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10 CFR 50.36

ONS-2014-127

October 2, 2014

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, Maryland 20852

Subject: Duke Energy Carolinas, LLC
Oconee Nuclear Station
Docket Numbers 50-269, 50-270, and 50-287
Technical Specification (TS) Bases Change

Please find attached changes to the Oconee Nuclear Station (ONS) TS Bases. These changes were processed in accordance with the provisions of Technical Specification 5.5.15, "Technical Specifications (TS) Bases Control Program."

TS Bases Change 2014-08 revises TS Bases 3.7.9, Control Room Ventilation System (CRVS) Booster Fans, to allow temporary return air isolation panels and a supply air isolation plate to provide adequate train separation on the Unit 1/2 Control Room air handling Units during maintenance activities.

TS Bases Change 2014-09 revises TS Bases 3.8.1, "AC Sources - Operating," to ensure the intent of Surveillance Requirement (SR) 3.8.1.9 is clear and to allow proper correlation between it and SR 3.8.2.1 which is applicable for the ONS Unit(s) in MODES 5 and 6.

TS Bases Change 2014-11 revises the TS Bases by adding TS Bases 3.7.10 Protected Service Water (PSW) System and TS Bases 3.7.10a Protected Service Water Battery Parameters, which are consistent with the PSW TSs issued by Amendment Nos. 386, 388, and 387.

Any questions regarding this information should be directed to Boyd Shingleton, ONS Regulatory Affairs Group, at (864) 873-4716.

Sincerely,

Scott L. Batson

Scott L. Batson
Vice President
Oconee Nuclear Station

Attachment

A001
NRR

cc: Mr. Victor McCree, Regional Administrator
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Mr. Eddy Crowe
Senior Resident Inspector
Oconee Nuclear Station

Attachment

Oconee Nuclear Station

Revised Technical Specification Bases Pages

DUKE ENERGY®

Oconee Nuclear Station

Duke Energy
7800 Rochester Hwy
Seneca, SC 29672

October 2, 2014

Re: Oconee Nuclear Station
Technical Specification Bases Change

Please replace the corresponding pages in your copy of the Oconee Technical Specifications Bases Manual as follows:

REMOVE THESE PAGES	INSERT THESE PAGES
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If you have any questions concerning the contents of this Technical Specification Bases update, contact Boyd Shingleton (864) 873-4716.

Chris Wasik
Regulatory Affairs Manager

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B 3.7 PLANT SYSTEMS

B 3.7.9 Control Room Ventilation System (CRVS) Booster Fans

BASES

BACKGROUND

The CRVS Booster Fan trains provide a protected environment from which operators can control the unit following an uncontrolled release of radioactivity, chemicals, or toxic gas.

Each CRVS Booster Fan train provides 50% capacity and consists of a fan filter assembly, Booster Fans, Ducting, and Dampers. Each filter train consists of a pre-filter, a high efficiency particulate air (HEPA) filter, and a charcoal filter.

The CRVS Booster Fan trains are an emergency system. Upon receipt of a radiation alarm from the Control Room air radiation monitor, the CRVS Booster Fan trains can be started manually to minimize unfiltered air from entering the control room. Upon starting the fans, dampers are automatically positioned to isolate the control room. The pre-filters remove any large particles in the air, and any entrained water droplets present, to prevent excessive loading of the HEPA and carbon filters.

The two CRVS Booster Fan trains, when operated simultaneously, can pressurize the Control Room to minimize infiltration of unfiltered air. The CRVS operation is discussed in the UFSAR, Section 9.4 (Ref. 1).

APPLICABLE SAFETY ANALYSES

The CRVS Booster Fan train components are arranged in two ventilation trains. The location of components and ducting ensures an adequate supply of filtered air to all areas requiring access. The CRVS provides airborne radiological protection for the control room operators for the most limiting design basis loss of coolant accident fission product release presented in the UFSAR, Chapter 15 (Ref. 2).

The CRVS Booster Fan trains satisfy Criterion 3 of 10 CFR 50.36 (Ref. 3).

LCO

Two CRVS trains are required to be OPERABLE. Total system failure could result in excessive doses to the Control Room operators in the event of a large radioactive release.

BASES

LCO (continued)

The CRVS Booster Fan trains are considered OPERABLE when the individual components necessary to control operator exposure are OPERABLE in both trains. A CRVS Booster Fan train is considered OPERABLE when the associated:

a. Booster Fan is OPERABLE;

b. HEPA filter and carbon absorber are not excessively restricting flow, and are capable of performing their filtration functions; and

c. Ductwork, valves, and dampers are OPERABLE, and control room pressurization can be maintained with both trains operating.

In addition, the Control Room boundary, including the integrity of the walls, floors, ceilings, ductwork, return air temporary isolation panels, supply air temporary isolation plate, and access doors, must be maintained within the assumptions of the design analysis.

Breaches (excluding the removal of system performance test port caps per testing procedures) in the CRVS, most commonly due to the opening of access doors, introduces the possibility of allowing unfiltered or unanalyzed concentrations of inleakage into the Control Room. This applies to breaches of the outside air filter trains, main air handling units and all ductwork outside the Control Room pressure boundary. Breaches are equivalent to two Booster Fan trains out of service.

APPLICABILITY

In MODES 1, 2, 3, and 4, the CRVS Booster Fan trains must be OPERABLE to reduce radiation dose to personnel in the Control Room during and following an accident.

During movement of recently irradiated fuel assemblies, the CRVS Booster Fan trains must be OPERABLE to cope with a release due to a fuel handling accident involving handling recently irradiated fuel. Due to radioactive decay, CRVS is only required to mitigate fuel handling accidents involving handling recently irradiated fuel (i.e., fuel that has occupied part of a critical reactor core within the previous 72 hours).

ACTIONS

A.1

With the two CRVS Booster Fan trains incapable of pressurizing the control room, the capability to pressurize the control room must be restored within 30 days. In this Condition, the capability to minimize the radiation dose to personnel located in the Control Room during and after

BASES

ACTIONS

A.1 (continued)

an accident is not assured. One or both CRVS Booster Fan trains may be OPERABLE in this Condition. If one or both CRVS Booster Fans are simultaneously inoperable, the Completion Time for these separate Conditions is more limiting than the 30 day Completion Time for Action A.1. If OPERABLE the CRVS Booster Fan train(s) can provide some dose reduction. The 30 day Completion Time is based on the low probability of an accident occurring during the time period and the potential for OPERABLE CRVS Booster Fan trains to provide some dose reduction.

B.1

With one CRVS Booster Fan train inoperable for reasons other than Condition A, action must be taken to restore the train to OPERABLE status within 72 hours. In this Condition, the remaining OPERABLE CRVS Booster Fan train provides some dose reduction for personnel in the Control Room. The 72 hour Completion Time is based on the low probability of an accident occurring during this time period, and ability of the remaining train to provide some dose reduction.

C.1

With the two CRVS Booster Fan trains inoperable for reasons other than Condition A, one train must be restored to OPERABLE status within 24 hours. In this Condition, the capability to minimize the radiation dose to personnel located in the Control Room during and after an accident is unavailable. The 24 hour Completion Time is based on the low probability of an accident occurring during this time period.

D.1

If the inoperable CRVS Booster Fan trains cannot be restored to OPERABLE status within the required Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours, and in MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

BASES

ACTIONS (continued)

E.1

During movement of recently irradiated fuel assemblies, when one or more CRVS trains are inoperable, action must be taken immediately to suspend activities that could release radioactivity that might require isolation of the control room. This places the unit in a condition that minimizes the accident risk. This does not preclude the movement of fuel to a safe position.

SURVEILLANCE REQUIREMENTS

SR 3.7.9.1

Standby systems should be checked periodically to ensure that they function properly. As the environment and normal operating conditions on this system are not severe, testing each train adequately checks this system. The trains need only be operated for ≥ one hour and all dampers verified to be OPERABLE to demonstrate the function of the system. This test includes an external visual inspection of the CRVS Booster Fan trains. The Surveillance Frequency is based on operating experience, *equipment reliability, and plant risk and is controlled under the* Surveillance Frequency Control Program.

SR 3.7.9.2

This SR verifies that the required CRVS Booster Fan train testing is performed in accordance with the Ventilation Filter Testing Program (VFTP). The CRVS Booster Fan train filter test frequencies are in accordance with Regulatory Guide 1.52 (Ref. 4). The VFTP includes testing HEPA filter performance and carbon adsorber efficiency. Specific test frequencies and additional information are discussed in detail in the VFTP.

SR 3.7.9.3

This SR verifies the integrity of the Control Room enclosure. The Control Room positive pressure, with respect to potentially contaminated adjacent areas, is periodically tested to verify that the CRVS Booster Fan trains are functioning properly. During the emergency mode of operation, the CRVS Booster Fan trains are designed to pressurize the Control Room to minimize unfiltered inleakage. The CRVS Booster Fan trains are designed to maintain this positive pressure with both trains in operation.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.9.3 (continued)

The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. UFSAR, Section 9.4.
2. UFSAR, Chapter 15.
3. 10 CFR 50.36.
4. Regulatory Guide 1.52, Rev. 2, March 1978.

B 3.7 PLANT SYSTEMS

B 3.7.10 Protected Service Water (PSW) System

BASES

BACKGROUND

The Protected Service Water (PSW) system is designed as a standby system for use under emergency conditions. The PSW system provides added "defense in-depth" protection by serving as a backup to existing safety systems and as such, the system is not required to comply with single failure criteria. The PSW system is provided as an alternate means to achieve and maintain safe shutdown conditions for one, two or three units following postulated scenarios that damage essential systems and components normally used for safe shutdown.

The PSW pumping system utilizes the inventory of lake water contained in the Unit 2 Condenser Circulating Water (CCW) piping. The PSW primary and booster pumps are located in the Auxiliary Building (AB) at elevation 771' and take suction from the Unit 2 CCW piping and discharge into the steam generators of each unit via the Emergency Feedwater (EFW) system headers. The raw water is vaporized in the steam generators (SGs), removing residual heat, and is dumped to atmosphere via the Main Steam Relief Valves (MSRVs) or Atmospheric Dump Valves (ADVs). For extended operation, the PSW portable pump with a flow path capable of taking suction from the intake canal and discharging into the Unit 2 CCW piping is designed to provide a backup supply of water to the PSW system in the event of loss of CCW and subsequent loss of CCW siphon flow. The PSW portable pump is stored onsite.

The PSW system is designed to support cool down of the Reactor Coolant System (RCS) and maintain safe shutdown conditions. The PSW system is designed to maintain SG water levels to promote natural circulation Decay Heat Removal (DHR) using the SGs for an extended period of time during which time other plant systems required to cool the RCS to MODE 5 conditions will be restored and brought into service. In addition, the PSW system, in combination with the High Pressure Injection (HPI) system, provides borated water for Reactor Coolant Pump (RCP) seal cooling, RCS makeup, and reactivity management.

The PSW system reduces fire risk by providing a diverse power supply to power safe shutdown equipment in accordance with the National Fire Protection Association (NFPA) 805 safe shutdown analyses (Ref. 4).

