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November 11, 2010
RC-10-0092

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTN: Mr. R. E. Martin

Dear Sir / Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION UNIT 1
DOCKET NO. 50/395
OPERATING LICENSE NO. NPF-12
LICENSE AMENDMENT REQUEST (LAR 10-02033)
CHANGES TO EMERGENCY DIESEL GENERATOR
SURVEILLANCE TEST REQUIREMENTS

Pursuant to 10 CFR 50.90, South Carolina Electric & Gas Company (SCE&G), acting for itself and as agent for South Carolina Public Service Authority, requests an amendment to the Virgil C. Summer Nuclear Station (VCSNS) Unit 1 Facility Operating License NFP-12. SCE&G proposes to revise Technical Specification (TS) 3/4.8.1, AC SOURCES - OPERATING, to provide surveillance enhancements that will improve operation and testing of the Emergency Diesel Generators (EDG). These changes conform to NUREG 1431, Revision 3, *Standard Technical Specifications Westinghouse Plants*, and are based upon the recommendations given in Regulatory Guide (RG)1.9, Revision 3, *Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants*. Additional requested changes will provide a more restrictive voltage and frequency band for operation when not connected in parallel with the offsite sources and are individually justified.

SCE&G's evaluation of the proposed change is provided in the enclosure to this letter. The enclosure also provides a description of the proposed change and the regulatory basis for the change. SCE&G has determined that there are no significant hazards considerations associated with the proposed change.

The VCSNS Final Safety Analysis Report has been reviewed and required revisions to Section 8 will occur after implementation of this LAR. There are no changes to the Fire Protection Evaluation Report (FPER).

SCE&G requests approval of the proposed amendment by November 11, 2011, with a 90-day implementation period to permit plant program changes and training. The proposed amendment has been reviewed by the appropriate VCSNS review committees. SCE&G has notified the State of South Carolina in accordance with 10CFR50.91.

A001
NRR

If you have any questions or require additional information, please contact Bruce Thompson at (803) 931-5042.

I certify under penalty of perjury that the information contained herein is true and correct.

11-11-2010
Executed on


Thomas D. Gatlin

WCM/TDG/gr
Enclosure: Evaluation of the proposed change

Attachment(s):

- I. Marked Up TS Pages
- II. Retyped TS Pages
- III. List of Regulatory Commitments
- IV. Changes to TS Bases pages

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**LICENSE AMENDMENT REQUEST – LAR 10-2033
CHANGES TO TS 3/4.8.1.1, EMERGENCY DIESEL GENERATOR
SURVEILLANCE REQUIREMENTS**

1.0 DESCRIPTION

SCE&G proposes to revise TS 3/4.8.1.1., AC Sources - Operating, to provide surveillance enhancements that will improve operation and testing of the Emergency Diesel Generators (EDGs). Additionally, the allowed voltage and frequency tolerance band is to be more restrictive when not connected in parallel to the offsite power sources.

2.0 PROPOSED CHANGE

Revise SR 4.8.1.1.2.a.3 to say: Verifying the diesel generator starts* and achieves a voltage of greater than or equal to 6511 volts but less than or equal to 7920 volts and frequency of 60 ± 1.2 Hz (58.8 – 61.2 Hz).

Revise SR 4.8.1.1.2.a.4 to say: Verifying the generator is synchronized, gradually loaded* to greater than or equal to 3825 kW and less than or equal to 4250 kW** while operating at a power factor less than or equal to 0.9 for at least 60 minutes.***

Revise the existing NOTE at the bottom of Page 3/4 8-3 as follows:

** Momentary transients outside of the load or power factor range specified do not invalidate this test.

Insert a new NOTE at the bottom of Page 3/4 8-3 as follows:

*** If grid conditions do not permit, the power factor limit is not required to be met. Under this condition, the power factor shall be maintained as close to 0.9 as practicable.

Revise 4.8.1.1.2.f.1: change the word verify to verifying to be consistent with the wording of the other surveillance requirements on the page.

Revise 4.8.1.1.2.f.1.a. to say: In less than or equal to 10 seconds, achieves a voltage greater than or equal to 6511 volts and a frequency greater than 58.8 Hz (60 – 1.2 Hz).

Revise 4.8.1.1.2.f.1.b. to say: Achieves a steady state voltage greater than or equal to 6840 volts but less than or equal to 7445 volts and a steady state frequency greater than or equal to 59.4 Hz but less than or equal to 60.6 Hz.

Revise 4.8.1.1.2.f.2 to say: Deleted.

Revise SR 4.8.1.1.2.g.2 to say: Verifying that on a load rejection of greater than or equal to 729 kW while operating at a power factor less than or equal to 0.9^{***}, frequency is maintained less than or equal to 63 Hz following the load rejection. Additionally, within 3 seconds following the load rejection, voltage is restored to greater than or equal to 6511 volts but less than or equal to 7920 volts and within 4 seconds frequency is restored to 60 ± 1.2 Hz.

Revise SR 4.8.1.1.2.g.3 to say: Verifying that on a load rejection of greater than or equal to 3825 kW and less than or equal to 4250 kW while operating at a power factor less than or equal to 0.9, the EDG does not trip. The generator voltage shall not exceed 8640 volts during and following the load rejection. ^{***}

Delete the existing NOTE^{**} at the bottom of Page 3/4 8-4 and insert the following:

^{***} If grid conditions do not permit, the power factor limit is not required to be met. Under this condition, the power factor shall be maintained as close to 0.9 as practicable.

Revise SR 4.8.1.1.2.g.4.b to say: ...voltage and frequency shall be maintained between 6840-7445 volts and 60 ± 0.6 Hz.

Revise SR 4.8.1.1.2.g.5 to say: ...achieves a voltage greater than 6511 volts and a frequency greater than 58.8 Hz. After steady state operation is obtained, the EDG shall be verified to have a voltage greater than or equal to 6840 volts but less than or equal to 7445 volts and a frequency greater than or equal to 59.4 Hz but less than or equal to 60.6 Hz.

Revise SR 4.8.1.1.2.g.6.b to say: ...voltage and frequency between 6840-7445 volts and 60 ± 0.6 Hz.

Revise SR 4.8.1.1.2.g.6.c to say: Deleted.

Revise SR 4.8.1.1.2.g.7 to say:

Verifying the EDG operates for at least 24 hours at a power factor less than or equal to 0.9 as follows:^{***}

- a) ^{**} The EDG shall be loaded* to greater than or equal to 3825 kW and less than or equal to 4250 kW for at least 22 hours.
- b) ^{**} The EDG shall be loaded* to greater than 4463 kW and less than 4675 kW (105%-110%) for a minimum of 2 hours.

Revise SR 4.8.1.1.2.g.7.c to say: Deleted.

Insert a new NOTE at the bottom of Page 3/4 8-6 as follows:

- * This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable regarding loading recommendations.

Revise the existing NOTE at the bottom of Page 3/4 8-6 as follows:

- ** Momentary transients outside of the load or power factor ranges specified do not invalidate this test.

Insert a new NOTE at the bottom of Page 3/4 8-6 as follows:

- *** If grid conditions do not permit, the power factor limit is not required to be met. Under this condition, the power factor shall be maintained as close to 0.9 as practicable.

Revise SR 4.8.1.1.2.g.14 to say: Verifying that within 5 minutes of operating the diesel generator for at least 2 hours at a load of 3825-4250 kW**, the diesel starts on the auto-start signal (Loss of Off-Site Power signal), energizes the emergency busses with permanently connected loads within 10 seconds, energizes the auto-connected shutdown loads through the load sequencer, and operates for greater than or equal to 5 minutes while its generator is loaded with the shutdown loads. After energization of these loads, the steady-state voltage and frequency shall be maintained between 6840-7445 volts and 60 ± 0.6 Hz.

Insert new SR 4.8.1.1.2.g.15 (formerly SR 4.8.1.1.2.g.6.c, revised to say) as follows:

Verifying that all EDG trips, except engine overspeed, generator differential, and low lube oil pressure are automatically bypassed when operating in the emergency start mode.

Revise SR 4.8.1.1.2.h to say:

At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting the diesel generators simultaneously*, during shutdown, and verifying the following:

1. Both EDGs achieve a voltage greater than 6511 volts and frequency greater than 58.8 Hz in less than 10 seconds.

2. Both EDGs achieve a steady-state voltage greater than or equal to 6840 volts but less than or equal to 7445 volts and frequency greater than or equal to 59.4 Hz but less than or equal to 60.6 Hz.

Insert new NOTES at the bottom of Page 3/4 8-6a as follows:

- * This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable regarding loading recommendations.
- ** Momentary transients outside of the load or power factor ranges specified do not invalidate this test.

