NMC
Committed to Nuclear Excellence
Point Beach Nuclear Plant
Operated by Nuclear Management Company, LLC

August 8, 2005

NRC 2005-0096
10 CFR 50.90

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

Point Beach Nuclear Plant, Units 1 and 2
Dockets 50-266 and 50-301
License Nos. DPR-24 and DPR-27

License Amendment Request 239, Supplement 2 and Response to Request for Additional Information; Technical Specification Surveillance Requirements SR 3.8.4.6 and SR 3.8.4.7, DC Sources – Operating

References: (1) Letter from NMC to NRC dated April 8, 2004 (NRC 2004-0034)
(2) Letter from NMC to NRC dated November 15, 2004 (NRC 2004-0120)
(3) Letter from NMC to NRC dated July 15, 2005 (NRC 2005-0091)

In Reference (1), Nuclear Management Company, LLC (NMC), submitted a request for an amendment to the Technical Specifications (TS) for Point Beach Nuclear Plant, Units 1 and 2. The proposed amendment would revise TS Surveillance Requirements (SR) 3.8.4.6 and SR 3.8.4.7, DC Sources – Operating. Reference (2) provided additional information in support of the proposed amendment. Reference (3) provided a supplement to more closely align SR 3.8.4.6 with NUREG-1431.

During telephone conferences between NRC staff and NMC personnel on July 22 and July 28, 2005, the staff requested additional information (RAI) to complete its evaluation. Enclosure 1 provides the NMC response to the staff's questions. Following further discussions with the NRC staff, NMC revised SR 3.8.4.6 to ensure that it is performed under appropriate conditions. This supplement revises the proposed SR 3.8.4.6 as submitted in Reference (1). To facilitate NRC staff review of the proposed amendment, the marked up and clean TS pages are resubmitted in their entirety, incorporating the proposed revision.

Enclosure 2 provides a description and analysis of the revised SR. Enclosures 3 and 4 provide the existing TS and Bases pages, respectively, marked up to show the proposed change. Enclosure 5 provides revised (clean) TS and Bases pages. Enclosures 6 and 7 provide copies of the battery charger sizing and current limit setpoints calculation and the supply breaker trip curves respectively.

A001

NMC has determined that this supplement to the proposed amendment remains bounded by the No Significant Hazards Consideration Determination submitted on April 8, 2004 by Reference (1).

This letter contains no new commitments or revisions to existing commitments.

In accordance with 10 CFR 50.91, a copy of this supplemental application, with attachments, is being provided to the designated Wisconsin Official.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on August 8, 2005.

for

Dennis L. Koehl
Site Vice-President, Point Beach Nuclear Plant
Nuclear Management Company, LLC

Enclosures (7)

cc: Regional Administrator, Region III, USNRC (w/o Enclosures 6 and 7)
Project Manager, Point Beach Nuclear Plant, USNRC
Resident Inspector, Point Beach Nuclear Plant, USNRC (w/o Enclosures 6 and 7)
PSCW (w/o Enclosures 6 and 7)

ENCLOSURE 1

SUPPLEMENT 2 AND RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
LICENSE AMENDMENT REQUEST 239
TECHNICAL SPECIFICATION SURVEILLANCE REQUIREMENTS
SR 3.8.4.6 AND SR 3.8.4.7, DC SOURCES – OPERATING
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

The following information is provided in response to the Nuclear Regulatory Commission (NRC) staff's request for additional information (RAI) regarding Nuclear Management Company (NMC) letter dated April 8, 2004, as supplemented, which proposed an amendment to the license for Point Beach Nuclear Plant (PBNP) Units 1 and 2, to revise TS Surveillance Requirements (SR) 3.8.4.6 and SR 3.8.4.7, DC Sources – Operating. The NRC staff's request is paraphrased below with the NMC response following.