BASES

BACKGROUND (continued)

The PSW system consists of the following:

1. PSW building and associated support systems.
2. Conduit duct bank from the Keowee Hydroelectric Station underground cable trench to the PSW building.
3. Conduit duct bank and raceway from the PSW Building to the Unit 3 AB.
4. Electrical power distribution system from breakers at the Keowee Hydroelectric Station and from the 100 kV PSW substation (supplied from the Central Tie Switchyard) to the PSW building, and from there to the AB.
5. PSW booster pump, PSW primary pump, and mechanical piping taking suction from the Unit 2 embedded CCW System to the EFW headers supplying cooling water to the respective unit's SGs and HPI pump motor bearing coolers.
6. PSW portable pumping system.

The mechanical portion of the PSW system provides decay heat removal by feeding Lake Keowee water to the secondary side of the SGs. In addition, the PSW pumping system supplies Keowee Lake water to the HPI pump motor coolers.

The PSW pumping system consists of a booster pump, a primary pump, and a portable pump. Other than the portable pump, the pumps and required valves are periodically tested in accordance with the In-Service Testing (IST) Program.

The PSW piping system has pump minimum flow lines that discharge back into the Unit 2 CCW embedded piping.

The PSW primary and booster pumps, motor operated valves, and solenoid valves required to bring the system into service, are controlled from the main control rooms. Check valves and manual handwheel operated valves are used to prevent back-flow, accommodate testing, or are used for system isolation.

The PSW electrical system is designed to provide power to PSW mechanical and electrical components as well as other system components needed to establish and maintain a safe shutdown condition. Normal power is provided by a transformer connected to a 100 kV overhead transmission line that receives power from the Central Tie Switchyard located approximately eight (8) miles from the plant. Standby

BASES

BACKGROUND (continued)

power is provided from the Keowee Hydroelectric Station via an underground path. These external power sources provide power to transformers, switchgear, breakers, load centers, batteries, and battery chargers located in the PSW electrical equipment structure. There are two (2) batteries inside the PSW Building. Either battery is sized to supply PSW DC loads. The battery banks are located in different rooms separated by fire rated walls. A separate room within the PSW building is provided for major PSW electrical equipment.

PSW building heating, ventilation, and air conditioning (HVAC) is designed to maintain transformer and battery rooms within their design temperature range. The HVAC System consists of two (2) systems; a non QA-1/non credited system designed to maintain the PSW Transformer and Battery Rooms environmental profile and a QA-1/credited system designed to actuate whenever the non QA-1 system is not able to meet its design function.

The hydrogen removal fans are designed to maintain the hydrogen in the Battery rooms below 2% in accordance with IEEE-484 (Ref. 5). The multiple thermostats in each Battery Room ensure temperatures are maintained within acceptable limits.

APPLICABLE SAFETY ANALYSES

The function of the PSW system is to provide a diverse means to achieve and maintain safe shutdown by providing secondary side DHR, RCP seal cooling, RCS primary inventory control, and RCS boration for reactivity management following scenarios that disable the 4160 V essential electrical power distribution system.

To verify PSW system performance criteria, thermal-hydraulic (T/H) analysis was performed to demonstrate that the PSW system could achieve and maintain safe shutdown following postulated fires that disable the 4160 V essential power distribution system, without reliance on equipment located in the turbine building. The analysis evaluates RCS subcooling margin using inputs that are representative of plant conditions as defined by Oconee's NFPA 805 fire protection program. The analysis uses an initial core thermal power of 2619 MWth (102% of 2568 MWth) and accounts for 24 month fuel cycles. The consequences of the postulated loss of main and emergency feedwater and 4160 VAC power were analyzed as a RCS overheating scenario. For the examined overheating scenario, an important core input is decay heat. High decay heat conditions were modeled that were reflective of maximum, end of cycle conditions. The high decay heat assumption was confirmed to be bounding with respect to the RCS subcooling response. The results of the analysis demonstrate that the PSW system is capable of meeting the relevant NFPA 805 nuclear safety performance criteria.

BASES

APPLICABLE SAFETY ANALYSES (continued)

During periods of very low decay heat the PSW system will be used to establish conditions that support the formation of subcooled natural circulation between the core and the SGs; however, natural circulation may not occur if the amount of decay heat available is less than or equal to the amount of heat removed by ambient losses to containment and/or by other means, e.g., letdown of required minimum HPI flow through the Reactor Coolant (RC) vent valves. When these heat removal mechanisms are sufficient to remove core decay heat, they are considered adequate to meet the core cooling function and systems supporting SG decay heat removal, although available, are not necessary for core cooling.

Regarding operation in MODES 1 and 2 other than operation at nominal full power, the duration of operation in these conditions is insufficient to result in an appreciable contribution to overall plant risk. As a result, T/H analysis was performed assuming full power initial conditions, as described above and in the Oconee Fire Protection Program, Nuclear Safety Capability Assessment. The plant configuration examined in the T/H analysis is representative of risk significant operating conditions and provides reasonable assurance that a fire mitigated by PSW during these MODES will not prevent the plant from achieving and maintaining fuel in a safe and stable condition.

The PSW system is not an Engineered Safety Feature Actuation System (ESFAS) and is not credited to mitigate design basis events as contained in UFSAR Chapters 6 and 15. No credit is taken in the safety analyses for PSW system operation following design basis events. Based on its contribution to the reduction of overall plant risk, the PSW system satisfies Criterion 4 of 10 CFR 50.36 (c)(2)(ii) (Ref. 3) and is therefore included in the Technical Specifications.

LCO

The OPERABILITY of the PSW system provides a diverse means to achieve and maintain safe shutdown by providing secondary side DHR, reactor coolant pump seal cooling, primary system inventory control, and RCS boration for reactivity management during certain plant scenarios that disable the 4160 V essential electrical power distribution system.

For OPERABILITY, the following are required:

- One (1) primary pump, one (1) booster pump, and one (1) portable pump.
- A flowpath taking suction from the Unit 2 CCW piping through the PSW pumping system (including recirculation flowpath) and discharging into the secondary side of each SG and the required HPI pump motor bearing cooler.

BASES

LCO
(continued)

- TS 3.8.3 required number of 125 VDC Vital I&C Battery Chargers. Note: The Standby battery chargers cannot be credited for PSW OPERABILITY because they are not supplied with PSW power.
- One (1) of two (2) PSW batteries and the associated battery charger.
- PSW building ventilation system (QA-1) consisting of ductwork, fans, heaters, fire `dampers, tornado dampers, motor-operated dampers and associated controls of the Transformer room AND in-service battery room.
- A PSW electrical system power path from the Keowee Hydroelectric Station.

For OPERABILITY, PSW supplied power is required for the following:

- Either the "A" or "B" HPI pump motor.
- PSW portable pump (unless self-powered).
- HPI valve needed to align the HPI pumps to the Borated Water Storage Tanks (HP-24).
- HPI valves that support RCP seal injection and RCS makeup (HP-26, HP-139, and HP-140).
- Pressurizer Heaters (150 kW above pressurizer ambient heat loss).
- Reactor Vessel Head Vent Valves (RC-159 and RC-160)
- One (1) RCS Loop High Point Vent Pathway (RC-155 and RC-156 or RC-157 and RC-158)
- Required 125 VDC Vital I&C Normal Battery Chargers.

For OPERABILITY, the following instrumentation and controls located in each main control room are required:

- Two (2) high flow controllers (PSW-22 and PSW-24).
- Two (2) low flow controllers (PSW-23 and PSW-25).
- Two (2) flow indicators (one per SG).
- One (1) SG header isolation valve (PSW-6).
- One (1) HPI seal injection flow indicator
- One (1) “A” HPI train flow indication (from ICCM plasma)

The LCO is modified by a Note indicating that it is not applicable to Unit(s) until startup from a refueling outage after completion of PSW modifications and after all of the PSW system equipment installed has been tested. Certain SRs require the unit to be shutdown to perform the SR.

BASES (continued)

APPLICABILITY

In MODES 1 and 2, the PSW system provides a diverse means to achieve and maintain safe shutdown by providing secondary side DHR, reactor coolant pump seal cooling, primary system inventory control, and RCS boration for reactivity management during certain plant scenarios that disable the 4160 V essential electrical power distribution system.

As a result of the system's contribution to overall plant risk in mitigating transients initiated during these operating conditions, PSW is required to be OPERABLE in MODES 1 and 2. In MODES 3 and 4, the PSW system can provide a diverse means for secondary side DHR (while the steam generators remain available), reactor coolant pump seal cooling, primary system inventory control, and RCS boration for reactivity management. Because of the relatively short periods of operation in these MODES, the contribution to the reduction of overall plant risk in mitigating transients initiated during these operating conditions is not sufficient to warrant inclusion of OPERABILITY requirements for MODES 3 and 4 in the Technical Specifications.

In MODES 5 and 6, the steam generators are not available for secondary side DHR. As such, the PSW feed to the SGs is not required. Protected Service Water system backup power to some of the HPI components may be relied upon for shutdown risk defense-in-depth associated with primary system makeup. There are multiple means to achieve primary system makeup during these conditions. As a result, the contribution to the reduction of overall plant risk during these operating conditions is not sufficient to warrant inclusion of OPERABILITY requirements for MODES 5 and 6 in the Technical Specifications.

ACTIONS

The exception for LCO 3.0.4 provided in the NOTE of the Actions, permits entry into MODES 1 or 2 with the PSW system not OPERABLE. This is acceptable because the PSW is not required to support normal operation of the facility or to mitigate a design basis event.

A.1

With the PSW system inoperable, action must be taken to restore the system to OPERABLE status within 14 days. The 14-day Completion Time (CT) is reasonable based on the Standby Shutdown Facility (SSF) Auxiliary Service Water (ASW) and reactor coolant makeup (RCMU) systems being OPERABLE and a low probability of scenarios occurring that would require the PSW system during the 14 day period.

B.1

With both the PSW and SSF systems inoperable, action must be taken to restore the PSW system to OPERABLE status within 7 days. The 7 day

BASES

ACTIONS

B.1 (continued)

CT is based on the diverse heat removal capabilities afforded by other systems, reasonable times for repairs, and the low probability of scenarios occurring that would require the PSW system during this period.

C.1

If the Required Action and associated CT of Condition A or B is not met, action must be taken to restore the PSW system to OPERABLE status within 30 days. Operation for up to 30 days is permitted if risk-reducing contingency measures are taken. The 30 days is from the time of discovery of initial inoperability.

The condition is modified by a note indicating that contingency measures are required to be in place prior to entry. The contingency measures provide additional assurance that key equipment is available. For example, the Keowee Hydroelectric Units (KHUs), Emergency Feedwater (EFW) pumps, High Pressure Injection (HPI) pumps, Elevated Water Storage Tank (EWST), and 230 kV switchyard, are key equipment which impact overall risk during the extended outage period. Unavailability of the specific equipment does not preclude entry into the condition nor does it require any action by this TS. Rather the appropriate actions for the specific equipment are specified in the applicable TS or Selected Licensee Commitments (SLC). For example, if the 1A HPI pump becomes inoperable before entry or becomes inoperable after entry, only TS LCO 3.5.2 (HPI), Condition A shall be entered for Unit 1 and the appropriate actions taken until the pump is restored. This does not preclude entry into LCO 3.7.10 Condition C.