Revise BASES Pages B 3/4 8-2 and B 3/4 8-3.

BASES Page B 3/4 8-2 will be revised as follows:

Revise last paragraph to say: ... "Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants," Revision 3, July 1993, with exceptions as stated in Appendix 3A of the FSAR.

BASES Page B 3/4 8-3 will be revised as follows:

Delete paragraph 2 and replace with the following:

The Surveillance Requirement that assures the diesel generator is capable of performing its design function follows the guidance of Regulatory Guide 1.9, Revision 3. The surveillance tests the capability of the diesel generator to start and close its breaker in the required 10 seconds to support the accident analysis, and carry the required electrical loads while maintaining the voltage and frequency limits necessary to assure OPERABILITY of the loads. The specified minimum and maximum steady state voltage and frequency of the EDG are 6840-7445 volts and 60 ± 0.6 Hz (59.4 - 60.6 Hz). These values ensure the ESF pumps can achieve adequate fluid flow to meet their safety and accident mitigation functions.

The proposed revisions to Technical Specification 3/4.8.1, AC SOURCES – OPERATING, will provide surveillance enhancements that will improve operation and testing of the Emergency Diesel Generators. These changes are consistent with NUREG 1431, Revision 3, Standard Technical Specifications Westinghouse Plants, and the recommendations given in Regulatory Guide 1.9, Revision 3, "Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants" and SOER 03-1, Emergency Power

Reliability. Additional requested changes will provide a more restrictive voltage and frequency band for operation when not connected in parallel with the offsite sources.

3.0 BACKGROUND

The Emergency Diesel Generators (EDGs) at VCSNS are discussed in FSAR Section 8.3.1.1.2. The onsite Engineered Safeguard Features (ESF) AC power source consists of two EDGs and their associated auxiliary systems comprising the fuel oil, lube oil, cooling water, starting air, air intake and exhaust systems, and the automatic control circuitry. Each EDG consists of a turbo-charged, four-cycle diesel engine directly coupled to a 7.2 kV, 3-phase, 4250 kW (continuous rating) AC synchronous generator. The EDG ratings are 4250 kW continuous, 4676 kW for a 7-day rating and 5100 kW for a 30-minute rating. The EDGs are capable of starting and accepting load within 10 seconds after receiving an automatic start signal.

The EDGs are seismically qualified, safety-related and located in separate rooms. The Diesel Generators, including associated starting equipment and other auxiliaries, are completely isolated from one another by a wall designed to withstand a safe shutdown earthquake (SSE). They are connected to separate power trains and supply emergency AC power to electrical loads needed to achieve safe shutdown of the plant or mitigate the consequences of an accident coincident with the loss of the normal AC supply. With any credible single failure, the EDGs are capable of assuring safe shutdown during a loss of offsite power (LOOP) concurrent with a loss-of-coolant accident (LOCA).

EDG testing is required to assure the EDG retains the capability to perform its design function under the worst postulated conditions. Over the years however, much has been learned about the performance of the EDG and the impact of some of the testing on continued performance.

INPO Significant Operating Experience Report (SOER) 03-01, *Emergency Power Reliability*, was distributed to require that nuclear plants perform another review of their systems to improve reliability of the emergency power sources. Significant events continue to occur throughout the world and several plants have lost all onsite and offsite power.

V. C. Summer Nuclear Station (VCSNS) has completed its review and has determined that several changes to the VCSNS TS (Section 4.8.1) are desired in order to comply with some of the recommendations in the SOER. Additionally, EDG voltage and frequency variation are being incorporated into the Charging Pump performance requirements. To ease the impact, the allowable voltage and frequency uncertainty limits for steady state operation are being reduced. This is necessary to provide an acceptable Charging Pump flow balance window. This change will ensure that the Charging Pumps will continue to operate within their analyzed range. The new specifications for Diesel Generator voltage

and frequency are within the design capability of the Diesel Generator governor and voltage regulator.

4.0 TECHNICAL ANALYSIS

Offsite Power System

VCSNS is a single nuclear unit that shares a lake with the Fairfield pump hydro facility. Two separate sources of offsite power are provided for the Class 1E electric system, which is in compliance with General Design Criterion 17 and Regulatory Guide (RG) 1.32. One source is the SCE&G transmission grid terminating at the VCSNS 230 kV switchyard bus, which feeds the plant through a step down transformer. The second source is from the existing Parr Combustion Turbine Generating Complex over a 115 kV transmission line. This source is connected to the plant through onsite step down transformers and a separate regulating transformer. Each source is capable of supplying either or both trains of the ESF power. These two sources have sufficient separation and isolation so that loss of the VCSNS generation with the Fairfield Hydro Units off line will not degrade either of the sources below their acceptable voltage limit.

Onsite Power Sources

At VCSNS, the onsite ESF AC power source consists of two EDGs and their associated auxiliary systems comprising the fuel oil, lube oil, cooling water, starting air, air intake and exhaust systems, and the automatic control circuitry. Each EDG consists of a turbo-charged, four-cycle diesel engine directly coupled to a 7.2 kV, 3-phase, 4250 kW (continuous rating) AC synchronous generator. The EDG ratings are 4250 kW continuous, 4676 kW for a 7-day rating and 5100 kW for a 30-minute rating. The EDGs are capable of starting and accepting load within 10 seconds after receiving an automatic start signal.

The EDGs are seismically qualified, safety-related and located in separate rooms. The Diesel Generators, including associated starting equipment and other auxiliaries, are completely isolated from one another by a wall designed to withstand a safe shutdown earthquake (SSE). They are connected to separate power trains and supply emergency AC power to electrical loads needed to achieve safe shutdown of the plant or mitigate the consequences of an accident coincident with the loss of the normal AC supply. With any credible single failure, the EDGs are capable of assuring safe shutdown during a loss of offsite power (LOOP) concurrent with a loss-of-coolant accident (LOCA).

Reliability and Performance Monitoring

Equipment relied upon for supplying electric power and mitigating the loss of power events is included in the VCSNS Maintenance Rule Program and is monitored for equipment reliability and unavailability. If the performance or condition of these systems,

structures, or components (SSCs) does not meet established performance criteria, appropriate corrective action is taken.

The station Maintenance Rule Program provides confidence that the proper maintenance is being performed to ensure the EDG system remains capable of performing their intended functions. Should either EDG be assessed as having degrading performance, additional resources, up to and including management attention will be directed at the problem until confidence is restored.

Reliability Improvements

INPO SOER 03-01 discusses some of the fundamental causal factors and weak barriers that have contributed to recent emergency power system events. The analysis provided in INPO SOER 03-01 discusses preventive measures that may help reduce the potential for challenges to emergency power systems. Specific recommendations are included to help focus attention on those actions determined to be of highest importance and value.

Testing the EDGs to more realistic conditions such as a specified power factor range and an expanded load range will provide assurance that the EDGs will remain operable and capable of performing their required accident functions. Testing of actual demand conditions will preclude declaring the EDG inoperable due to a test that provides conditions that would not occur during an offsite power event.

The revised test acceptance criteria reflect the capability of the EDG governor and voltage regulator. No changes are being made in operational philosophy, testing frequency, how the system actually operates, or how the system is physically tested. This change does not affect the EDGs ability to supply minimum voltage and frequency within 10 seconds or the steady state voltage and frequency. The EDGs will continue to perform their intended safety function, in accordance with the safety analysis.

Surveillance Requirement Changes

4.8.1.1.2.a.3 - will be revised to remove the synchronous speed requirement. Specifying the required frequency is sufficient to verify that the EDG is at the required speed. The actual synchronous speed of the EDG is 514 rpm and not the 504 rpm value that is currently specified in the SR. Removing the requirement to verify synchronous speed will not impact the performance of the EDG as the speed is directly related to the output frequency of the generator. In addition, the revised surveillance also raises the minimum allowable EDG bus voltage from 6480 volts to 6511 volts. VCSNS review of IN 2007-09, discovered an inconsistency within TS whereby TS Section 3/4.3.2, Table 3.3-4, has the design calculated minimum EDG bus voltage of 6511 volts to ensure equipment operability, whereas TS section 3/4.8.1.1 has a minimum voltage of 6480 volts (7200 - 720 volts) for diesel operability. Raising the minimum voltage for diesel operability to the

design calculated minimum voltage for equipment operability provides consistency in TS 3/4.3.2, Table 3.3-4, and meets the intent of IN 2007-09.

4.8.1.1.2.a.4 - will be revised to expand the load range from between 4150 kW - 4250 kW to between 3825 kW - 4250 kW. This corresponds to the load range recommended in RG 1.9, Revision 3, of 90% to 100% of the continuously rated load. Also, power factor limits were added in order to implement the recommendations resulting from the review of INPO SOER 03-01, recommendation 5, which recommends that testing be representative of actual conditions. This surveillance is also modified by two notes at the bottom of Page 3/4 8-3.