NRC Request:

Provide the following information:

- Description and specifications of the following current requirements and/or settings so the staff can evaluate overall acceptability:
    - o Battery charger continuous load
    - o Battery recharging load following one hour discharge
    - o Current limiter setting
    - o Breaker setting
- Describe the basis for the current limiter setting; specify the parameters that constitute the "margin." Does PBNP have actual calculated or historical values that were used to develop the margin? If so, provide the information on what they are and how they were developed. If this is a conservative number based on engineering judgment, provide a basis, such as typical testing tolerances from similar applications.
- Description of surveillance testing describing how PBNP demonstrates ability to supply maximum load requirements, verify the current limiter function, and demonstrate that the supply breaker can accommodate the load.
- Provide a copy of the battery charger sizing and current limit setpoints calculation and a copy of the supply breaker trip curves.

NMC Response:

Battery Charger Continuous Load

PBNP Calculation 2003-0046, "Battery Chargers Sizing and Current Limit Setpoints," (provided as Enclosure 2) is based on a validated assumption that the maximum continuous DC system load during charging is 240 amperes DC. The technical justification is based on plant trending data over the past four years, which demonstrates that the normal DC output current from battery chargers D-07, D-08, D-09, D-107, D-108 and D-109 ranges from approximately 120 amps to 170 amps. A re-review of the plant trending data revealed that excursions beyond 170 amps were brief and do not reflect normal plant operation. All charger peak loads during the past four years were reviewed and correlation to testing or maintenance activities on the systems was found. Based on this, 170 amps will be used as a conservative base loading condition during normal operation for each charger.

For conservatism, an additional load of 30 amperes DC per charger is assumed to account for additional annunciators that may be lit during non-normal operating conditions. This equates to more than 225 additional annunciators at a conservative value of 16 watts per window. An additional 5 amperes DC load per charger is assumed for EDG control. To support future growth, 20 amperes DC is added. Finally, an additional 15 amperes DC conservative margin of load per charger is assumed for miscellaneous control loads. Therefore, the assumed value of 240 amperes DC is considered to be conservative.

Battery Recharging Load Following One Hour Discharge

Calculation 2003-0046 uses a validated assumption that the maximum Ampere-Hours (Ah) discharged from the battery is 925 Ah. Use of 925 Ah is a conservative value to use for all of the chargers. Using this discharge capacity, an efficiency factor of 1.1, and a battery recharge within 24 hours results in a current value needed to recharge a battery of 43 amperes (rounded up).

$$(925 \times 1.1 / 24) = 42.4 \text{ amperes}$$

Total Current to Maintain DC Bus Loads and Recharge a Battery

Based on the previous two sections, the total current needed to maintain the DC bus loads while recharging a battery is 283 amperes DC (240 A + 43 A).

Current Limiter Settings

Calculation 2003-0046 uses a validated assumption that the minimum AC supply voltage for the battery chargers while they are in current limit is 450 Volts AC. This assumption is technically justified in that the worst-case minimum AC supply voltage at the battery charger input terminals is 455 Volts AC while loaded on the emergency diesel generators."

The calculation is also based on a maximum charger output voltage of 136 Volts DC while recharging the battery and supplying the DC load. This basis is technically justified in that the calibration procedures for battery chargers D-07, D-08 and D-09 is set between 132.5 to 133 Volts DC. The calibration procedure for battery chargers D-107, D-108 and D-109 directs setting the voltage between 133.5 to 134.5 Volts DC. The normal operating range of the battery chargers is 130 to 136 Volts DC. Therefore, it is conservative to assume the maximum charger DC output voltage of 136 Volts DC for the conditions evaluated in this calculation."

The most restrictive element in the D-07, D-08 and D-09 charger systems is a 100 ampere AC supply breaker to the charger (molded-case circuit breaker). This translates to a charger current limit of 375 amperes DC (the charger power factor is 0.72 and the charger efficiency is 0.91).

375 amperes DC = (1.732 x 450 x 100 x 0.72 x 0.91 / 136)

The most restrictive element in the D-107, D-108 and D-109 charger systems is a 125 ampere AC supply breaker to the charger (molded-case circuit breaker). This translates to a charger current limit of 498 amperes DC (the charger power factor is 0.751 and the charger efficiency is 0.925).