The strategy for the contingency measures is to defer non-essential surveillances or other maintenance activities where human error could increase the likelihood of a loss of offsite power (LOOP) or remove key equipment that is important to overall plant risk. This does not preclude surveillances required by technical specifications or corrective maintenance to equipment that is important to overall plant risk. Technical specification required surveillances and corrective maintenance are examples of essential activities.

The following contingency measures are applied to available key equipment to reduce plant risk:

- No non-essential surveillances or other maintenance activities, or testing, will be conducted in the 230 kV switchyard.
- No non-essential surveillances or other maintenance activities, or testing will be conducted on the Keowee Hydro Units' emergency power system and associated power paths.

BASES

ACTIONS

C.1 (continued)

- No non-essential surveillances or other maintenance activities, or testing, will be conducted on each unit's EFW motor-driven and turbine-driven pumps and associated equipment including the EFW cross connects.
- No non-essential surveillances or other maintenance activities, or testing, will be conducted on the unit's HPI pumps and associated equipment.
- No non-essential surveillances or other maintenance activities, or testing, will be conducted on the EWST.

D.1

If the Required Action and associated CTs of Condition A, B, or C are not met, the unit(s) must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to MODE 3 within 12 hours. The allowed CT is appropriate to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems, considering a three unit shutdown may be required.

SURVEILLANCE REQUIREMENTS

SR 3.7.10.1

Verifying battery terminal voltage while on float charge for the batteries helps to ensure the effectiveness of the charging system and the ability of the batteries to perform their intended function. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery (or battery cell) and maintain the battery (or a battery cell) in a fully charged state. The voltage requirements are based on the nominal design voltage of the battery and are consistent with the initial voltage assumed in the battery sizing calculations. The surveillance frequency is in accordance with the Surveillance Frequency Control Program.

SR 3.7.10.2

SR verifies availability of the Keowee Hydroelectric Station power path to the PSW electrical system. Power path verification is included to demonstrate breaker OPERABILITY from the Keowee Hydroelectric Station to the PSW electrical system. To verify KHU-1 can supply the PSW electrical system, Breaker KPF-9 is closed. To verify KHU-2 can supply the PSW electrical system, Breaker KPF-10 is closed. Breakers KPF-9 and KPF-10 are electrically interlocked such that breakers cannot be closed simultaneously.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.10.2 (continued)

Electrical interlocks prevent compromise of existing redundant emergency power paths. To verify either KHU can supply the PSW electrical system, the PSW Feeder Breaker [B6T-A] or [B7T-C and the PSW switchgear tie breaker] is closed. The Surveillance Frequency is in accordance with the Surveillance Frequency Control Program.

SR 3.7.10.3

This SR requires the PSW primary and booster pumps be tested in accordance with the Inservice Test (IST) Program. The IST program verifies the developed head of PSW primary and booster pumps at flow test point is greater than or equal to the required developed head. The specified Frequency is in accordance with IST Program requirements.

SR 3.7.10.4

A battery service test is a special test of the battery capability, as found, to satisfy the design requirements (battery duty cycle) of the DC electrical power system. The discharge rate and test length correspond to the design duty cycle requirements.

The surveillance frequency is in accordance with the Surveillance Frequency Control Program.

SR 3.7.10.5

This SR verifies the design capacity of the battery charger. According to Regulatory Guide 1.32 (Ref. 2), the battery charger supply is recommended to be based on the largest combined demands of the various steady state loads and the charging capacity to restore the battery from the design minimum charge state to the fully charged state, irrespective of the status of the unit during these demand occurrences. The minimum required amperes and duration ensure that these requirements can be satisfied.

This SR provides two options. One option requires that each battery charger be capable of supplying ≥300 amps for greater than 8 hours at the minimum established float voltage. The current requirements are based on the output rating of the charger. The voltage requirements are based on the charger voltage level after a response to a loss of AC power. The time period is sufficient for the charger temperature to stabilize and to have been maintained for at least 2 hours.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.10.5 (continued)

The other option requires that the battery charger be capable of recharging the battery after a service test coincident with supplying the largest coincident demands of the various continuous steady state loads (irrespective of the status of the plant during which these demands occur). This level of loading may not normally be available following the battery service test and will need to be supplemented with additional loads. The duration for this test may be longer than the charger sizing criteria since the battery recharge is affected by float voltage, temperature, and the exponential decay in charging current.

The battery is recharged when the measured charging current is $\leq$ 2 amps. The surveillance frequency is in accordance with the Surveillance Frequency Control Program.

SR 3.7.10.6

This SR verifies that the PSW switchgear can be aligned and power both the "A" and "B" HPI pump motors (not simultaneously). Although both pump motors are tested, only one (1) is required to support PSW system OPERABILITY. The surveillance frequency is in accordance with the Surveillance Frequency Control Program. Refer to the SR 3.7.10.7 table below for testing of the HPI power and transfer switches.

SR 3.7.10.7

This SR verifies that power transfer switches (shown in table below) for pressurizer heaters, PSW control, electrical panels, and valves, are functional for the required equipment.

Component
1HPI-SX-ALGN001 (PSW HPI alignment switch)
2HPI-SX-ALGN001 (PSW HPI alignment switch)
3HPI-SX-ALGN001 (PSW HPI alignment switch)
1HPI-SX-TRN001 (1A HPI pump transfer switch)
1HPI-SX-TRN002 (1B HPI pump transfer switch)
2HPI-SX-TRN001 (2A HPI pump transfer switch)
2HPI-SX-TRN002 (2B HPI pump transfer switch)
3HPI-SX-TRN001 (3A HPI pump transfer switch)
3HPI-SX-TRN002 (3B HPI pump transfer switch)
1HPI-SX-TRN003 (1HP-24 PSW transfer switch)
1HPI-SX-TRN004 (1HP-26 PSW transfer switch)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.10.7 (continued)

Component
2HPI-SX-TRN003 (2HP-24 PSW transfer switch)
2HPI-SX-TRN004 (2HP-26 PSW transfer switch)
3HPI-SX-TRN003 (3HP-24 PSW transfer switch)
3HPI-SX-TRN004 (3HP-26 PSW transfer switch)
1PSW-SX-TRN001 (1CA CHARGER auto transfer switch)
1PSW-SX-TRN002 (1CB CHARGER auto transfer switch)
2PSW-SX-TRN001 (2CA CHARGER auto transfer switch)
2PSW-SX-TRN002 (2CB CHARGER auto transfer switch)
3PSW-SX-TRN001 (3CA CHARGER auto transfer switch)
3PSW-SX-TRN002 (3CB CHARGER auto transfer switch)
1PSW-SX-TRN004 (manual transfer switch for 1XJ)
1PSW-SX-TRN005 (manual transfer switch for 1XK)
2PSW-SX-TRN003 (manual transfer switch for 2XJ)
2PSW-SX-TRN004 (manual transfer switch for 2XI)
2PSW-SX-TRN005 (manual transfer switch for 2XK)
3PSW-SX-TRN003 (manual transfer switch for 3XJ)
3PSW-SX-TRN004 (manual transfer switch for 3XI)
3PSW-SX-TRN005 (manual transfer switch for 3XK)
1RC-155/1RC-156 power transfer
1RC-157/1RC-158 power transfer
1RC-159/1RC-160 power transfer
2RC-155/2RC-156 power transfer
2RC-157/2RC-158 power transfer
2RC-159/2RC-160 power transfer
3RC-155/3RC-156 power transfer
3RC-157/3RC-158 power transfer
3RC-159/3RC-160 power transfer

The surveillance frequency is in accordance with the Surveillance Frequency Control Program.

SR 3.7.10.8

SR verifies PSW booster pump and check valves can supply water to the "A" and "B" HPI pump motor coolers in accordance with the IST program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.10.9

This SR requires that the PSW portable pump be tested to verify that the developed head of PSW portable pump at the flow test point is greater than or equal to the required developed head. The surveillance frequency is in accordance with the Surveillance Frequency Control Program.

SR 3.7.10.10

This SR requires the required PSW valves be tested in accordance with the IST Program. The specified Frequency is in accordance with IST Program requirements.

SR 3.7.10.11

Performance of the CHANNEL CHECK for each required instrumentation channel ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel with a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. A CHANNEL CHECK will detect gross channel failure; therefore, it is key in verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION. The instrument string to the control room is checked and calibrated periodically per the Surveillance Frequency Control Program.

Agreement criteria are determined based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the criteria, it may be an indication that the sensor or the signal processing equipment has drifted outside its limit. If the channels are within the criteria, it is an indication that the channels are OPERABLE. If the channels are normally off scale during times when surveillance is required, the CHANNEL CHECK will only verify that they are off scale in the same direction. Off scale low current loop channels are verified to be reading at the bottom of the range and not failed downscale.

The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled in accordance with the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.10.12

CHANNEL CALIBRATION is a complete check of the instrument channel, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift to ensure that the instrument channel remains operational between successive tests. CHANNEL CALIBRATION shall find that measurement errors and bistable setpoint errors are within the assumptions of the setpoint analysis. CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the setpoint analysis. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled in accordance with the Surveillance Frequency Control Program.

SR 3.7.10.13

Visual inspection of the battery cells, cell plates, and battery racks provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance.

The presence of physical damage or deterioration does not necessarily represent a failure of this SR, provided an evaluation determines that the physical damage or deterioration does not affect the OPERABILITY of the battery (its ability to perform its design function).

The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled in accordance with the Surveillance Frequency Control Program.

REFERENCES

1. IEEE-450-1995.
2. Regulatory Guide 1.32, February 1977.
3. 10 CFR 50.36 (last amended September 24, 2008).
4. NFPA 805 Safety Evaluation Report, dated December 29, 2010.
5. IEEE-484-2002.

B 3.7 PLANT SYSTEMS

B 3.7.10a PSW Battery Cell Parameters

BASES

BACKGROUND

This LCO delineates the limits on battery float current as well as electrolyte temperature, level, and float voltage for the Protected Service Water (PSW) Power system batteries. In addition to the limitations of this Specification, the PSW Battery Monitoring and Maintenance Program specified in Specification 5.5.22 for monitoring various battery parameters is based on the recommendations of IEEE-450 (Ref. 1).

Each PSW battery consists of 60 cells (nominal) and either battery can meet the PSW DC System design basis duty cycle with up to two (2) cells jumpered out. A minimum of 58 of 60 cells are required for a battery to be considered OPERABLE.

The battery cells are of flooded lead acid construction with a nominal specific gravity of 1.215. This specific gravity corresponds to an open circuit battery voltage of approximately 124 V for 60 cell battery, i.e., cell voltage of 2.07 Volts per cell (Vpc). The open circuit voltage is the voltage maintained when there is no charging or discharging. Once fully charged with its open circuit voltage < 2.07 Vpc, the battery cell will maintain its capacity for 30 days without further charging per manufacturer's instructions. Optimal long term performance however, is obtained by maintaining a float voltage 2.20 to 2.25 Vpc. This provides adequate over-potential which limits the formation of lead sulfate and self discharge. The nominal float voltage of 2.22 Vpc corresponds to a total float voltage output of 133.2 V for a 60 cell battery.

The PSW DC system consists of two (2) batteries, two (2) battery chargers, a distribution center and panelboards. Either battery can be aligned to either battery charger. For PSW DC System OPERABILITY, only one (1) battery and one (1) battery charger is required to be aligned to the PSW DC Bus.