- Revise the existing NOTE at the bottom of Page 3/4 8-3 as follows:

** Momentary transients outside of the load or power factor range specified do not invalidate this test.

Allowing for momentary transients that exceed the load or power factor limit do not invalidate the testing as the transients are not sufficient to damage the EDG. The ratings for the EDG are specified such that overloads are permitted for short periods of time. The greater the overload, the shorter the time allowed. These ratings are specified by the vendor and protect the EDG. Conversely, momentary transients below the ranges specified should not invalidate a test since the intent of the test is still being satisfied. This change is administrative in nature and intended to provide clarity.

- Insert a new NOTE at the bottom of Page 3/4 8-3 as follows:

*** If grid conditions do not permit, the power factor limit is not required to be met. Under this condition, the power factor shall be maintained as close to 0.9 as practicable.

The power factor limit is representative of the actual inductive loading an EDG would see under design basis accident conditions. However, when synchronized to the grid and grid voltage is high, the additional field excitation needed to lower the power factor to less than or equal to 0.9 results in no-load voltages on the emergency busses that are too high. Under these conditions, the power factor should be maintained as close as practicable to 0.9 while still maintaining acceptable voltage limits on the emergency busses. This revision is intended to incorporate the recommendations of INPO SOER 03-01 which recommends that testing be performed under conditions that are as close to design basis conditions as possible, while providing the flexibility needed to test the EDG when it is synchronized to the electrical grid.

4.8.1.1.2.f.1 - will be revised to change the word verify to verifying to be consistent with the wording of the other surveillance requirements on the page. This is an administrative change.

4.8.1.1.2.f.1.a - will be revised to incorporate the revised minimum EDG bus voltage for equipment operability. VCSNS review of IN 2007-09 determined the previous minimum bus voltage of 6480 volts was less than the calculated minimum EDG bus voltage for equipment operability. The revised minimum degraded bus voltage value of 6511 volts will replace the previous minimum of 6480 volts and eliminate an inconsistency in TS Sections 3/4.3.2 and 3/4.8.1.

4.8.1.1.2.f.1.b – will be revised to tighten voltage and frequency bands during steady state operation. The steady state EDG frequency band will be decreased from +/-1.2 Hz to +/-0.6 Hz. The steady state EDG voltage band will be decreased from 6840 - 7560 volts to 6840 - 7445 volts. The revised band only applies to surveillances when the EDG is not synchronized to offsite power and the EDG governor and voltage regulator are controlling frequency and voltage. The reason for narrowing the steady state operating band for voltage and frequency is to decrease the impact for supplied AC Motors during steady state operation. Variation in supplied voltage and frequency results in variation in motor speed. Variation in pump motor speed results in variation in the pump head-flow curves. This must be taken into account in pump performance testing. The narrow band will specifically be applied to the charging pump flow balancing and pump performance testing.

4.8.1.1.2.f.2 - This surveillance will be deleted as a separate test item. A fast load test is not required by R.G. 1.9 Rev 3. Diesel generator load tests are performed monthly in accordance with S.R. 4.8.1.1.2a.4

4.8.1.1.2.g.2 - will be revised to include a power factor limit as well as provide a revised frequency limit of 63 Hz and a time requirement of 3 seconds to establish steady state frequency and voltage conditions during step load increases. These changes are being made in order to implement recommendations resulting from VCSNS review of INPO SOER 03-01, recommendation 5, which recommends that testing be representative of actual conditions.

Allowing a momentary transient during load rejection to affect the output frequency of the EDG as long as output frequency is maintained less than or equal to 63 hertz is acceptable as long as the EDG does not trip on overspeed. Per RG 1.9, Revision 3, the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint or 115% of nominal, whichever is lower. The speed that corresponds to 63 hertz is approximately 540 rpm, which is approximately 50% of the difference between the trip setpoint and synchronous speed.

The time requirements allowing frequency and voltage to stabilize and return to acceptable steady state conditions are specified in RG 1.9, Revision 3. Three seconds is 60% of the interval between sequencing loads onto the EDG and is considered to be sufficient time to recover from the effects of adding the largest load onto the EDG. Four seconds is 80% of the load sequencing interval and provides sufficient time for frequency recovery following rejection of the single largest load.

4.8.1.1.2.g.3 - will be revised to specify an expanded full load range of between 3825 kW and less than or equal to 4250 kW, include a power factor limit, and specify a maximum allowable voltage. The allowable voltage limit of 8640 volts during full load rejection testing is 20% greater than the nominal EDG voltage. Due to the response of the EDG to a transient such as a load rejection, the voltage will increase as the EDG speeds up, and the magnitude of the increase is partially dependant on the power factor carried by the EDG at the instant the load rejection occurs. 20% is generally considered the maximum voltage increase that will occur under these circumstances.

A 20% over-voltage is acceptable during the performance of this load rejection test. Based on discussion with the manufacturer, there would be no significant adverse affect on the generator or the voltage regulator/excitation equipment in seeing a momentary over-voltage as high as 20%.

The intent of this test is to show that should the EDG output breaker open under fully loaded emergency conditions, the voltage overshoot would not damage the voltage regulator, generator windings, etc. It should also be noted that this test is conducted with the EDG in droop mode and synchronized to the electrical grid, whereas the EDG is in isochronous mode should a real event occur. The voltage overshoot is expected to be less when the EDG is operated in isochronous mode.

- Delete the existing NOTE** at the bottom of Page 3/4 8-4 and insert with the following:

*** If grid conditions do not permit, the power factor limit is not required to be met. Under this condition, the power factor shall be maintained as close to 0.9 as practicable.

This NOTE is the same as at the bottom of Page 3/4 8-3 and was previously discussed.

4.8.1.1.2.g.4.b - will be revised to provide a more restrictive voltage and frequency band for steady state operation when the EDG is not paralleled to the offsite power source. EDG voltage and frequency variation are being incorporated into the Charging Pump performance requirements. To ease the impact, the allowable voltage and frequency uncertainty limits for steady state operation are being reduced. This will ensure that the Charging Pumps continue to operate within their analyzed range. Historical test data indicates the EDG has not been challenged in satisfying these tighter limits.

4.8.1.1.2.g.5 – will be revised to increase the minimum allowable EDG bus voltage from 6480 volts to 6511 volts resulting from VCSNS review of IN 2007-09. The revised surveillance also provides a more restrictive voltage and frequency band for steady state operation when the EDG is not paralleled to the offsite power source. EDG voltage and frequency variation are being incorporated into the Charging Pump performance requirements. To ease the impact, the allowable voltage and frequency uncertainty limits for steady state operation are being reduced. This will ensure that the Charging Pumps continue to operate within their analyzed range.

4.8.1.1.2.g.6.b - will be revised to provide a more restrictive voltage and frequency band for steady state operation when the EDG is not paralleled to the offsite power source. EDG voltage and frequency variation are being incorporated into the Charging Pump performance requirements. To ease the impact, the allowable voltage and frequency uncertainty limits for steady state operation are being reduced. This will ensure that the Charging Pumps continue to operate within their analyzed range. Historical test data indicates the EDG has not been challenged in satisfying these tighter limits.

4.8.1.1.2.g.6.c – will be deleted. Old SR 4.8.1.1.2.g.6.c is revised to become new SR 4.8.1.1.2.g.15. The present requirement requires these tests to be performed during the integrated safeguards testing which is both complex and resource intensive. The EDG trips to be verified as being bypassed can be verified at any time during the performance of any surveillance test which requires the Diesel Generator to be operated in the emergency mode.

4.8.1.1.2.g.7 - will be revised to provide a power factor limit during the 24 hour run, as well as expand the continuous load range to between 90% and 100% of the continuous load rating and the overload range to between 105% and 110%. Further, the overload portion of the test will be performed during the 24 hour run instead of the first 2 hours. These changes are consistent with RG 1.9, Revision 3, and make the testing more realistic, as recommended in INPO SOER 03-01.

4.8.1.1.2.g.7.c - will be deleted as voltage and frequency cannot be controlled by the EDG when paralleled to the offsite power source.

Insert new NOTES at the bottom of Page 3/4 8-6 and revise the existing NOTES as follows:

- Insert a new NOTE at the bottom of Page 3/4 8-6 as follows:

* This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable regarding loading recommendations.

Note* is being inserted to provide flexibility in the testing of the EDG in order to slow start and load the EDG in accordance with the recommendations in RG 1.9, Revision 3. This note previously existed in the Technical Specifications on Page 3/4 8-3.

