hydro Unit available and can be aligned to the Oconee 230kV Yellow Bus within approximately one hour prior to start of outage d) Temporary DG located at Keowee Hydro Station with capability to restore available KHU unit to operable status within 4 hours from dual KHU outage e) Reduced RCS Inventory not permitted during dual KHU outage f) Temporary diesel-driven pump available to feed each unit's steam generators g) The Protected Service Water (PSW) system is installed and capable of aligning the Fant 100 kV line or a KHU to the SSF should the SSF diesel generator (DG) fail to start and run.	During KHU generator field pole rewind outages
6	Duke Energy will not use the 2nd Completion Time for Required Action C.2.2.5 for planned Keowee work prior to the Keowee generator pole rewind outage for each KHU	Ongoing until KHU generator field pole rewind outages complete

6.0 CONCLUSION

The staff has reviewed the licensee's LAR and supplemental information provided in letters dated December 14, 2012, May 28, 2013, July 26, 2013, November 26, 2013, December 6, 2013, and December 11, 2013. The staff finds that the proposed change to TS LCO 3.8.1, "AC Sources - Operating," Required Action C.2.2.5 that would allow a temporary one-time Completion Time extension of 62 days with 80 hours of dual Keowee Hydro Unit (KHU) to restore an inoperable KHU due to generator field pole rewinds, to be used once for each KHU is acceptable.

The staff's conclusion is based on the following compensatory actions and risk reduction measures that will be implemented for the 62-day KHU outage:

- With two KHU hydro units in allowed outage time on maintenance, in addition to LCT, other back-up power sources (a diesel generator at KHU Station, and a black-start capable Hydro Power Unit at Jocassee Station) are available, and therefore can provide power to safety system buses necessary to maintain all three units in a safe shutdown condition should a loss of all station power occur until power can be restored.
- No discretionary maintenance or testing will be allowed on the Standby Shutdown Facility (SSF), Emergency Feed Water (EFW) System, and essential Alternating Current (AC) power systems.

- No discretionary maintenance or testing on the offsite power system (230 kV system) will be performed
- Operability of required offsite circuits should be maintained at all time.
- Preventative Maintenance and Servicing Checks are in place for regular maintenance of the equipment
- The LCTs are tested as per TS, and the LCT's have a monthly PM (non-TS related) to align each unit to the system grid and load to full power which is well in excess of LOCA/LOOP load requirements.
- The transformer CT-5 connecting the LCT and the plant Safety Buses undergoes minor PM every 18 months and major PM every 3 years.
- The licensee will follow the Critical Activity Plan which are primarily developed for application to planned work activities for such major refurbishment work

On the basis of its review, the staff finds that the licensee has adequately addressed the staff's concerns regarding the vulnerability of the ONS during a dual KHU outage for a major refurbishment work of generator field pole rewind, and that the LAR is acceptable based on the deterministic evaluation.