APPLICABLE SAFETY ANALYSES

The PSW system is not credited to mitigate design basis events. No credit is taken in the safety analyses for PSW system operation following design basis events. Based on its contribution to the reduction of overall plant risk, the PSW system satisfies Criterion 4 of 10 CFR 50.36 (c)(2)(ii) (Ref. 3) and is therefore included in the Technical Specifications. Refer to the Applicable Safety Analysis discussion in the Bases for LCO 3.7.10.

BASES (continued)

LCO

For PSW DC System OPERABILITY, only one (1) battery and one (1) battery charger is required to be aligned to the PSW DC Bus. A minimum of 58 of 60 cells are required for a battery to be considered OPERABLE.

PSW Battery parameters must remain within acceptable limits to ensure availability of the PSW DC power system after an occurrence that disables essential systems and components needed for safe shutdown. Battery parameter limits are conservatively established, allowing continued PSW DC electrical system function even with limits not met. Additional preventative maintenance, testing, and monitoring for the PSW batteries are performed in accordance with the PSW Battery Monitoring and Maintenance Program specified in Specification 5.5.22.

APPLICABILITY

The battery parameters are required solely for the support of the associated PSW electrical power systems; therefore, battery parameter limits are only required when the PSW DC power source is required to be OPERABLE. Refer to the Applicability discussion in the Bases for LCO 3.7.10.

ACTIONS

The exception for LCO 3.0.4 provided in the NOTE of the Actions, permits entry into MODES 1 or 2 with the PSW system not OPERABLE. This is acceptable because the PSW is not required to support normal operation of the facility or to mitigate a design basis event.

A.1, A.2, and A.3

With one or more cells in the required battery ≤ 2.07 V, the battery cell is degraded. Within 2 hours verification of the required battery charger OPERABILITY is made by monitoring the battery terminal voltage (SR 3.7.10.1) and the overall battery state of charge by monitoring the battery float charge current (SR 3.7.10a.1). This assures that there is still sufficient battery capacity to perform the intended function. Therefore, the affected battery is not required to be considered inoperable solely as a result of one or more cells in a battery ≤ 2.07 V, and continued operation is permitted for a limited period up to 24 hours.

Since the Required Actions only specify "perform," a failure of SR 3.7.10.1 or SR 3.7.10a.1 acceptance criteria does not result in this Required Action not met. However, if one of the SRs is failed, the

BASES

ACTIONS

A.1, A.2 and A.3 (continued)

appropriate Condition(s), depending on the cause of the failures, is entered. If SR 3.7.10a.1 is failed then there is no assurance that there is still sufficient battery capacity to perform the intended function and the battery must be declared inoperable immediately.

B.1 and B.2

A required battery with float current >2 amps indicates that a partial discharge of the battery capacity has occurred. This may be due to a temporary loss of a battery charger or possibly due to one or more battery cells in a low voltage condition reflecting some loss of capacity. Within 2 hours verification of the required battery charger OPERABILITY is made by monitoring the battery terminal voltage (SR 3.7.10.1). If the terminal voltage is found to be less than the minimum established float voltage, there are two possibilities: (1) the battery charger is inoperable or (2) it is operating in the current limit mode. Condition A addresses charger inoperability. After 2 hours, if the charger is operating in the current limit mode, it is an indication that the battery has been substantially discharged and likely cannot perform its required design functions. The time to return the battery to its fully charged condition in this case is a function of the battery charger capacity, the amount of loads on the associated DC system, the amount of the previous discharge, and the recharge characteristic of the battery. The charge time can be extensive, and there is not adequate assurance that it can be recharged within 12 hours (Required Action B.2). The battery must therefore be declared inoperable.

If the float voltage is found to be satisfactory but there are one or more battery cells with float voltage less than 2.07 V, the associated "OR" statement in Condition E is applicable and the battery must be declared inoperable immediately. If float voltage is satisfactory and there are no cells less than 2.07 V, there is reasonable assurance that, within 12 hours, the battery will be restored to its fully charged condition (Required Action B.2) from any discharge that might have occurred due to a temporary loss of the battery charger.

A discharged battery with float voltage (the charger setpoint) across its terminals indicates that the battery is on the exponential charging current portion (the second part) of its recharge cycle. The time to return a battery to its fully charged state under this condition is simply a function of the amount of the previous discharge and the recharge characteristic of the battery. Thus there is good assurance of fully recharging the battery within 12 hours.

BASES

ACTIONS

B.1 and B.2 (continued)

If the condition is due to one or more cells in a low voltage condition but still greater than 2.07 V and float voltage is found to be satisfactory, this is not indication of a substantially discharged battery and 12 hours is a reasonable time prior to declaring the battery inoperable.

Since Required Action B.1 only specifies "perform," a failure of SR 3.7.10.1 acceptance criteria does not result in the Required Action not met. However, if SR 3.7.10.1 is failed, the appropriate Condition(s), depending on the cause of the failure, is entered.

C.1, C.2, and C.3

With the required battery with one or more cells electrolyte level above the top of the plates, but below the minimum established design limits, the battery still retains sufficient capacity to perform the intended function. Therefore, the affected battery is not required to be considered inoperable solely as a result of electrolyte level not met. Within 31 days the minimum established design limits for electrolyte level must be re-established.

With electrolyte level below the top of the plates there is a potential for dryout and plate degradation. Required Actions C.1 and C.2 address this potential (as well as provisions in Specification 5.5.22, PSW Battery Monitoring and Maintenance Program). They are modified by a note that indicates they are only applicable if electrolyte level is below the top of the plates. Within 8 hours level is required to be restored to above the top of the plates. The Required Action C.2 requirement to verify that there is no leakage by visual inspection and the Specification 5.5.22 item to initiate action to equalize and test in accordance with manufacturer's recommendation are taken from Appendix D of IEEE-450 (Ref. 1). They are performed following the restoration of the electrolyte level to above the top of the plates. Based on the results of the manufacturer's recommended testing the battery may have to be declared inoperable and the affected cell[s] replaced.

D.1

With the required battery with pilot cell temperature less than the minimum established design limits, 12 hours is allowed to restore the temperature to within limits. A low electrolyte temperature limits the current and power available. Since the battery is sized with margin, while battery capacity is degraded, sufficient capacity exists to perform the intended function and the affected battery is not required to be considered inoperable solely as a result of the pilot cell temperature not met.

BASES

ACTIONS (continued)

E.1

With the required battery having any battery parameter outside the allowances of the Required Actions for Condition A, B, C, or D, sufficient capacity to supply the maximum expected load requirement is not assured and must be declared inoperable.

Additionally, discovering the required battery with one or more battery cells float voltage less than or equal to 2.07 V and float current greater than 2 amps indicates that the battery capacity may not be sufficient to perform the intended functions. The battery must therefore be declared inoperable immediately.

SURVEILLANCE REQUIREMENTS

SR 3.7.10a.1

Verifying battery float current while on float charge is used to determine the state of charge of the battery. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery and maintain the battery in a charged state. The float current requirements are based on the float current indicative of a charged battery. Use of float current to determine the state of charge of the battery is consistent with IEEE-450 (Ref. 1). The surveillance frequency is in accordance with the Surveillance Frequency Control Program.

This SR is modified by a Note that states the float current requirement is not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.7.10.1. When this float voltage is not maintained, the Required Actions of LCO 3.7.10a ACTION A are being taken, which provide the necessary and appropriate verifications of the battery condition. Furthermore, the float current limit of 2 amps is established based on the nominal float voltage value and is not directly applicable when this voltage is not maintained.

SR 3.7.10a.2 and SR 3.7.10a.5

Optimal long term battery performance is obtained by maintaining a float voltage greater than or equal to the minimum established design limits provided by the battery manufacturer, which corresponds to 2.20 Vpc. This provides adequate over potential, which limits the formation of lead sulfate and self discharge, which could eventually render the battery inoperable. Float voltages in this range or less, but greater than 2.07 Vpc, are addressed in Specification 5.5.22. SRs 3.7.10a.2 and 3.7.10a.5 require verification that the cell float voltages are greater than the short term absolute minimum voltage of 2.07 V. The surveillance frequency is in accordance with the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.10a.3

The limit specified for electrolyte level ensures that the plates suffer no physical damage and maintains adequate electron transfer capability. The surveillance frequency is in accordance with the Surveillance Frequency Control Program.

SR 3.7.10a.4

This Surveillance verifies that the pilot cell temperature is greater than or equal to the minimum established design limit (60 °F). Pilot cell electrolyte temperature is maintained above this temperature to assure the battery can provide the required current and voltage to meet the design requirements.

Temperatures lower than assumed in battery sizing calculations act to inhibit or reduce battery capacity. The surveillance frequency is in accordance with the Surveillance Frequency Control Program.

SR 3.7.10a.6

A battery performance discharge test is a test of constant current capacity of a battery, normally done in the as-found condition, after having been in service, to detect any change in the capacity determined by the acceptance test. The test is intended to determine overall battery degradation due to age and usage.

Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.7.10a.6; however, only the modified performance discharge test may be used to satisfy the battery service test requirements of SR 3.7.10.4.

A modified discharge test is a test of the battery capacity and its ability to provide a high rate, short duration load (usually the highest rate of the duty cycle). This will often confirm the battery's ability to meet the critical period of the load duty cycle, in addition to determining its percentage of rated capacity. Initial conditions for the modified performance discharge test should be identical to those specified for a service test.

The modified discharge test may consist of just two rates; for instance the one minute rate for the battery or the largest current load of the duty cycle, followed by the test rate employed for the performance test, both of which envelope the duty cycle of the service test. Since the ampere-hours removed by a one minute discharge represents a very small portion of the battery capacity, the test rate can be changed to that for the performance test without compromising the results of the performance discharge test.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.10a.6 (continued)

The battery terminal voltage for the modified performance discharge test must remain above the minimum battery terminal voltage specified in the battery service test for the duration of time equal to that of the service test.

The acceptance criteria for this Surveillance are consistent with IEEE-450 (Ref. 1) and IEEE-485 (Ref. 2). These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements. Furthermore, the battery is sized to meet the assumed duty cycle loads when the battery design capacity reaches this 80 percent limit.

The surveillance frequency is in accordance with the Surveillance Frequency Control Program. If the battery shows degradation, or if the battery has reached 85% of its expected life and capacity is < 100% of the manufacturer's rating, the Surveillance Frequency is reduced to 12 months. However, if the battery shows no degradation but has reached 85% of its expected life, the Surveillance Frequency is only reduced to 24 months for batteries that retain capacity ≥ 100% of the manufacturer's ratings. Degradation is indicated, according to IEEE-450 (Ref. 1), when the battery capacity drops by more than 10% relative to its capacity on the previous performance test or when it is ≥ 10% below the manufacturer's rating. These Frequencies are consistent with the recommendations in IEEE-450 (Ref. 1).