- Revise the existing NOTE at the bottom of Page 3/4 8-6 as follows:

** Momentary transients outside of the load or power factor range specified do not invalidate this test.

- Insert a new NOTE at the bottom of Page 3/4 8-6 as follows:

*** If grid conditions do not permit, the power factor limit is not required to be met. Under this condition, the power factor shall be maintained as close to 0.9 as practicable.

NOTE** and NOTE*** are the same as those at the bottom of Page 3/4 8-3 and have been previously discussed.

4.8.1.1.2.g.14 - will be revised to expand the continuous load limit, run the diesel for 2 hours, and provide a more restrictive voltage and frequency band for steady state operation when the EDG is not paralleled to the offsite power source. The changes satisfy recommendations in RG 1.9, Revision 3, for the EDG to be tested at 90% to 100% of continuous load rating and be run for two hours prior to the hot restart test. The change also ensure that the Charging Pumps continue to operate within their analyzed range after EDG voltage and frequency variations are incorporated into the Charging Pump performance requirements.

4.8.1.1.2.g.15 (new) - this SR was 4.8.1.1.2.g.6.c. The present requirement requires these tests to be performed during the integrated safeguards testing which is both complex and resource intensive. The EDG trips to be verified as being bypassed can be verified at any time during the performance of any surveillance test which requires the Diesel Generator to be operated in the emergency mode.

4.8.1.1.2.h - will be revised to specify voltage and frequency limits. This SR demonstrates that the EDG starting independence has not been compromised, and that the engine can achieve proper speed within the specified time when the EDGs are started simultaneously. The synchronous speed requirement is being deleted as it is redundant to the frequency. The actual synchronous speed of the EDGs is 514 rpm which corresponds to 60 hertz.

- Insert new NOTES at the bottom of Page 3/4 8-6a as follows:

- * This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable regarding loading recommendations.

Note * is being inserted to provide flexibility in the testing of the EDG in order to slow start and load the EDG in accordance with the recommendations in RG 1.9, Revision 3.

- ** Momentary transients outside of the load or power factor range specified do not invalidate this test.

Note ** is the same as the bottom of Page 3/4 8-3 and has been previously discussed.

Revise BASES Pages B 3/4 8-2 and B 3/4 8-3.

BASES Page B 3/4 8-2 will be revised as follows:

Revise last paragraph to say: ... "Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants," Revision 3, July 1993, with exceptions as stated in Appendix 3A of the FSAR,

Revision to BASES B 3/4 8-2 reflects the use of Regulatory Guide (RG) 1.9, Revision 3, for surveillance testing. VCSNS is currently committed to RG 1.9, Revision 0, and RG 1.108, Revision 1. RG 1.9, Revision 3, incorporated the provisions of RG 1.108, Revision 1.

VCSNS commits to RG 1.9, Revision 3, with the following exceptions:

1. Design provisions of IEEE Std 387-1984 as referenced in RG 1.9, Revision 3. VCSNS is designed to IEEE Std 387-1972.
2. The Refueling Outage surveillance test frequency as outlined in Table 1 of RG 1.9, Revision 3. VCSNS performs these diesel generator surveillances per Technical Specifications every 18 months which may occur during plant conditions other than refueling outages.

BASES Page B 3/4 8-3 will be revised as follows:

Delete paragraph 2 and replace with the following:

The Surveillance Requirement that assures the diesel generator is capable of performing its design function follows the guidance of Regulatory Guide 1.9, Revision 3. The surveillance tests the capability of the diesel generator to start and close its breaker in the required 10 seconds to support the accident analysis, and carry the required electrical loads while maintaining the voltage and frequency limits necessary to assure OPERABILITY of the loads. The specified minimum and maximum steady state voltage and frequency of the EDG are 6840-7445 volts and 60 ± 0.6 Hz (59.4 - 60.6 Hz). These values ensure the ESF pumps can achieve adequate fluid flow to meet their safety and accident mitigation functions.

Revision to the BASES section also documents the bases for the new voltage and frequency requirements inserted into the revised Surveillance Requirements SR 4.8.1.1.2.f.1.b, SR 4.8.1.1.2.g.4.b, SR 4.8.1.1.2.g.5, SR 4.8.1.1.2.g.6.b, SR 4.8.1.1.2.g.14, and SR 4.8.1.1.2.h.

5.0 REGULATORY SAFETY ANALYSIS

5.1 No Significant Hazards Consideration

SCE&G has evaluated the proposed changes to the VCSNS license described above against the significant hazards criteria of 10 CFR 50.92 and has determined that the changes do not involve any significant hazard. The following is provided in support of this conclusion.

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

No.

The changes proposed by this license amendment will revise the Surveillance Requirements of Technical Specification 3/4.8.1, AC SOURCES – OPERATING, to expand the continuous rated load specification to a range of 90% to 100% of the continuous rated load, specify an overload range of 105% to 110% of the continuous rated load, add a power factor limit while testing, allow gradual loading and unloading of the EDG, specify a maximum frequency for the overspeed limit, specify a maximum allowable overspeed voltage, and add a more restrictive voltage and frequency band for testing during steady state operation.

The majority of these changes are being proposed in order to implement recommendations contained in INPO Significant Operating Experience Report (SOER) 03-01, *Emergency Power Reliability*, Recommendation Number 5, which recommends that the utility review testing practices for emergency power systems to verify that the practices are representative of actual demand conditions and appropriately exercise equipment that is expected to respond in an actual demand condition. These changes are based on the guidance provided by Regulatory Guide 1.9, Revision 3, *Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plant*.

The more restrictive voltage and frequency band for testing during steady state operation is proposed to ease the impact of EDG voltage and frequency that are being incorporated into the Charging Pump performance requirements. The allowable voltage and frequency uncertainty limits for steady state operation are being reduced. This will ensure that the Charging Pumps continue to operate within their analyzed range.

These changes do not affect the probability or consequences of an accident previously evaluated because the proposed changes do not make a change to any accident initiator, initiating condition, or assumption. The proposed changes do not involve a significant change to the plant design or operation. These changes do not invalidate assumptions used in evaluating the radiological consequences of an accident, do not alter the source term or containment isolation, and do not provide a new radiation release path or alter a potential radiological release. Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

No.

These changes do not create the possibility of a new or different kind of accident from any accident previously evaluated because the proposed changes do not introduce a new or different accident initiator or introduce a new or different equipment failure mode or mechanism.

No changes are being made in equipment hardware or software, operational philosophy, testing frequency, or how the system actually operates. Therefore, the proposed amendment will not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

No.

These changes do not involve a significant reduction in a margin of safety because the proposed changes do not reduce the margin of safety that exists in the present Technical Specifications or Updated Final Safety Analysis Report. The operability requirements of the Technical Specifications are consistent with the initial condition assumptions of the safety analyses. The proposed changes do not affect the Action statement requirements for the various levels of degradation in the EDG. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, SCE&G concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

10 CFR 50.36 (c) (3), Surveillance Requirements requires that surveillances be performed to assure the necessary quality of systems and components be maintained, that the facility operation will be within safety limits, and that the limiting condition for operation will be met.

10 CFR 50 Appendix A, Criterion 17, Electric Power Systems, requires an onsite electric power system and an offsite electric power system to permit functioning of structures, systems, and components important to safety.

10 CFR 50 Appendix A, Criterion 18, Inspection and Testing of Electric Power Systems, and 10 CFR 50 Appendix B, Criterion XI, Test Control, both require established programs for assuring that the Systems Structures and Components (SSCs) are demonstrated operable on a periodic basis.

Regulatory Guide 1.9, Revision 3, is based on guidance of IEEE Std 387-1984. The design of the diesel generators at VCSNS is based on guidance of IEEE Std 387-1972. IEEE Std 387-1972, however, encompasses design considerations outlined in Regulatory Guide 1.9, Revision 3. Additionally, periodic testing of VCSNS diesel generators conform to the guidance provided in Regulatory Guide 1.9, Revision 3, which incorporated guidance provided in Regulatory Guide 1.108, Revision 1.

The proposed changes do not violate any requirement or recommended method for assuring the operability of the EDG and maintaining the plant design and licensing basis.

The change verifies the required parameters are within the prescribed limits and independently verifies that the values assumed in the accident analysis are satisfied. This testing is performed at the stated frequencies to assure continued operability of the EDG.

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

6.0 ENVIRONMENTAL CONSIDERATION

SCE&G has determined that the proposed amendment would change requirements with respect to the installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. SCE&G has evaluated the proposed changes and has determined that the changes do not involve, (i) a significant hazards consideration, (ii) a significant change in the types of or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed changes meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51, specifically 10 CFR 51.22(c)(9). Therefore, pursuant 10 CFR 51.22(b), an environmental assessment of the proposed change is not required.