498 amperes DC = (1.732 x 450 x 125 x 0.751 x 0.925 / 136)

Breaker Settings

The limiting components are molded-case circuit breakers (MCCBs). The long time overcurrent trip settings on these breakers are not adjustable. A copy of the time versus current curves is provided in Enclosure 7. The most limiting MCCB for Battery Chargers D-07, D-08 and D-09 is a Square D FC34100 breaker. The most limiting MCCB for Battery Chargers D-107 and D-108 is a Square D KC34125 breaker. The most restrictive MCCB for Battery Charger D-109 is a Cutler Hammer FD3125L breaker.

Current Limiter Settings

For Battery Chargers D-07, D-08 and D-09, the minimum current needed is 283 amperes DC. The maximum current that these charger systems are limited to is 375 amperes DC. Therefore, a nominal current limit setting of 350 amperes is selected. Maintenance procedures that will be issued during implementation of the proposed amendment will direct setting these chargers such that the limit is between 340 and 355 amperes. An additional tolerance of 20 amperes allows for a change in charger performance over time and maintenance test equipment tolerances. This establishes the minimum setting of 320 amperes as requested in the proposed amendment. This is conservative in that the current limit is 37 amperes DC above the minimum needed per PBNP Calculation 2003-0046.

For Battery Chargers D-107, D-108 and D-109, the minimum current needed is 283 amperes DC. The maximum current that these charger systems are limited to is 497 amperes DC. Therefore, a nominal current limit setting of 450 amperes is selected. Maintenance procedures that will be issued during implementation of the proposed amendment will direct setting these chargers such that the limit is between 440 and 460 amperes. An additional tolerance of 20 amperes is included to allow for change in charger performance over time and maintenance test equipment tolerances. This establishes the minimum setting of 420 amperes as requested in the proposed amendment. This is considered conservative in that the current limit is 137 amperes DC above the minimum needed per Calculation 2003-0046.

Further Discussion Regarding the 20 Ampere Allowance for Changes in Charger Current Limit Settings Over Time and Maintenance Test Equipment Tolerances

PBNP has limited information regarding charger current limit variations over time. PBNP started checking the current limit settings in 2003 and has not been able to determine whether the variations in the as-found readings were as a result of instrument drift or whether the current limits were incorrectly set. The proposed 20-ampere tolerance to allow for charger variation over time and maintenance test equipment is based on engineering judgment.

Surveillance Testing

Periodic surveillance testing as delineated in the proposed Surveillance Requirements is structured to verify that the current limit is within a 320 to 375 ampere band for Battery Chargers D-07, D-08 and D-09. The test will then verify that the charger is capable of operating in the current limit mode for at least eight (8) hours. This verifies that the charger is capable of operating in this mode for the requisite time. Additionally, this testing verifies that the most restrictive MCCB in the charger supply circuit is capable of performing as needed.

Periodic surveillance testing as delineated in the proposed Surveillance Requirements is structured to verify that the current limit is within the 420 to 497 ampere band for Battery Chargers D-107, D-108 and D-109. The test will then verify that the charger is capable of operating in the current limit mode for at least eight (8) hours. This verifies that the charger is capable of operating in this mode for the requisite time. Additionally, this testing verifies that the most restrictive MCCB in the charger supply circuit is capable of performing as needed.

ENCLOSURE 2

DESCRIPTION AND JUSTIFICATION
SUPPLEMENT 2 TO LICENSE AMENDMENT REQUEST 239
TECHNICAL SPECIFICATION SURVEILLANCE REQUIREMENTS
SR 3.8.4.6 AND SR 3.8.4.7, DC SOURCES – OPERATING
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

This supplement to the proposed amendment would modify Technical Specification (TS) Surveillance Requirements (SR) 3.8.4.6, DC Sources – Operating, to ensure that the first option is performed under appropriate conditions and to conform the second option to the corresponding option in NUREG-1431, *Standard Technical Specifications, Westinghouse Plants*, Revision 3.

SR 3.8.4.6 is proposed for modification as follows (deletions are marked as strikethrough, additions are double-underlined). The section following the "OR" remains as proposed in Supplement 1 to the original submittal. The section preceding the "OR" is revised by this supplement.