REFERENCES

1. IEEE-450-1995.
2. IEEE-485-1983.
3. 10 CFR 50.36 (last amended September 24, 2008).
4. NFPA 805 Safety Evaluation Report, dated December 29, 2010.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources – Operating

BASES

BACKGROUND

The AC Power System consists of the offsite power sources (preferred power) and the onsite standby power sources, Keowee Hydro Units (KHU). This system is designed to supply the required Engineered Safeguards (ES) loads of one unit and safe shutdown loads of the other two units and is so arranged that no single failure can disable enough loads to jeopardize plant safety. The design of the AC Power System provides independence and redundancy to ensure an available source of power to the ES systems (Ref. 1). The KHU turbine generators are powered through a common penstock by water taken from Lake Keowee. The use of a common penstock is justified on the basis of past hydro plant experience of the licensee (since 1919) which indicates that the cumulative need to dewater the penstock can be expected to be limited to about one day a year, principally for inspection, plus perhaps four days every tenth year.

The preferred power source is provided from offsite power to the red or yellow bus in the 230 kV switchyard to the units startup transformer and the E breakers. The 230 kV switchyard is electrically connected to the 525 kV switchyard via the autobank transformer. Emergency power is provided using two emergency power paths, an overhead path and an underground path. The underground emergency power path is from one KHU through the underground feeder circuit, transformer CT-4, the CT-4 incoming breakers (SK breakers), standby bus and the standby breakers (S breakers). The standby buses may also receive offsite power from the 100 kV transmission system through transformer CT-5 and the CT-5 incoming breakers (SL breakers). The overhead emergency power path is from the other KHU through the startup transformer and the startup incoming breakers (E breakers). In addition to supplying emergency power for Oconee, the KHUs provide peaking power to the generation system. During periods of commercial power generation, the KHUs are operated within the acceptable region of the KHU operating restrictions. This ensures that the KHUs are able to perform their emergency power functions from an initial condition of commercial power generation. The KHU operating restrictions for commercial power generation are contained in UFSAR Chapter 16, (Ref. 2). The standby buses can also

BASES

BACKGROUND (continued)

receive power from a combustion turbine generator at the Lee Steam Station through a dedicated 100 kV transmission line, transformer CT-5, and both SL breakers. The 100 kV transmission line can be supplied from a Lee combustion turbine (LCT) and electrically separated from the system grid and offsite loads. The minimum capacity available from any of the multiple sources of AC power is 22.4MVA (limited by CT-4 and CT-5 transformer capacities).

APPLICABLE SAFETY ANALYSIS

The initial conditions of design basis transient and accident analyses in the UFSAR Chapter 6 (Ref. 4) and Chapter 15 (Ref. 5) assume ES systems are OPERABLE. The AC power system is designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ES systems so that the fuel, reactor coolant system, and containment design limits are not exceeded.

Consistent with the accident analysis assumptions of a loss of offsite power (LOOP) and a single failure of one onsite emergency power path, two onsite emergency power sources are required to be OPERABLE.

AC Sources – Operating are part of the primary success path and function to mitigate an accident or transient that presents a challenge to the integrity of a fission product barrier. As such, AC Sources – Operating satisfies the requirements of Criterion 3 of 10 CFR 50.36 (Ref. 3).

LCO

Two sources on separate towers connected to the 230 kV switchyard to a unit startup transformer and one main feeder bus are required to be OPERABLE. Two KHUs with one capable of automatically providing power through the underground emergency power path to both main feeder buses and the other capable of automatically providing power through the overhead emergency power path to both main feeder buses are required to be OPERABLE. The Keowee Reservoir level is required to be ≥ 775 feet above sea level to support OPERABILITY of the KHUs. The zone overlap protection circuitry is required to be OPERABLE when the overhead electrical disconnects for the KHU associated with the underground power path are closed to provide single failure protection for the KHUs. The zone overlap protection circuitry includes the step-up transformer lockout, the underground KHU lockout, the Keowee emergency start signal, and the underground breaker for the overhead KHU to ensure the zone overlap protection circuitry logic is OPERABLE.

BASES

LCO (continued)

Operable offsite sources are required to be "physically independent" (separate towers) prior to entering the 230 kV switchyard. Once the 230 kV lines enter the switchyard, an electrical pathway must exist through OPERABLE power circuit breakers (PCBs) and disconnects such that both sources are available to energize the Unit's startup transformer either automatically or with operator action. Once within the boundary of the switchyard, the electrical pathway may be the same for both independent offsite sources. In addition, at least one E breaker must be available to automatically supply power to a main feeder bus from the energized startup transformer. The voltage provided to the startup transformer by the two independent offsite sources must be sufficient to ensure ES equipment will operate. Two of the following offsite sources are required:

1) Jocassee (from Jocassee) Black or White,
2) Dacus (from North Greenville) Black or White,
3) Oconee (from Central) Black or White,
4) Calhoun (from Central) Black or White,
5) Autobank transformer fed from either the Asbury (from Newport), Norcross (from Georgia Power), or Katoma (from Jocassee) 525 kV line.

An OPERABLE KHU and its required emergency power path are required to be able to provide sufficient power within specified limits of voltage and frequency within 23 seconds after an emergency start initiate signal and includes its required emergency power path, required instrumentation, controls, auxiliary and DC power, cooling and seal water, lubrication and other auxiliary equipment necessary to perform its safety function. Two emergency power paths are available. One emergency power path consists of an underground circuit while the other emergency power pathway uses an overhead circuit through the 230 kV switchyard.

BASES

LCO (continued)

An OPERABLE KHU and its required overhead emergency power path must be capable of automatically supplying power from the KHU through the KHU main step-up transformer, the 230 kV yellow bus, the Unit startup transformer and both E breakers to both main feeder buses. At least one channel of switchyard isolation (by actuation from degraded grid voltage protection) is required to be OPERABLE to isolate the 230 kV switchyard yellow bus. If closed, each N breaker must be capable of opening using either of its associated breaker trip circuits. KPF-9 (for KHU1) and KPF-10 (for KHU2) must remain open since there is no engineering analysis that ensures that the associated KHU can power both PSW and Engineered Safeguards (ES) system loads should an event occur (with the breaker closed). Either of the following combinations provides an acceptable KHU and required overhead emergency power path:

Keowee Hydro Unit	Keowee Hydro Unit
1A) Keowee Unit 1 generator,	1B) Keowee Unit 2 generator,
2A) Keowee ACB 1 (enabled by one channel of Switchyard Isolate Complete),	2B) Keowee ACB 2 (enabled by one channel of Switchyard Isolate Complete),
3A) Keowee auxiliary transformer 1X, Keowee ACB 5, Keowee Load Center 1X,	3B) Keowee auxiliary transformer 2X, Keowee ACB 6, Keowee Load Center 2X,
4A) Keowee MCC 1XA,	4B) Keowee MCC 2XA,
5A) Keowee Battery #1, Charger #1 or Standby Charger, and Distribution Center 1DA,	5B) Keowee Battery #2, Charger #2 or Standby Charger, and Distribution Center 2DA,
6A) ACB-1 to ACB-3 interlock,	6B) ACB-2 to ACB-4 interlock,
7A) Keowee Unit 1 Voltage and Frequency out of tolerance (OOT) logic	7B) Keowee Unit 2 Voltage and Frequency out of tolerance (OOT) logic
8) Keowee reservoir level ≥ 775 feet above sea level,	
8A) KPF-9 is OPEN with closing spring discharged,	8B) KPF-10 is OPEN with closing spring discharged,

<u>Overhead Emergency Power Path</u>

9) Keowee main step-up transformer,
10) PCB 9 (enabled by one channel of Switchyard Isolate Complete),
11) The 230kV switchyard yellow bus capable of being isolated by one channel of Switchyard Isolate,
12) A unit startup transformer and associated yellow bus PCB (CT-1 / PCB 18, CT-2 / PCB 27, CT-3 / PCB 30),
13) Both E breakers.

BASES

LCO
(continued)

An OPERABLE KHU and its required underground emergency power path must be capable of automatically supplying power from the KHU through the underground feeder, transformer CT-4, both standby buses, and both Unit S breakers to both main feeder buses. If closed, each N breaker and each SL breaker must be capable of opening using either of its associated breaker trip circuits. KPF-9 (for KHU1) and KPF-10 (for KHU2) must remain open since there is no engineering analysis that ensures that the associated KHU can power both PSW and Engineered Safeguards (ES) system loads should an event occur (with the breaker closed). Either of the following combinations provides an acceptable KHU and required underground emergency power path:

Keowee Hydro Unit	Keowee Hydro Unit
1A) Keowee Unit 1 generator,	1B) Keowee Unit 2 generator,
2A) Keowee ACB 3,	2B) Keowee ACB 4,
3A.1) Keowee auxiliary transformer CX, Keowee ACB 7, Keowee Load Center 1X,	3B.1) Keowee auxiliary transformer CX, Keowee ACB 8, Keowee Load Center 2X,
3A.2) One Oconee Unit 1 S breaker capable of feeding switchgear 1TC,	3B.2) One Oconee Unit 1 S breaker capable of feeding switchgear 1TC,
3A.3) Switchgear 1TC capable of feeding Keowee auxiliary transformer CX,	3B.3) Switchgear 1TC capable of feeding Keowee auxiliary transformer CX,
4A) Keowee MCC 1XA,	4B) Keowee MCC 2XA,
5A) Keowee Battery #1, Charger #1 or Standby Charger, and Distribution Center 1DA,	5B) Keowee Battery #2, Charger #2 or Standby Charger, and Distribution Center 2DA,
6A) ACB-1 to ACB-3 interlock,	6B) ACB-2 to ACB-4 interlock,
7A) Keowee Unit 1 Voltage and Frequency OOT logic	7B) Keowee Unit 2 Voltage and Frequency OOT logic
8) Keowee reservoir level ≥ 775 feet above sea level,	
8A) KPF-9 is OPEN with closing spring discharged,	8B) KPF-10 is OPEN with closing spring discharged,

Underground Emergency Power Path

9) The underground feeder,
10) Transformer CT-4,
11) Both SK breakers,
12) Both standby buses,
13) Both S breakers, and
14) ACB-3 to ACB-4 interlock.

BASES

LCO (continued)

This LCO is modified by three Notes. Note 1 indicates that a unit startup transformer may be shared with a unit in MODES 5 and 6. Note 2 indicates that the requirements of Specification 5.5.18, "KHU Commercial Power Generation Testing Program," shall be met for commercial KHU power generation. Note 3 indicates that the requirements of Specification 5.5.19, "Lee Combustion Turbine Testing Program," shall be met when a Lee Combustion Turbine (LCT) is used to comply with Required Actions.

APPLICABILITY

The AC power sources are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of accidents and transients, and

b. Adequate core cooling is provided, and containment OPERABILITY and other vital functions are maintained in the event of a postulated accident.

AC source requirements during MODE 5 and 6 are covered in LCO 3.8.2, AC Sources-Shutdown.

ACTIONS

The ACTIONS are modified by a Note. The Note excludes the MODE change restriction of LCO 3.0.4 when both standby buses are energized from an LCT via an isolated power path to comply with Required Actions. This exception allow entry into an applicable MODE while relying on the ACTIONS even though the ACTIONS may eventually require a unit shutdown. This exception is acceptable due to the additional capabilities afforded when both standby buses are energized from an LCT via an isolated power path.

<u>A.1, A.2, A.3.1, and A.3.2</u>

In the event a startup transformer becomes inoperable, it effectively causes the emergency overhead power path and both of the offsite sources to be inoperable. A KHU and its required underground power path remain available to ensure safe shutdown of the unit in the event of a transient or accident without a single failure.