7.0 REFERENCES

1. NUREG 1431, Revision 3, *Standard Technical Specifications Westinghouse Plants*
2. Regulatory Guide 1.9, Revision 3, *Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants*
3. Regulatory Guide 1.108, Revision 1, *Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants*
4. Institute of Nuclear Power Operations (INPO) Significant Operating Experience Report (SOER), 03-1, *Emergency Power Reliability*
5. NRC Information Notice 2007-09, *Equipment Operability Under Degraded Voltage Conditions*

ATTACHMENT I

PROPOSED TECHNICAL SPECIFICATION CHANGES (MARK-UP)

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

Remove Pages

3/4 8-3
3/4 8-4
3/4 8-5
3/4 8-6
3/4 8-6a

B 3/4 8-2
B 3/4 8-3

Insert Pages

3/4 8-3
3/4 8-4
3/4 8-5
3/4 8-6
3/4 8-6a

B 3/4 8-2
B 3/4 8-3

Technical Specification Mark-Up Insertions

Insert 1

Revise SR 4.8.1.1.2.a.3 to say: Verifying the diesel generator starts* and achieves a voltage of greater than or equal to 6511 volts but less than or equal to 7920 volts and frequency of 60 ± 1.2 Hz (58.8 – 61.2 Hz).

Insert 2

Revise SR 4.8.1.1.2.a.4 to say: Verifying the generator is synchronized, gradually loaded* to greater than or equal to 3825 kW and less than or equal to 4250 kW** while operating at a power factor less than or equal to 0.9 for at least 60 minutes.***

Insert 3

Revise the existing NOTE at the bottom of Page 3/4 8-3 as follows:

** Momentary transients outside of the load or power factor range specified do not invalidate this test.

Insert a new NOTE at the bottom of Page 3/4 8-3 as follows:

*** If grid conditions do not permit, the power factor limit is not required to be met. Under this condition, the power factor shall be maintained as close to 0.9 as practicable.

No Insert

Revise 4.8.1.1.2.f.1: change the word verify to verifying to be consistent with the wording of the other surveillance requirements on the page.

Insert 4

Revise 4.8.1.1.2.f.1.a. to say: In less than or equal to 10 seconds, achieves a voltage greater than or equal to 6511 volts and a frequency greater than 58.8 Hz (60 – 1.2 Hz).

Insert 5

Revise 4.8.1.1.2.f.1.b. to say: Achieves a steady state voltage greater than or equal to 6840 volts but less than or equal to 7445 volts and a steady state frequency greater than or equal to 59.4 Hz but less than or equal to 60.6 Hz.

Insert 6

Revise 4.8.1.1.2.f.2 to say: Deleted.

Insert 7

Revise SR 4.8.1.1.2.g.2 to say: Verifying that on a load rejection of greater than or equal to 729 kW while operating at a power factor less than or equal to 0.9^{***}, frequency is maintained less than or equal to 63 Hz following the load rejection. Additionally, within 3 seconds following the load rejection, voltage is restored to greater than or equal to 6511 volts but less than or equal to 7920 volts and within 4 seconds frequency is restored to 60 ± 1.2 Hz.

Insert 8

Revise SR 4.8.1.1.2.g.3 to say: Verifying that on a load rejection of greater than or equal to 3825 kW and less than or equal to 4250 kW while operating at a power factor less than or equal to 0.9, the EDG does not trip. The generator voltage shall not exceed 8640 volts during and following the load rejection. ^{***}

Insert 9

Delete the existing NOTE^{**} at the bottom of Page 3/4 8-4 and insert with the following:

^{***} If grid conditions do not permit, the power factor limit is not required to be met. Under this condition, the power factor shall be maintained as close to 0.9 as practicable.

Insert 10

Revise SR 4.8.1.1.2.g.4.b to say: ...voltage and frequency shall be maintained between 6840-7445 volts and 60 ± 0.6 Hz.

Insert 11

Revise SR 4.8.1.1.2.g.5 to say: ...achieves a voltage greater than 6511 volts and a frequency greater than 58.8 Hz. After steady state operation is obtained, the EDG shall be verified to have a voltage greater than or equal to 6840 volts but less than or equal to 7445 volts and a frequency greater than or equal to 59.4 Hz but less than or equal to 60.6 Hz.

Insert 12

Revise SR 4.8.1.1.2.g.6.b to say: ...voltage and frequency between 6840-7445 volts and 60 ± 0.6 Hz.

Insert 13

Revise SR 4.8.1.1.2.g.6.c to say: Deleted.

Insert 14

Revise SR 4.8.1.1.2.g.7 to say:

Verifying the EDG operates for at least 24 hours at a power factor less than or equal to 0.9 as follows:***

- a) ** The EDG shall be loaded* to greater than or equal to 3825 kW and less than or equal to 4250 kW for at least 22 hours.
- b) ** The EDG shall be loaded* to greater than 4463 kW and less than 4675 kW (105%-110%) for a minimum of 2 hours.

Insert 15

Revise SR 4.8.1.1.2.g.7.c to say: Deleted.

Insert 16

Insert a new NOTE at the bottom of Page 3/4 8-6 as follows:

- * This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable regarding loading recommendations.

Insert 17

Revise the existing NOTE at the bottom of Page 3/4 8-6 as follows:

- ** Momentary transients outside of the load or power factor range specified do not invalidate this test.

Insert a new NOTE at the bottom of Page 3/4 8-6 as follows:

- *** If grid conditions do not permit, the power factor limit is not required to be met. Under this condition, the power factor shall be maintained as close to 0.9 as practicable.

Insert 18

Revise SR 4.8.1.1.2.g.14 to say: Verifying that within 5 minutes of operating the diesel generator for at least 2 hours at a load of 3825-4250 kW**, the diesel starts on the auto-start signal (Loss of Off-Site Power signal), energizes the emergency busses with permanently connected loads within 10 seconds, energizes the auto-connected shutdown loads through the load sequencer, and operates for greater than or equal to 5 minutes while its generator is loaded with the shutdown loads. After energization of these loads, the steady-state voltage and frequency shall be maintained between 6840-7445 volts and 60 ± 0.6 Hz.

Insert 19

Insert new SR 4.8.1.1.2.g.15 (formerly SR 4.8.1.1.2.g.6.c, revised to say) as follows:

Verifying that all EDG trips, except engine overspeed, generator differential, and low lube oil pressure are automatically bypassed when operating in the emergency start mode.

Insert 20

Revise SR 4.8.1.1.2.h to say:

At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting the diesel generators simultaneously*, during shutdown, and verifying the following:

1. Both EDGs achieve a voltage greater than 6511 volts and frequency greater than 58.8 Hz in less than 10 seconds.
2. Both EDGs achieve a steady-state voltage greater than or equal to 6840 volts but less than or equal to 7445 volts and frequency greater than or equal to 59.4 Hz but less than or equal to 60.6 Hz.

Insert 21

Insert new NOTES at the bottom of Page 3/4 8-6a as follows:

- * This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable regarding loading recommendations.
- ** Momentary transients outside of the load or power factor range specified do not invalidate this test.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 Each EDG shall be demonstrated OPERABLE:

- INSERT 1
- INSERT 2
- a. At least once per 31 days on a STAGGERED TEST BASIS by:
 1. Verifying the fuel level in the day tank and fuel storage tank.
 2. Verifying the fuel transfer pump can be started and transfers fuel from the storage system to the day tank.
 3. ~~Verifying the diesel generator can start* and accelerate to synchronous speed (504 rpm) with generator voltage and frequency at 7200 ± 720 volts and 60 ± 1.2 Hz.~~
 4. ~~Verifying the generator is synchronized, gradually loaded** to an indicated 4150-4250 kW** and operates for at least 60 minutes.~~
 - b. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to 1 hour by removing accumulated water from the day tank.
 - c. At least once per 31 days by checking for and removing accumulated water from the fuel oil storage tanks.
 - d. By sampling new fuel oil based on the applicable ASTM standard prior to addition to storage tanks and:
 1. By verifying based on the tests specified in the applicable ASTM standard prior to addition to the storage tanks that the sample has:
 - a) An API Gravity of within 0.3 degrees at 60°F or a specific gravity of within 0.0016 at 60/60°F, when compared to the supplier's certificate, or an absolute specific gravity at 60/60°F of greater than or equal to 0.83 but less than or equal to 0.89, or an API gravity of greater than or equal to 27 degrees but less than or equal to 39 degrees;
 - b) A kinematic viscosity at 40°C of greater than or equal to 1.9 centistokes, but less than or equal to 4.1 centistokes (alternatively, Saybolt viscosity, SUS at 100°F of greater than or equal to 32.6, but less than or equal to 40.1), if gravity was not determined by comparison with the supplier's certification;

* This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prefire and warmup procedures, and as applicable regarding loading recommendations.