> Verify battery chargers D-07, D-08, and D-09, while operating at the current limit setting, each supply ~~≥ 203~~ 320 amps at greater than or equal to the minimum established float voltage ~~≥ 125 V~~ for ≥ 8 hours, and battery chargers D-107, D-108, and D-109, while operating at the current limit setting, each supply ~~≥ 273~~ 420 amps at greater than or equal to the minimum established float voltage ~~≥ 125 V~~ for ≥ 8 hours.
>
> OR
>
> Verify each battery charger can recharge the battery to the fully charged state within 24 hours while supplying the largest combined demands of the various continuous steady-state loads, after a battery discharge to the bounding design basis event discharge state.

SR 3.8.4.6, as proposed, provides two options. The first option requires that battery chargers D-07, D-08, and D-09 be capable of supplying 320 amps at the minimum established float voltage for 8 hours, and battery chargers D-107, D-108, and D-109 be capable of supplying 420 amps at the minimum established float voltage for eight (8) hours. The ampere and voltage requirements are based on the design capacity of the chargers and the settings of the current limiters. PBNP Calculation 2003-0046 (Enclosure 6) provides the engineering analysis used to derive these values.

The battery current needed to supply the largest coincident demands of the various continuous steady-state loads and recharge the battery was calculated to be 283 amps. The minimum allowed amperage value specified in proposed SR 3.8.4.6 provides margin to the required current value and thereby ensures that the chargers are able to supply required loads under accident conditions.

Battery output current is limited by current limiting devices installed on the battery chargers. These current limiter devices ensure that the battery output current remains within the capacity of the supply breakers. The nominal current limiter setpoints are 350 amps for battery chargers D-07, D-08, and D-09; and 450 amps for battery chargers D-107, D-108, and D-109. A setting band (340 - 355 amps and 440 - 460 amps respectively), based on these nominal setpoint values, is provided to allow for setting tolerances should adjustment of a current limiting device be required.

Battery charger supply testing is performed by connecting sufficient resistive load to verify that the battery charger is operating at its as-left current limit setting without exceeding the capacity of the supply breaker even with increased loading. The time period is sufficient for the charger temperature to have stabilized and to have been maintained for at least two (2) hours.

An additional allowance is proposed as an alternative method for satisfying SR 3.8.4.6. This alternative option requires that each battery charger be capable of recharging the battery after a service test, coincident with supplying the largest combined demands of the various continuous steady-state loads. The duration for this test may be longer than the charger design capacity test discussed in the first option 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 two (2) amps.

The alternate acceptance criteria would allow an actual inservice demonstration that the charger can recharge the battery to the fully charged state within 24 hours while supplying the largest combined demands of the various continuous steady-state loads, after a battery discharge to the bounding design basis event discharge state. The proposed allowance meets the intent of the existing test and allows for normal in-place demonstration of the charger capability, thereby minimizing the time when the charger would be disconnected from the DC bus. This additional allowance is consistent with the Standard TS.

Technical Specification Bases changes are also being made to reflect the proposed Technical Specifications changes, provide additional clarification, and to correct editorial errors in references.

The proposed changes for the second option are consistent with NUREG-1431, *Standard Technical Specifications, Westinghouse Plants*, Revision 3.

ENCLOSURE 3

PROPOSED TECHNICAL SPECIFICATION CHANGES
SUPPLEMENT 2 TO LICENSE AMENDMENT REQUEST 239
TECHNICAL SPECIFICATION SURVEILLANCE REQUIREMENTS
SR 3.8.4.6 AND SR 3.8.4.7, DC SOURCES – OPERATING
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