BASES

ACTIONS

A.1, A.2, A.3.1, and A.3.2 (continued)

Operation may continue provided the KHU and its required underground emergency power path are tested using SR 3.8.1.3 within one hour if not performed in the previous 12 hours. This Required Action provides assurance that no undetected failures have occurred in the KHU and its required underground emergency power path. Since Required Action A.1 only specifies "perform," a failure of SR 3.8.1.3 acceptance criteria does not result in a Required Action not met. However, if the KHU and its required underground emergency path fails SR 3.8.1.3, both emergency power paths and both required offsite circuits are inoperable, and Condition I for both KHUs and their required emergency power paths inoperable for reasons other than Condition G and H is entered concurrent with Condition A.

If available, another Unit's startup transformer should be aligned to supply power to the affected Unit's auxiliaries so that offsite power sources and the KHU and its required overhead emergency power path will also be available if needed. Although this alignment restores the availability of the offsite sources and the KHU and its required overhead emergency power path, the shared startup transformer's capacity and voltage adequacy could be challenged under certain DBA conditions. The shared alignment is acceptable because the preferred mode of Unit shutdown is with reactor coolant pumps providing forced circulation and due to the low likelihood of an event challenging the capacity of the shared transformer during a 72 hour period to bring a Unit to MODE 5. Required Action A.3.1 requires that the unit startup transformer be restored to OPERABLE status and normal startup bus alignment in 36 hours or Required Action 3.2 requires designating one unit sharing the startup transformer, to be shutdown. For example, if Unit 1 and 2 are operating and CT-2 becomes inoperable, Unit 2 may align CT-1 to be available to the Unit 2 main feeder buses and continue operating for up to 36 hours. At that time, if CT-2 has not been restored to OPERABLE status, one Unit must be "designated" to be shutdown. The designated Unit must be shut down per ACTION B. Note that with one Unit in MODES 1, 2, 3 or 4 and another Unit in a condition other than MODES 1, 2, 3, or 4, the units may share a startup transformer indefinitely provided that the loads on the unit not in MODES 1, 2, 3 or 4 are maintained within acceptable limits. For example, if Unit 1 is in MODE 5 and CT-2 becomes inoperable, Unit 2 may align CT-1 to the Unit 2 main feeder buses and continue operation indefinitely.

BASES

ACTIONS (continued)

B.1 and B.2

When a unit is designated to be shutdown due to sharing a unit startup transformer per Required Action A.3.2, the unit must be brought to a MODE in which the LCO does not apply, since the shared unit startup transformer's capacity could be challenged under certain DBA conditions. To achieve this status, the unit must be brought to at least MODE 3 within 12 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

C.1, C.2.1, C.2.2.1, C.2.2.2, C.2.2.3, C.2.2.4, and C.2.2.5

With the KHU or its required overhead emergency power path inoperable due to reasons other than an inoperable startup transformer (Condition A), sufficient AC power sources remain available to ensure safe shutdown of the unit in the event of a transient or accident. Operation may continue if the OPERABILITY of the remaining KHU and its required underground emergency power path is determined by performing SR 3.8.1.3 within 1 hour if not performed in the previous 12 hours and once every 7 days thereafter. This demonstration assures the remaining emergency power path is not inoperable due to a common cause or other failure. Testing on a 7 day Frequency is acceptable since both standby buses must be energized from an LCT via an isolated power path when in Condition C for > 72 hours. When the standby buses are energized by an LCT via an isolated power path, the likelihood that the OPERABLE KHU and its required underground emergency power path will be required is decreased. Since Required Action C.1 only specifies "perform," a failure of SR 3.8.1.3 acceptance criteria does not result in a Required Action not met. SR 3.8.1.3 is only required to be performed when the KHU associated with the underground emergency power path is OPERABLE.

If the KHU and its required underground emergency path fails SR 3.8.1.3, both KHUs and their required emergency power paths are inoperable, and Condition I (Both KHUs or their required emergency power paths inoperable for reasons other than Condition G or H) is entered concurrent with Condition C.

BASES

ACTIONS

C.1, C.2.1, C.2.2.1, C.2.2.2, C.2.2.3, C.2.2.4, and C.2.2.5 (continued)

If the inoperable KHU or its required overhead emergency power path are not restored to OPERABLE status within 72 hours as required by Required Action C.2.1, a controlled shutdown must be initiated as required by the Required Actions for Condition M unless the extended Completion Times of Required Action C.2.2.5 are applicable. The second Completion Time for Required Action C.2.1 establishes a limit on the maximum time allowed for a KHU to be inoperable during any single contiguous occurrence of having a KHU inoperable. If Condition C is entered as a result of switching an inoperable KHU from the underground to the overhead emergency power path, it may have been inoperable for up to 72 hours. This could lead to a total of 144 hours since the initial failure of the KHU. The second Completion Time allows for an exception to the normal "time zero" for beginning the allowed time "clock." This will result in establishing the "time zero" at the time the KHU become inoperable, instead of at the time Condition C was entered.

The extended Completion Times of Required Action C.2.2.5 apply when the KHU or its required overhead emergency power path is inoperable due to an inoperable Keowee main step-up transformer, an inoperable KHU (if not used for that KHU in the previous 3 years), or a KHU made inoperable to perform generator field pole rewind work. In order to use the extended Completion Times, within 72 hours of entering Condition C both standby buses must be energized from an LCT (Required Action C.2.2.1), KHU generation to the grid except for testing must be suspended (Required Action C.2.2.2), the remaining KHU and its required underground emergency power path and both required offsite sources must be verified OPERABLE, the LCOs indicated in Required Action C.2.2.3 must be verified to be met, and alternate power source capability must be verified by performing SR 3.8.1.16.

Required Action C.2.2.5 permits maintenance and repair of a Keowee main step-up transformer which requires longer than 72 hours. Transformer replacement is rare but is time extensive. A 28 day Completion Time is permitted by Required Action C.2.2.5 to restore the KHU and its overhead power path to OPERABLE status when inoperable due to an inoperable Keowee main step-up transformer. This allows a reasonable period of time for transformer replacement.

Required Action C.2.2.5 also permits maintenance and repair of a KHU which requires longer than 72 hours. The primary long term maintenance items are expected to be hydro turbine runner and discharge ring welding

BASES

ACTIONS

C.1, C.2.1, C.2.2.1, C.2.2.2, C.2.2.3, C.2.2.4, and C.2.2.5 (continued)

repairs which are estimated to be necessary every six to eight years. Also, generator thrust and guide bearing replacements are necessary. Other items which manifest as failures are expected to be rare and may be performed during the permitted maintenance periods. The 45-day Completion Time of Required Action C.2.2.5 is allowed to be applied cumulatively over a rolling three year period for each KHU. This Completion Time is 45 days from discovery of initial inoperability of the KHU. This effectively limits the time the KHU can be inoperable to 45 days from discovery of initial inoperability rather than 45 days from entry into Condition C and precludes any additional time that may be gained as a result of switching an inoperable KHU from the underground to the overhead emergency power path. The Completion Time is modified by three notes. Note 1 indicates that the Completion Time is cumulative per a rolling 3-year time period for each KHU. For example, if KHU-1 is inoperable for 15 days, the 45-day Completion Time for KHU-1 is reduced to 30 days for the rolling 3-year time period containing the 15 day inoperability. This requires a review of entries for the previous 3 years to determine the remaining time allowed in the 45-day Completion Time. If the 72 hour Completion Time of C.2.1 is not exceeded, the 45-day Completion is not applicable and is not reduced. Notes 2 and 3 indicate the Completion Time is not applicable during generator field pole rewind work or until one year after the KHU is declared OPERABLE following generator field pole rewind work. Note 2 is added to avoid using up the 45-day Completion Time concurrent with the 62-day Completion Time and preserves some time to perform emergent maintenance work should the need arise after a one year waiting period. Note 3 is added to require a one year waiting period prior to use.

The temporary 62-day Completion Time of Required Action C.2.2.5 is allowed for each KHU to perform generator field pole rewind work. The 62-day Completion Time is modified by three notes that provide conditions for using the extended outage. Note 1 indicates that no discretionary maintenance or testing is allowed on the Standby Shutdown Facility (SSF), Emergency Feedwater (EFW), and essential alternating current (AC) Power Systems. Note 2 indicates that the 62-day Completion Time is only applicable one time for each KHU due to generator field pole rewind work and expires on January 1, 2015. Note 3 indicates that it is only applicable if the SSF and EFW are administratively verified OPERABLE prior to entering the extended Completion Time. This increases the probability, even in the unlikely event of an additional failure, that the risk significant systems will function as required to support their safety function.

Required Actions C.2.2.1, C.2.2.2, C.2.2.3, and C.2.2.4 must be met in order to allow the longer restoration times of Required Action C.2.2.5.

BASES

ACTIONS

C.1, C.2.1, C.2.2.1, C.2.2.2, C.2.2.3, C.2.2.4, and C.2.2.5 (continued)

Required Action C.2.2.1 requires that both standby buses be energized using an LCT through the 100 kV transmission circuit. With this arrangement (100 kV transmission circuit electrically separated from the system grid and all offsite loads), a high degree of reliability for the emergency power system is provided. In this configuration, the LCT is serving as a second emergency power source, however, since the 100 kV transmission circuit is vulnerable to severe weather a time limit is imposed. The second Completion Time of Required Action C.2.2.1 permits the standby buses to be re-energized by an LCT within 1 hour in the event this source is subsequently lost. Required Action C.2.2.2 requires suspension of KHU generation to the grid except for testing. The restriction reduces the number of possible failures which could cause loss of the underground emergency power path. Required Action C.2.2.3 requires verifying by administrative means that the remaining KHU and its required underground emergency power path and both required offsite sources are OPERABLE. This provides additional assurance that offsite power will be available. In addition, this assures that the KHU and its required underground emergency power path are available.

Required Action C.2.2.3 also requires verifying by administrative means that the requirements of the following LCOs are met:

LCO 3.8.3, "DC Sources – Operating;"

LCO 3.8.6, "Vital Inverters – Operating;"

LCO 3.8.8, "Distribution Systems – Operating;"

LCO 3.3.17, "EPSL Automatic Transfer Function;"

LCO 3.3.18, "EPSL Voltage Sensing Circuits;"

LCO 3.3.19, "EPSL 230 kV Switchyard DGVP;" and

LCO 3.3.21, "EPSL Keowee Emergency Start Function."

This increases the probability, even in the unlikely event of an additional failure, that the DC power system and the 120 VAC Vital Instrumentation power panelboards will function as required to support EPSL, power will not be lost to ES equipment, and EPSL will function as required.

BASES

ACTIONS

C.1, C.2.1, C.2.2.1, C.2.2.2, C.2.2.3, C.2.2.4, and C.2.2.5 (continued)

Verifying by administrative means allows a check of logs or other information to determine the OPERABILITY status of required equipment in place of requiring unique performance of Surveillance Requirements. If the AC Source is subsequently determined inoperable, or an LCO stated in Required Action C.2.2.3 is subsequently determined not met, continued operation up to a maximum of four hours is allowed by ACTION L. Required Action C.2.2.3 is modified by a note indicating that it is not applicable to the 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. This note is needed to allow entry into the 60 hour dual unit outage to reassemble the refurbished KHU and return it to functional condition, as well as perform balance runs and shots, post modification testing, and a commissioning run prior to declaring the refurbished KHU operable. Without this note, entry into Condition L would be required allowing only 16 hours to restore the KHU and its required underground path and only 4 hours to restore compliance with LCO 3.3.21.