INSERT 3
** This band is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band shall not invalidate the test.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

- c) A flash point equal to or greater than 125°F; and
 - d) A clear and bright appearance when tested based on the applicable ASTM standard.
2. By verifying within 30 days of obtaining the sample that the specified properties are met when tested based on the applicable ASTM standard.
- e. At least once every 31 days by obtaining a sample of fuel oil based on the applicable ASTM standard, and verifying that total contamination is less than 10 mg/liter when checked based on the applicable ASTM standard.
 - f. At least once per 184 days by:

No INSERT

- 1. ^{Verifying} ~~Verify~~ each EDG starts from standby conditions and:

INSERT 4

a) ~~In less than or equal to 10 seconds, achieves a voltage greater than 6480 volts (7200 - 720 volts) and a frequency greater than 58.8 Hz (60 - 1.2 Hz).~~

INSERT 5

b) ~~Achieve a steady state voltage greater than 6480 volts but less than 7920 volts and a steady state frequency greater than 58.8 Hz but less than 61.2 Hz.~~

The EDG shall be started for this test by using one of the following signals:

- a) Simulated loss of offsite power by itself.
- b) Simulated loss of offsite power in conjunction with an ESF actuation test signal.
- c) An ESF actuation test signal by itself.
- d) Simulated degraded offsite power by itself.
- e) Manual.

INSERT 6

2. ~~The generator shall be manually synchronized, loaded to an indicated 4150-4250 kW** in less than or equal to 60 seconds, and operate for at least 60 minutes.~~

- g. At least once every 18 months by:

1. Deleted.

INSERT 7

2. ~~Verifying that on rejection of a load of greater than or equal to 729 kW, the voltage and frequency are maintained at 7200 ± 720 volts and frequency at 60 ± 1.2 Hz.~~

INSERT 8

3. ~~Verifying the generator capability to reject a load of 4250 kW without tripping. The generator voltage shall not exceed 7920 volts during and following the load rejection.~~

INSERT 9

~~** This band is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band shall not invalidate the test.~~

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

4. Simulating a loss of offsite power by itself, and:
- Verifying de-energization of the emergency busses and load shedding from the emergency busses.
 - Verifying the diesel starts on the auto-start signal, energizes the emergency busses with permanently connected loads within 10 seconds, energizes the auto-connected shutdown loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the shutdown loads. After energization of these loads, the steady state voltage and frequency shall be maintained at 7200 ± 720 volts and 60 ± 1.2 Hz.

INSERT 10

5. Verifying that on an ESF actuation test signal, without loss of offsite power, the diesel generator starts on the auto-start signal and operates on standby for greater than or equal to 5 minutes. Verify that the EDG starts from standby conditions and in less than or equal to 10 seconds, achieves a voltage greater than 6480 volts and a frequency greater than 58.8 Hz. After steady state operation is obtained, the EDG shall be verified to have a voltage greater than 6480 volts but less than 7920 volts and a frequency greater than 58.8 Hz but less than 61.2 Hz. After 5 minutes of standby operation verify that on a simulated loss of offsite power:

INSERT 11

- the loads are shed from the emergency busses,
- the diesel generator does not connect to the bus for at least 5 seconds, and
- that subsequent loading of the diesel generator is in accordance with design requirements.

6. Simulating a loss of offsite power in conjunction with an ESF actuation test signal, and

- Verifying de-energization of the emergency busses and load shedding from the emergency busses.
- Verifying the EDG starts in the emergency mode, energizes the emergency busses with permanently connected loads within 10 seconds, energizes the auto-connected emergency (accident) loads through the load sequencer and operates for greater than or equal to 5 minutes and maintains the steady state voltage and frequency at 7200 ± 720 volts and 60 ± 1.2 Hz.

INSERT 12

- Verifying that all EDG trips, except engine overspeed, generator differential and low lube oil pressure are automatically bypassed upon loss of voltage on the emergency bus concurrent with a safety injection actuation signal.

INSERT 13

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

INSERT 14

7. Verifying the EDG operates for at least 24 hours:
- a) The EDG shall be loaded to the continuous rating (4150-4250 kW^{**}) for the time required to reach engine temperature equilibrium, at which time the EDG shall be loaded to an indicated target value of 4676 kW (between 4600-4700 kW^{**}) and maintained for 2 hours.
 - b) During the remaining 22 hours of this test, the EDG shall be loaded to an indicated 4150-4250 kW^{**}.

INSERT 15

c) During this test the steady state voltage and frequency shall be maintained at 7200 ± 720 volts and 60 ± 1.2 Hz.

8. Verifying that the auto-connected loads to each EDG do not exceed the 2000 hour rating of 4548 kW.
9. Verifying the EDG's capability to:
- a) Synchronize with the offsite power source while the generator is loaded with its emergency loads upon a simulated restoration of offsite power,
 - b) Transfer its loads to the offsite power source, and
 - c) Be restored to its standby status.
10. Verifying that with the diesel generator operating in a test mode, connected to its bus, a simulated safety injection signal overrides the test mode by (1) returning the diesel generator to standby operation and (2) automatically energizes the emergency loads with offsite power.
11. Verifying that the fuel transfer pump transfers fuel from each fuel storage tank to the day tank of each diesel via the installed cross connection lines.
12. Verifying that the automatic load sequence timer is OPERABLE with the interval between each load block within $\pm 10\%$ of its design interval.
13. Verifying that the following diesel generator lockout features prevent diesel generator starting only when required:
- a) Barring Device
 - b) Remote-Local-Maintenance Switch

INSERT 18

INSERT 16 (ADD NEW NOTE)

14. Verifying that within 5 minutes of operating the diesel generator for at least 1 hour at a load of 4150-4250 kW^{**} the diesel starts on the auto-start signal (Loss of Off-Site Power signal), energizes the emergency bus(es) with permanently connected loads

INSERT 17

** This band is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band shall not invalidate the test.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

INSERT 18 (CONT.)

within 10 seconds, energizes the auto-connected shutdown loads through the load sequencer, and operates for greater than or equal to 5 minutes while its generator is loaded with the shutdown loads. After energization of these loads, the steady-state voltage and frequency shall be maintained at 7200 ± 720 volts and 60 ± 1.2 Hz.

INSERT 19 (NEW)

h.

INSERT 20

At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting the diesel generators simultaneously, during shutdown, and verifying that the diesel generators accelerate to at least 504 rpm in less than or equal to 10 seconds.

i. At least once per 10 years by:

1. Draining each fuel oil storage tank, removing the accumulated sediment and cleaning the tank using a sodium hypochlorite solution or its equivalent, and
2. Performing a pressure test of those portions of the diesel fuel oil system designed to Section III subsection ND of the ASME Code in accordance with Specification 4.0.5.

INSERT 21 (NEW NOTES)

Document Control Desk
Attachment II
CR-10-02033
RC-10-0092
Page 1 of 6

ATTACHMENT II

PROPOSED TECHNICAL SPECIFICATION CHANGES (RETYPE)

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 Each EDG shall be demonstrated OPERABLE:

- a. At least once per 31 days on a STAGGERED TEST BASIS by:
 1. Verifying the fuel level in the day tank and fuel storage tank.
 2. Verifying the fuel transfer pump can be started and transfers fuel from the storage system to the day tank.
 3. Verifying the diesel generator starts* and achieves a voltage of greater than or equal to 6511 volts but less than or equal to 7920 volts and frequency of 60 ± 1.2 Hz (58.8 - 61.2 Hz).
 4. Verifying the generator is synchronized, gradually loaded* to greater than or equal to 3825 kW and less than or equal to 4250 kW** while operating at a power factor less than or equal to 0.9 for at least 60 minutes. ***
- b. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to 1 hour by removing accumulated water from the day tank.
- c. At least once per 31 days by checking for and removing accumulated water from the fuel oil storage tanks.
- d. By sampling new fuel oil based on the applicable ASTM standard prior to addition to storage tanks and:
 1. By verifying based on the tests specified in the applicable ASTM standard prior to addition to the storage tanks that the sample has:
 - a) An API Gravity of within 0.3 degrees at 60°F or a specific gravity of within 0.0016 at 60/60°F, when compared to the supplier's certificate, or an absolute specific gravity at 60/60°F of greater than or equal to 0.83 but less than or equal to 0.89, or an API gravity of greater than or equal to 27 degrees but less than or equal to 39 degrees;
 - b) A kinematic viscosity at 40°C of greater than or equal to 1.9 centistokes, but less than or equal to 4.1 centistokes (alternatively, Saybolt viscosity, SUS at 100°F of greater than or equal to 32.6, but less than or equal to 40.1), if gravity was not determined by comparison with the supplier's certification;

* This test shall be conducted in accordance with the manufacturer's recommendations regarding engine pre-lube and warmup procedures, and as applicable regarding loading recommendations.