Required Action C.2.2.4 requires verifying alternate power source capability by performing SR 3.8.1.16. This confirms that entry into Condition C is due only to an inoperable main step-up transformer or an inoperable KHU, as applicable. If SR 3.8.1.16 is subsequently determined not met, continued operation up to a maximum of four hours is allowed by ACTION L.

D.1, D.2 and D.3

With the KHU or its required underground emergency power path inoperable, sufficient AC power sources remain available to ensure safe shutdown of the unit in the event of a transient or accident. Operation may continue for 72 hours if the remaining KHU and its required overhead emergency power path are tested using SR 3.8.1.4 within one hour if not performed in the previous 12 hours. SR 3.8.1.4 is only required to be performed when the KHU associated with the overhead emergency power path is OPERABLE. This Required Action provides assurance that no undetected failures have occurred in the overhead emergency power path. Since Required Action D.1 only specifies "perform," a failure of SR 3.8.1.4 acceptance criteria does not result in a Required Action not met. However, if the KHU and its required overhead emergency path fails SR 3.8.1.4, both KHUs and their required emergency power paths are inoperable, and Condition I for both KHUs and their emergency power paths inoperable for reasons other than Condition G or H is entered concurrent with Condition D. This

BASES

ACTIONS

D.1, D.2 and D.3 (continued)

demonstration is to assure that the remaining emergency power path is not inoperable due to a common cause or due to an undetected failure. For outages of the KHU and its required underground emergency power path in excess of 24 hours, an LCT (using the 100 kV transmission circuit electrically separated from the grid and offsite loads) must energize a standby bus prior to the outage exceeding 24 hours. This ensures the availability of a power source on the standby buses when the KHU and its required underground emergency power path are out of service in excess of 24 hours. The second Completion Time of Required Action D.2 permits the standby buses to be re-energized by an LCT within 1 hour in the event this source is subsequently lost.

The second Completion Time for Required Action D.3 establishes a limit on the maximum time allowed for a KHU to be inoperable during any single contiguous occurrence of having a KHU inoperable. If Condition D is entered as a result of switching an inoperable KHU from the overhead to the underground emergency power path, it may have been inoperable for up to 72 hours. This could lead to a total of 144 hours since the initial failure of the KHU. The second Completion Time allows for an exception to the normal "time zero" for beginning the allowed time "clock." This will result in establishing the "time zero" at the time the KHU become inoperable, instead of at the time Condition D was entered.

E.1 and E.2

If the Required Action and associated Completion Time for Required Action D.2 are not met, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 12 hours for one Oconee unit and 24 hours for other Oconee unit(s) and to MODE 5 within 84 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

F.1 and F.2

With the zone overlap protection circuitry inoperable when the overhead electrical disconnects for the KHU associated with the underground power path are closed, the zone overlap protection circuitry must be restored to OPERABLE status or the overhead electrical disconnects must be opened within 72 hours. In this Condition, both KHUs and their required emergency power paths are OPERABLE, however a single failure could result in the loss of both KHUs.

BASES

ACTIONS (continued)

G.1

With both emergency power paths inoperable due to an E breaker and S breaker inoperable on the same main feeder bus, one breaker must be restored to OPERABLE status. In this Condition, both emergency power paths can still provide power to the remaining main feeder bus.

H.1 and H.2

With both KHUs or their required emergency power paths inoperable for planned maintenance or test with both standby buses energized from an LCT via an isolated power path, the KHU must be restored to OPERABLE status within 60 hours. Operation with both KHUs and their required power paths inoperable is permitted for 60 hours provided that both standby buses are energized using an LCT through the 100 kV transmission circuit and the requirements of the Note to the Condition are met. The Note to the Condition indicates that it may only be entered when both offsite sources are verified by administrative means to be OPERABLE and the requirements of the following LCOs are verified by administrative means to be met:

LCO 3.8.3, "DC Sources – Operating;"

LCO 3.8.6, "Vital Inverters – Operating;"

LCO 3.8.8, "Distribution Systems – Operating;"

LCO 3.3.17, "EPSL Automatic Transfer Function;"

LCO 3.3.18, "EPSL Voltage Sensing Circuits;" and

LCO 3.3.19, "EPSL 230 kV Switchyard DGVP."

This increases the probability, even in the unlikely event of an additional failure, that the DC power system and the 120 VAC Vital Instrumentation power panelboards will function as required to support EPSL, power will not be lost to ES equipment, and EPSL will function as required.

BASES

ACTIONS

H.1 and H.2 (continued)

Verifying by administrative means allows a check of logs or other information to determine the OPERABILITY status of required equipment in place of requiring unique performance of Surveillance Requirements. If the AC Source is subsequently determined inoperable, or an LCO stated in the Note to Condition H is subsequently determined not met, continued operation up to a maximum of four hours is allowed by ACTION L.

With both standby buses energized from an LCT via an isolated power path (100 kV transmission circuit electrically separated from the system grid and all offsite loads), a high degree of reliability for the emergency power system is provided. In this configuration, the LCT is serving as the Oconee emergency power source, however, since the Oconee Units are vulnerable to a single failure of the 100 kV transmission circuit a time limit of 60 hours is imposed. Required Action H.1 permits the standby buses to be re-energized by an LCT within 1 hour in the event this source is subsequently lost. The second Completion Time of Required Action H.2 limits the amount of time two KHUs can be inoperable during the 45-day Completion Time of Required Action C.2.2.5 to a cumulative 240 hours over a rolling 3-year period. This requires a review of entries for the previous 3 years to determine the remaining time allowed in the 240-hour Completion Time. This limits the dual KHU outage time when using the 45-day Completion Time of Required Action C.2.2.5 on a cumulative basis over a 3-year time period.

If both emergency power paths are restored, unrestricted operation may continue. If only one power path is restored, operation may continue per ACTIONS C or D.

I.1, I.2, and I.3

With both KHUs or their required emergency power paths inoperable for reasons other than Conditions G and H, insufficient standby AC power sources are available to supply the minimum required ES functions. In this Condition, the offsite power system is the only source of AC power available for this level of degradation. The risk associated with continued operation for one hour without an emergency power source is considered acceptable due to the low likelihood of a LOOP during this time period, and because of the potential for grid instability caused by the simultaneous shutdown of all three units. This instability would increase the probability of a total loss of AC power. Operation with both KHUs or their required power paths inoperable is permitted for 12 hours provided that Required Actions I.1 and I.2 are met. Required Action I.1 requires that both standby buses be energized using an LCT via an isolated power

BASES

ACTIONS

I.1, I.2, and I.3 (continued)

path. With this arrangement (100 kV transmission circuit electrically separated from the system grid and all offsite loads), a high degree of reliability for the emergency power system is provided. In this configuration, the LCT is serving as the Oconee emergency power source, however, since the Oconee Units are vulnerable to a single failure of the 100 kV transmission circuit a time limit of 12 hours is imposed. The second Completion Time of Required Action I.1 permits the standby buses to be re-energized by an LCT within 1 hour in the event this source is subsequently lost. Required Action I.2 requires that the OPERABILITY status of both offsite sources be determined by administrative means and that the OPERABILITY status of equipment required by the following LCOs be determined by administrative means:

LCO 3.8.3, "DC Sources – Operating;"

LCO 3.8.6, "Vital Inverters – Operating;"

LCO 3.8.8, "Distribution Systems – Operating;"

LCO 3.3.17, "EPSL Automatic Transfer Function;"

LCO 3.3.18, "EPSL Voltage Sensing Circuits;" and

LCO 3.3.19, "EPSL 230 kV Switchyard DGVP."

This increases the probability, even in the unlikely event of an additional failure, that the DC power system and the 120 VAC Vital Instrumentation power panelboards will function as required to support EPSL, power will not be lost to ES equipment, and EPSL will function as required.

Determining by administrative means allows a check of logs or other information to determine the OPERABILITY status of required equipment in place of requiring unique performance of Surveillance Requirements. If the AC Source is initially or subsequently determined inoperable, or an LCO stated in Required Action I.2 is initially or subsequently determined not met, continued operation up to a maximum of four hours is allowed by ACTION L.

If both emergency power paths are restored, unrestricted operation may continue. If only one power path is restored, operation may continue per ACTIONS C or D.

BASES

ACTIONS (continued)

J.1, J.2, and J.3

With one or both required offsite sources inoperable for reasons other than Condition A, sufficient AC power sources are available to supply necessary loads in the event of a DBA. However, since the AC power system is degraded below the Technical Specification requirements, a time limit on continued operation is imposed. With only one of the required offsite sources OPERABLE, the likelihood of a LOOP is increased such that the Required Actions for all required offsite circuits inoperable are conservatively followed. The risk associated with continued operation for one hour without a required offsite AC source is considered acceptable due to the low likelihood of a LOOP during this time period, and because of the potential for grid instability caused by the simultaneous shutdown of all three units.

Operation with one or both required offsite sources inoperable is permitted for 24 hours provided that Required Actions J.1 and J.2 are met. Required Action J.1 requires that both standby buses be energized using an LCT via an isolated power path. With this arrangement (100 kV transmission circuit electrically separated from the system grid and all offsite loads), a high degree of reliability for the emergency power system is provided. In this configuration, the LCT is serving as an emergency power source, however, since the Oconee units are vulnerable to a single failure of the 100 kV transmission circuit a time limit is imposed. The second Completion Time of Required Action J.1 permits the standby buses to be re-energized by an LCT within 1 hour in the event this source is subsequently lost. Required Action J.2 requires that the OPERABILITY status of both KHUs and their required emergency power paths be determined by administrative means and that the OPERABILITY status of equipment required by the following LCOs be determined by administrative means:

LCO 3.8.3, "DC Sources – Operating;"

LCO 3.8.6, "Vital Inverters – Operating;"

LCO 3.8.8, "Distribution Systems – Operating;"

LCO 3.3.17, "EPSL Automatic Transfer Function;"

LCO 3.3.18, "EPSL Voltage Sensing Circuits;"

LCO 3.3.19, "EPSL 230 kV Switchyard DGVP," and

LCO 3.3.21, "EPSL Keowee Emergency Start Function."

BASES

ACTIONS

J.1, J.2, and J.3 (continued)

This increases the probability, even in the unlikely event of an additional failure, that the DC power system and the 120 VAC Vital Instrumentation power panelboards will function as required to support EPSL, power will not be lost to ES equipment, and EPSL will function as required.

Determining by administrative means allows a check of logs or other information to determine the OPERABILITY status of required equipment in place of requiring unique performance of Surveillance Requirements. If the AC Source is initially or subsequently determined inoperable, or an LCO stated in Required Action J.2 is initially or subsequently determined not met, continued operation up to a maximum of four hours is allowed by ACTION L.