** Momentary transients outside of the load or power factor range specified do not invalidate this test.

*** If grid conditions do not permit, the power factor limit is not required to be met. Under this condition, the power factor shall be maintained as close to 0.9 as practicable.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

- c) A flash point equal to or greater than 125°F; and
 - d) A clear and bright appearance when tested based on the applicable ASTM standard.
2. By verifying within 30 days of obtaining the sample that the specified properties are met when tested based on the applicable ASTM standard.
- e. At least once every 31 days by obtaining a sample of fuel oil based on the applicable ASTM standard, and verifying that total contamination is less than 10 mg/liter when checked based on the applicable ASTM standard.
- f. At least once per 184 days by:
- 1. Verifying each EDG starts from standby conditions and:
 - a) In less than or equal to 10 seconds, achieves a voltage greater than or equal to 6511 volts and a frequency greater than 58.8 Hz (60 - 1.2 Hz).
 - b) Achieves a steady state voltage greater than or equal to 6840 volts but less than or equal to 7445 volts and a steady state frequency greater than or equal to 59.4 Hz but less than or equal to 60.6 Hz.
- The EDG shall be started for this test by using one of the following signals:
- a) Simulated loss of offsite power by itself.
 - b) Simulated loss of offsite power in conjunction with an ESF actuation test signal.
 - c) An ESF actuation test signal by itself.
 - d) Simulated degraded offsite power by itself.
 - e) Manual.
2. Deleted.
- g. At least once every 18 months by:
- 1. Deleted.
 - 2. Verifying that on a load rejection of greater than or equal to 729 kW while operating at a power factor less than or equal to 0.9^{***}, frequency is maintained less than or equal to 63 Hz following the load rejection. Additionally, within 3 seconds following the load rejection, voltage is restored to greater than or equal to 6511 volts but less than or equal to 7920 volts and within 4 seconds frequency is restored to 60 ± 1.2 Hz.
 - 3. Verifying that on a load rejection of greater than or equal to 3825 kW and less than or equal to 4250 kW while operating at a power factor less than or equal to 0.9, the EDG does not trip. The generator voltage shall not exceed 8640 volts during and following the load rejection. ^{***}

^{***} If grid conditions do not permit, the power factor limit is not required to be met. Under this condition, the power factor shall be maintained as close to 0.9 as practicable.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

4. Simulating a loss of offsite power by itself, and:
 - a) Verifying de-energization of the emergency busses and load shedding from the emergency busses.
 - b) Verifying the diesel starts on the auto-start signal, energizes the emergency busses with permanently connected loads within 10 seconds, energizes the auto-connected shutdown loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the shutdown loads. After energization of these loads, the steady-state voltage and frequency shall be maintained between 6840-7445 volts and 60 ± 0.6 Hz.
5. Verifying that on an ESF actuation test signal, without loss of offsite power, the diesel generator starts on the auto-start signal and operates on standby for greater than or equal to 5 minutes. Verify that the EDG starts from standby conditions and in less than or equal to 10 seconds, achieves a voltage greater than 6511 volts and a frequency greater than 58.8 Hz. After steady state operation is obtained, the EDG shall be verified to have a voltage greater than or equal to 6840 volts but less than or equal to 7445 volts and a frequency greater than or equal to 59.4 Hz but less than or equal to 60.6 Hz. After 5 minutes of standby operation verify that on a simulated loss of offsite power:
 - a) the loads are shed from the emergency busses,
 - b) the diesel generator does not connect to the bus for at least 5 seconds, and
 - c) that subsequent loading of the diesel generator is in accordance with design requirements.
6. Simulating a loss of offsite power in conjunction with an ESF actuation test signal, and
 - a) Verifying de-energization of the emergency busses and load shedding from the emergency busses.
 - b) Verifying the EDG starts in the emergency mode, energizes the emergency busses with permanently connected loads within 10 seconds, energizes the auto-connected emergency (accident) loads through the load sequencer and operates for greater than or equal to 5 minutes and maintains the steady state voltage and frequency between 6840-7445 volts and 60 ± 0.6 Hz.
 - c) Deleted.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

7. Verifying the EDG operates for at least 24 hours at a power factor less than or equal to 0.9 as follows: ***
 - a) ** The EDG shall be loaded* to greater than or equal to 3825 kW and less than or equal to 4250 kW for at least 22 hours.
 - b) ** The EDG shall be loaded* to greater than 4463 kW and less than 4675 kW (105%-110%) for a minimum of 2 hours.
 - c) Deleted.
8. Verifying that the auto-connected loads to each EDG do not exceed the 2000 hour rating of 4548 kW.
9. Verifying the EDG's capability to:
 - a) Synchronize with the offsite power source while the generator is loaded with its emergency loads upon a simulated restoration of offsite power,
 - b) Transfer its loads to the offsite power source, and
 - c) Be restored to its standby status.
10. Verifying that with the diesel generator operating in a test mode, connected to its bus, a simulated safety injection signal overrides the test mode by (1) returning the diesel generator to standby operation and (2) automatically energizes the emergency loads with offsite power.
11. Verifying that the fuel transfer pump transfers fuel from each fuel storage tank to the day tank of each diesel via the installed cross connection lines.
12. Verifying that the automatic load sequence timer is OPERABLE with the interval between each load block within $\pm 10\%$ of its design interval.

* This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelude and warmup procedures, and as applicable regarding loading recommendations.

** Momentary transients outside of the load or power factor range specified do not invalidate this test.

***If grid conditions do not permit, the power factor limit is not required to be met. Under this condition, the power factor shall be maintained as close to 0.9 as practicable.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

13. Verifying that the following diesel generator lockout features prevent diesel generator starting only when required:
 - a) Barring Device
 - b) Remote-Local-Maintenance Switch

 14. Verifying that within 5 minutes of operating the diesel generator for at least 2 hours at a load of 3825-4250 kW**, the diesel starts on the auto-start signal (Loss of Off-Site Power signal), energizes the emergency busses with permanently connected loads within 10 seconds, energizes the auto-connected shutdown loads through the load sequencer, and operates for greater than or equal to 5 minutes while its generator is loaded with the shutdown loads. After energization of these loads, the steady-state voltage and frequency shall be maintained between 6840-7445 volts and 60 ± 0.6 Hz.

 15. Verifying that all EDG trips, except engine overspeed, generator differential, and low lube oil pressure are automatically bypassed when operating in the emergency start mode.
- h. At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting the diesel generators simultaneously*, during shutdown, and verifying the following:
1. Both EDGs achieve a voltage greater than 6511 volts and frequency greater than 58.8 Hz in less than 10 seconds.
 2. Both EDGs achieve a steady-state voltage greater than or equal to 6840 volts but less than or equal to 7445 volts and frequency greater than or equal to 59.4 Hz but less than or equal to 60.6 Hz.
- i. At least once per 10 years by:
1. Draining each fuel oil storage tank, removing the accumulated sediment and cleaning the tank using a sodium hypochlorite solution or its equivalent, and
 2. Performing a pressure test of those portions of the diesel fuel oil system designed to Section III subsection ND of the ASME Code in accordance with Specification 4.0.5.

* This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable regarding loading recommendations.

** Momentary transients outside of the load or power factor range specified do not invalidate this test.

ATTACHMENT III

LIST OF REGULATORY COMMITMENTS

The following identifies actions committed to by Virgil C. Summer Nuclear Station (VCSNS) Unit 1. Any other statements in this submittal which can be construed as commitments are provided as information only and are not considered regulatory commitments. If there are any questions regarding these commitments, please contact Mr. Bruce L. Thompson at (803) 931-5042.

Commitment	Due Date
<p>VCSNS commits to RG 1.9, Revision 3, with the following exceptions:</p> <ol style="list-style-type: none"><li data-bbox="261 1056 794 1192">1. Design provisions of IEEE Std 387-1984 as referenced in RG 1.9, Revision 3. VCSNS is designed to IEEE Std 387-1972.<li data-bbox="261 1249 832 1528">2. The Refueling Outage surveillance test frequency as outlined in Table 1 of RG 1.9, Revision 3. VCSNS performs these diesel generator surveillances per Technical Specifications every 18 months which may occur during plant conditions other than refueling outages.	<p>Within 90 days after approval of the license amendment request.</p>

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ATTACHMENT IV

Change to Technical Specification Bases Pages

Revise BASES Pages B 3/4 8-2 and B 3/4 8-3.

BASES Page B 3/4 8-2 will be revised as follows:

Revise last paragraph to say: ... "Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants," Revision 3, July 1993, with exceptions as stated in Appendix 3A of the FSAR,

BASES Page B 3/4 8-3 will be revised as follows:

Delete paragraph 2 and replace with the following:

The Surveillance Requirement that assures the diesel generator is capable of performing its design function follows the guidance of Regulatory Guide 1.9, Revision 3. The surveillance tests the capability of the diesel generator to start and close its breaker in the required 10 seconds to support the accident analysis, and carry the required electrical loads while maintaining the voltage and frequency limits necessary to assure OPERABILITY of the loads. The specified minimum and maximum steady state voltage and frequency of the EDG are 6840-7445 volts and 60 ± 0.6 Hz (59.4 - 60.6 Hz). These values ensure the ESF pumps can achieve adequate fluid flow to meet their safety and accident mitigation functions.

ELECTRICAL POWER SYSTEMS

BASES

A.C. SOURCES, D.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS

(Continued)

During normal operation with both EDGs OPERABLE, the AAC availability is demonstrated by performance of periodic testing. An operational readiness check is performed in addition to the periodic testing when the AAC is relied upon as the back up power source. This check includes verification of the readiness of the keep warm diesel to automatically start and Parr to energize the selected ESF bus and verifying alignment to the selected ESF bus. This check will be performed at least once per 72 hours following the initial availability verification. Should the AAC become unavailable during the 14-day AOT and cannot be immediately restored to available status, the EDG AOT reverts back to the remainder of the 72 hours. The 72 hours begins with the discovery of the AAC unavailability, not to exceed a total of 14 days from the time the EDG initially became inoperable.

The extended EDG AOT is based on the Probabilistic Safety Analysis (PRA) evaluation to perform the online maintenance when the AAC is available. The results of the evaluation demonstrate that the AAC is capable of mitigating the dominant core damage sequences and provides a significant overall risk reduction for station operation. The AAC alone is adequate to supply electrical power to affect a safe shutdown of the plant.

The AOT to verify redundant equipment is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The AOT only begins on discovery that both an inoperable EDG exists and a required feature on the other train is inoperable. If at any time during the existence of this condition (one EDG is inoperable), a required feature subsequently becomes inoperable, this AOT would then begin to be tracked. Four hours from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the plant to transients associated with shutdown.

If it can be determined that the cause of the inoperable diesel generator does not exist on the OPERABLE diesel generator, then Surveillance 4.8.1.1.2.a.3 does not have to be performed. If the cause of the initial inoperable diesel generator cannot be confirmed not to exist on the redundant diesel generator, performance of Surveillance Requirement 4.8.1.1.2.a.3 suffices to provide assurance of continued OPERABILITY of that diesel generator. This allows for reduced start testing of the diesel generators, which has been shown to be a factor in engine degradation.

In the event that the inoperable diesel generator is restored to OPERABLE status prior to completing either the evaluation of cause or performing the surveillance requirement, the CER program will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed by the action statement. According to Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," 24 hours is reasonable to confirm that the OPERABLE diesel generator is not affected by the same problem as the inoperable diesel generator.

The OPERABILITY of the minimum specified A.C. and D.C. power sources and associated distribution systems during shutdown and refueling ensures that 1) the facility can be maintained in the shutdown or refueling condition for extended time periods and 2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit status.

The Surveillance Requirements for demonstrating the OPERABILITY of the diesel generators are in accordance with the recommendations of Regulatory Guides 1.9, "Selection of Diesel Generator Set Capacity for Standby Power Supplies," March 10, 1971, and 1.137, "Fuel-Oil

ELECTRICAL POWER SYSTEMS

BASES

A.C. SOURCES, D.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS

(Continued)

Systems for Standby Diesel Generators," Revision 1, October 1979, as modified by the NRC's review and approval of South Carolina Electric & Gas Company's June 10, 1985, December 6, 1985, and November 10, 2000 amendment requests.

~~The Surveillance Requirement that assures the diesel generator is capable of performing its design function follows the guidance of NUREG 1366 and NUREG 1431, Rev 2. The surveillance tests the capability of the diesel generator to start and close its breaker in the required 10 seconds to support the accident analysis, and carry the required electrical load while maintaining the voltage and frequency limits necessary to assure OPERABILITY of the loads.~~

In addition to the Surveillance Requirements, the time for the diesel generator to reach steady state operation, unless the modified start method is utilized, is periodically monitored and the trend evaluated to identify degradation of the governor and voltage regulator performance.

The fuel storage system minimum volume of fuel to demonstrate operability of the diesel generators was based on fuel consumption determined from the development of time dependent loads following a design basis accident and a loss of off-site power utilizing FSAR Table 8.3-3 for seven days.

All safety-related portions of the VCSNS diesel engine fuel oil storage and transfer system, are Seismic Category I, Safety Class 2b, and designed to ANSI Standard N195-1976 with the provision listed below:

VCSNS will maintain at least 2% margin above the minimum calculated seven day required volume during Modes 1-4. This is an exception to ANSI N195-1976, "Fuel Oil Systems for Standby Diesel Generators," Section 5.4, during Modes 1-4. EDG fuel replenishment is available from multiple sources, including off-site suppliers, on-site non safety storage in the Auxillary Boiler Fuel Tank, and the ability to provide fuel from the opposite train EDG Fuel Oil Storage Tank via the fuel oil and transfer system cross-tie.

The 10% fuel margin as recommended in Regulatory Guide 1.137, Revision 1, "Fuel-Oil Systems for Standby Diesel Generators," position C.1.c.(2) will be met during Modes 5 and 6.

The Surveillance Requirement for demonstrating the OPERABILITY of the Station batteries are based on the recommendations of Regulatory Guide 1.129, "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants," February 1978, and IEEE Std 450-1987, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations."

Verifying average electrolyte temperature above the minimum for which the battery was sized, total battery terminal voltage and float charge, connection resistance values and the performance of battery service and discharge tests ensures the effectiveness of the charging system, the ability to handle high discharge rates and compares the battery capacity at that time with the rated capacity.

ELECTRICAL POWER SYSTEMS

BASES

A.C. SOURCES, D.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS

(Continued)

During normal operation with both EDGs OPERABLE, the AAC availability is demonstrated by performance of periodic testing. An operational readiness check is performed in addition to the periodic testing when the AAC is relied upon as the back up power source. This check includes verification of the readiness of the keep warm diesel to automatically start and Parr to energize the selected ESF bus and verifying alignment to the selected ESF bus. This check will be performed at least once per 72 hours following the initial availability verification. Should the AAC become unavailable during the 14-day AOT and cannot be immediately restored to available status, the EDG AOT reverts back to the remainder of the 72 hours. The 72 hours begins with the discovery of the AAC unavailability, not to exceed a total of 14 days from the time the EDG initially became inoperable.

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The Surveillance Requirements for demonstrating the OPERABILITY of the diesel generators are in accordance with the recommendations of Regulatory Guides 1.9, "Selection Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite

ELECTRICAL POWER SYSTEMS

BASES

A.C. SOURCES, D.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS

(Continued)

Electric Power Systems at Nuclear Power Plants," Revision 3, July 1993, with exceptions as stated in Appendix 3A of the FSAR, and 1.137, "Fuel-Oil Systems for Standby Diesel Generators," Revision 1, October 1979, as modified by the NRC's review and approval of South Carolina Electric & Gas Company's June 10, 1985, December 6, 1985, and November 10, 2000 amendment requests.

The Surveillance Requirement that assures the diesel generator is capable of performing its design function follows the guidance of Regulatory Guide 1.9, Revision 3. The surveillance tests the capability of the diesel generator to start and close its breaker in the required 10 seconds to support the accident analysis, and carry the required electrical loads while maintaining the voltage and frequency limits necessary to assure OPERABILITY of the loads. The specified minimum and maximum steady state voltage and frequency of the EDG are 6840-7445 volts and 60 ± 0.6 Hz (59.4 - 60.6 Hz). These values ensure the ESF pumps can achieve adequate fluid flow to meet their safety and accident mitigation functions.

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The 10% fuel margin as recommended in Regulatory Guide 1.137, Revision 1, "Fuel-Oil Systems for Standby Diesel Generators," position C.1.c.(2) will be met during Modes 5 and 6.

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Verifying average electrolyte temperature above the minimum for which the battery was sized, total battery terminal voltage and float charge, connection resistance values and the performance of battery service and discharge tests ensures the effectiveness of the charging system, the ability to handle high discharge rates and compares the battery capacity at that time with the rated capacity.