K.1

The two trip circuits for each closed N and SL breakers are required to ensure both breakers will open. An N breaker trip circuit encompasses those portions of the breaker control circuits necessary to trip the associated N breaker from the output of the 2 out of 3 logic matrix formed by the auxiliary transformer's undervoltage sensing circuits up to and including an individual trip coil for the associated N breaker. The undervoltage sensing channels for the auxiliary transformer are addressed in LCO 3.3.18, "Emergency Power Switching Logic (EPSL) Voltage Sensing Circuits." An SL breaker trip circuit encompasses those portions of the breaker control circuits necessary to trip the SL breaker from the output of both 2 out of 3 logic matrices formed by each standby bus's undervoltage sensing circuits up to and including an individual trip coil for the associated SL breaker. The undervoltage sensing channels for the CT- 5 transformer are addressed in LCO 3.3.18, "Emergency Power Switching Logic (EPSL) Voltage Sensing Circuits." With one trip circuit inoperable a single failure could cause an N or SL breaker to not open. This could prevent the transfer to other available sources. Therefore, 24 hours is allowed to repair the trip circuit or open the breaker (opening the breaker results in exiting the Condition). The Completion Time is based on engineering judgement taking into consideration the time required to complete the required action and the availability of the remaining trip circuit.

A Note modifies the Condition, indicating that separate Condition Entry is permitted for each breaker. Thus, Completion Times are tracked separately for the N1, N2, SL1, and SL2 breaker.

BASES

ACTIONS (continued)

L.1, L.2, and L.3

With an AC Source inoperable or LCO not met, as stated in Note for Condition H entry; or with an AC Source inoperable or LCO not met, as stated in Required Action C.2.2.3 when in Condition C for > 72 hours; or with an AC Source inoperable or LCO not met, as stated in Required Action I.2 or J.2 when in Conditions I or J for > 1 hour; or with SR 3.8.1.16 not met, Required Action L.1, L.2 and L.3 requires restoration within four hours. Condition L is modified by a Note indicating that separate Condition entry is permitted for each inoperable AC Source, and LCO or SR not met. The Required Action is modified by a Note that allows the remaining OPERABLE KHU and its required emergency power path to be made inoperable for up to 12 hours if required to restore both KHUs and their required emergency power paths to OPERABLE status. This note is necessary since certain actions such as dewatering the penstock may be necessary to restore the inoperable KHU although these actions would also cause both KHUs to be inoperable.

The purpose of this Required Action is to restrict the allowed outage time for an inoperable AC Source or equipment required by an LCO when in Conditions C, H, I or J. For Conditions I and J when the LCOs stated are initially not met, the maximum Completion Time is four hours or the remaining Completion Time allowed by the stated LCO, whichever is shorter.

M.1 and M.2

If a Required Action and associated Completion Time for Condition C, F, G, H, I, J, K or L are not met; or if a Required Action and associated Completion Time are not met for Required Action D.1 or D.3, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 12 hours and to MODE 5 within 84 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.8.1.1

This SR ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.1 (continued)

connected to their power source, and that appropriate separation of offsite sources is maintained. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.2

This SR verifies adequate battery voltage when the KHU batteries are on float charge. This SR is performed to verify KHU battery OPERABILITY. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.3

This SR verifies the availability of the KHU associated with the underground emergency power path to start automatically and energize the underground power path. Utilization of either the auto-start or emergency start sequence assures the control function OPERABILITY by verifying proper speed control and voltage. Power path verification is included to demonstrate breaker OPERABILITY from the KHU onto the standby buses. This is accomplished by closing the Keowee Feeder Breakers (SK) to energize each deenergized standby bus. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.4

This surveillance verifies the availability of the KHU associated with the overhead emergency power path. Utilization of either the auto-start or emergency start sequence assures the control function OPERABILITY by verifying proper speed control and voltage. The ability to supply the overhead emergency power path is satisfied by demonstrating the ability to synchronize (automatically or manually) the KHU with the grid system. If an automatic start of the KHU is performed and a manual synchronization is desired, the KHU will need to be shutdown and re-started in manual to allow a manual synchronization of the KHU. The SR also requires that the underground power path be energized after removing the KHU from the overhead emergency power path. This surveillance can be satisfied by first demonstrating the ability of the KHU

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.4 (continued)

associated with the underground emergency path to energize the underground path then synchronizing the KHU to the overhead emergency power path. The SR is modified by a Note indicating that the requirement to energize the underground emergency power path is not applicable when the overhead disconnects are open for the KHU associated with the underground emergency power path or 2) when complying with Required Action D.1. The latter exception is necessary since Required Action D.1 continues to be applicable when both KHUs are inoperable.

The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.5

This surveillance verifies OPERABILITY of the trip functions of each closed SL and each closed N breaker. Neither of these breakers have any automatic close functions; therefore, only the trip coils require verification. Cycling of each breaker demonstrates functional OPERABILITY and the coil monitor circuits verify the integrity of each trip coil. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

This SR modified by a Note that states it is not required to be performed for an SL breaker when its standby bus is energized from a LCT via an isolated power path. This is necessary since the standby buses are required to be energized from a LCT by several Required Actions of Specification 3.8.1 and the breakers must remain closed to energize the standby buses from a LCT.

SR 3.8.1.6

Infrequently used source breakers are cycled to ensure OPERABILITY. The Standby breakers are to be cycled one breaker at a time to prevent inadvertent interconnection of two units through the standby bus breakers. Cycling the startup breakers verifies OPERABILITY of the breakers and associated interlock circuitry between the normal and startup breakers. This circuitry provides an automatic, smooth, and safe transfer of auxiliaries in both directions between sources. The Surveillance Frequency is based on operating experience, equipment

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.6 (continued)

reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

This SR is modified by a Note which states the SR is not required to be performed for an S breaker when its standby bus is energized from a LCT via an isolated power path. This is necessary since the standby buses are required to be energized from a LCT by several Required Actions of Specification 3.8.1 and cycling the S breakers connects the standby buses with the main feeder buses which are energized from another source.

SR 3.8.1.7

The KHU tie breakers to the underground path, ACB3 and ACB4, are interlocked to prevent cross-connection of the KHU generators. The safety analysis utilizes two independent power paths for accommodating single failures in applicable accidents. Connection of both generators to the underground path compromises the redundancy of the emergency power paths. Installed test logic is used to verify a circuit to the close coil on one underground ACB does not exist with the other underground ACB closed. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.8

Each KHU tie breaker to the underground emergency power path and tie breaker to the overhead emergency path, are interlocked to prevent the unit associated with the underground circuit from automatically connecting to the overhead emergency power path. The safety analysis utilizes two independent power paths for accommodating single failures in applicable accidents. Connection of both generators to the overhead emergency power path compromises the redundancy of the emergency power paths. Temporary test instrumentation is used to verify a circuit to the close coil on the overhead ACB does not exist with the Underground ACB closed. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.9

This surveillance verifies the KHUs' response time to an Emergency Start signal (normally performed using a pushbutton in the control room) to ensure ES equipment will have adequate power for accident mitigation. UFSAR Section 6.3.3.3 (Ref. 9) establishes the 23 second time requirement for each KHU to achieve rated frequency and voltage based on the assumption that an engineered safeguards actuation in one unit occurs simultaneously with a loss of offsite power to all three units. Emergency start without a design basis event or minimal load such as unit shutdown could conceivably cause the KHU to experience overshoot or over-frequency. Since the only available loads of adequate magnitude for simulating a accident is the grid, subsequent loading on the grid is required to verify the KHU's ability to assume rapid loading under accident conditions. Sequential block loads are not available to fully test this feature. This is the reason for the requirement to load the KHUs at the maximum practical rate. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.10

A battery service test is a special test of the battery capability, as found, to satisfy the design requirements (battery duty cycle) of the DC electrical power system. The discharge rate and test length should correspond to the design duty cycle requirements as specified in Reference 4.

The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.11

Visual inspection of the battery cells, cell plates, and battery racks provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.12

Verification of cell to cell connection cleanliness, tightness, and proper coating with anti-corrosion grease provides an indication of any abnormal condition, and assures continued OPERABILITY of the battery. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.13

The KHU underground ACBs have a control feature which will automatically close the KHU, that is pre-selected to the overhead path, into the underground path upon an electrical fault in the zone overlap region of the protective relaying. This circuitry prevents an electrical fault in the zone overlap region of the protective relaying from locking out both emergency power paths during dual KHU grid generation. In order to ensure this circuitry is OPERABLE, an electrical fault is simulated in the zone overlap region and the associated underground ACBs are verified to operate correctly. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

This SR is modified by a Note indicating the SR is only applicable when the overhead disconnects to the underground KHU are closed. When the overhead disconnects to the underground KHU are open, the circuitry preventing the zone overlap protective lockout of both KHUs is not needed.

SR 3.8.1.14

This surveillance verifies OPERABILITY of the trip functions of the SL and N breakers. This SR verifies each trip circuit of each breaker independently opens each breaker. Neither of these breakers have any automatic close functions; therefore, only the trip circuits require verification. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

The SR is modified by a Note indicating that the SR is not required for an SL breaker when its standby bus is energized by a LCT via an isolated power path. This is necessary since the standby buses are required to be energized from a LCT by several Required Actions of Specification 3.8.1 and the breakers must remain closed to energize the standby buses from a LCT.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.15

This surveillance verifies proper operation of the 230 kV switchyard circuit breakers upon an actual or simulated actuation of the Switchyard Isolation circuitry. This test causes an actual switchyard isolation (byactuation of degraded grid voltage protection) and alignment of KHUs to the overhead and underground emergency power paths. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program. The effect of this SR is not significant because the generator red bus tie breakers and feeders from the Oconee 230 kV switchyard red bus to the system grid remain closed. Either Switchyard Isolation Channel causes full system realignment, which involves a complete switchyard realignment. To avoid excessive switchyard circuit breaker cycling, realignment and KHU emergency start functions, this SR need be performed only once each SR interval.

SR 3.8.1.16

This SR verifies by administrative means that one KHU provides an alternate manual AC power source capability by manual or automatic KHU start with manual synchronize, or breaker closure, to energize its non-required emergency power path. That is, when the KHU to the overhead emergency power path is inoperable, the SR verifies by administrative means that the overhead emergency power path is OPERABLE. When the overhead emergency power path is inoperable, the SR verifies by administrative means that the KHU associated with the overhead emergency power path is OPERABLE.

This SR is modified by a Note indicating that the SR is only applicable when complying with Required Action C.2.2.4.

SR 3.8.1.17

This SR verifies the Keowee Voltage and Frequency out of tolerance logic trips and blocks closure of the appropriate overhead or underground power path breakers on an out of tolerance trip signal. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.17 (continued)

There are three over voltage relays, three under voltage relays, and three over/under frequency relays per KHU with each relay actuating an auxiliary relay used to provide two out of three logic. These relays monitor generator output voltage and if two phases are above/below setpoint, prevent the power path breakers from closing or if closed, provide a trip signal which is applied after a time delay, to open the power path breakers. Testing demonstrates that relays actuate at preset values, that timers time out and that two under voltage relays, two over voltage relays, or two over/under frequency relays will actuate the logic channel. This ensures that the power path breakers will not close and if closed, will trip after a preset time delay that becomes effective when the KHU first reaches the required frequency and voltage band.

REFERENCES

1. UFSAR, Section 3.1.39
2. UFSAR, Chapter 16
3. 10 CFR 50.36
4. UFSAR, Chapter 6
5. UFSAR, Chapter 15
6. Regulatory Guide 1.32
7. Regulatory Guide 1.129
8. IEEE-450-1980
9. UFSAR, Section 6.3.3.3