(2 Pages Follow)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.2	Verify no visible corrosion at battery terminals and connectors. OR Verify battery connection resistance is within limits.	92 days
SR 3.8.4.3	Verify battery cells, cell plates, and racks show no visual indication of physical damage or abnormal deterioration that could degrade battery performance.	12 months
SR 3.8.4.4	Remove visible terminal corrosion, and verify battery cell to cell and terminal connections are coated with anti-corrosion material.	12 months
SR 3.8.4.5	Verify battery connection resistance is within limits.	12 months
SR 3.8.4.6	Verify battery chargers D-07, D-08, and D-09, while operating at the current limit setting, each supply ≥ ~~203~~ 320 amps at greater than or equal to the minimum established float voltage ~~≥ 125 V~~ for ≥ 8 hours, and battery chargers D-107, D-108, and D-109, while operating at the current limit setting, each supply ≥ ~~273~~ 420 amps at greater than or equal to the minimum established float voltage ~~≥ 125 V~~ for ≥ 8 hours. OR Verify each battery charger can recharge the battery to the fully charged state within 24 hours while supplying the largest combined demands of the various continuous steady-state loads, after a battery discharge to the bounding design basis event discharge state.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.7	-------------------------NOTES------------------------- The modified performance discharge test in SR 3.8.4.8 may be performed in lieu of ~~the service test in~~ SR 3.8.4.7 ~~once per 60 months~~. -- Verify battery capacity is adequate to supply, and maintain in OPERABLE status, the required emergency loads for the design duty cycle when subjected to a battery service test.	18 months
SR 3.8.4.8	Verify battery capacity is ≥ 80% of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.	60 months <u>AND</u> 12 months when battery shows degradation or has reached 85% of expected life with capacity < 100% of manufacturer's rating <u>AND</u> 24 months when battery has reached 85% of the expected life with capacity ≥ 100% of manufacturer's rating

ENCLOSURE 4

PROPOSED TECHNICAL SPECIFICATION BASES CHANGES
SUPPLEMENT 2 TO LICENSE AMENDMENT REQUEST 229
TECHNICAL SPECIFICATION SURVEILLANCE REQUIREMENTS
SR 3.8.4.6 AND SR 3.8.4.7, DC SOURCES – OPERATING
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

(6 Pages Follow)

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.4 DC Sources-Operating

BASES

BACKGROUND

The station DC electrical power system provides the AC emergency power system with control power. It also provides both motive and control power to selected safety related equipment and preferred AC vital instrument bus power (via inverters). As required by the Point Beach Design Criteria (Ref. 1), the DC electrical power system is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure.

The safety-related 125 VDC system consists of four main distribution buses: D01, D02, D03, and D04, in addition to two swing buses (D301 and D302) each capable of supplying one of the four 125 VDC buses.

Each of the four main distribution buses is powered by a battery charger (D07, D08, D107 and D108) and a station battery (D05, D06, D105, and D106). The function of the battery chargers is to supply their respective DC loads, while maintaining the batteries at full charge. All of the battery chargers are powered from the 480 VAC Engineered Safety Feature (ESF) system.

The battery chargers are interlocked such that a loss of offsite power ~~combined with a safety injection signal~~ will disconnect the battery chargers from their 480 VAC source. A coincident safety injection signal would prevent restoration of the battery chargers unless offsite power is restored to the safeguards buses. This limits the loading on the standby emergency power supply during the period immediately following a safety injection signal. During this period, the 125 VDC loads are supplied by their associated station battery until such time as power to the chargers is restored.

Two swing battery chargers are available through one of the swing DC distribution buses. Swing charger D09 is connected to swing DC distribution bus D301 and can provide a source of DC power to distribution buses D01 or D02. Likewise, swing charger D109 is connected to swing DC distribution bus D302 and can provide a source of DC power to distribution buses D03 or D04. In addition, there exists a swing safety-related battery D305 which is connected to swing DC distribution bus D301. This swing battery is capable of being aligned to any one of the four main distribution buses to take the place of the normal battery. Interlocks exist on swing DC distribution buses D301 and D302 which prevent the paralleling of redundant DC buses.

The station batteries have been sized to carry their expected shutdown

BASES

BACKGROUND (continued)

loads following a plant trip/LOCA and loss of offsite power, or following a station blackout for a period of one hour, without battery terminal voltage falling below 105 volts (for battery considerations) and while maintaining voltage at the fed components sufficient for them to operate. ~~Major battery loads, with their approximate operating times, are listed in FSAR Table 8.7-1~~ Load profiles for batteries D05, D06 and D305 are shown in FSAR Figure 8.7-2 and for batteries D105 and D106 in FSAR Figure 8.7-3 (Ref. 2). The swing station battery, D305, has been sized to provide an equivalent voltage at each of the four main DC buses. The swing battery chargers and the swing battery allow the normally on-line battery chargers and batteries to be removed from service for maintenance or testing that can not be performed with the equipment on-line.

Each 125 VDC battery is separately housed in a ventilated room apart from its charger and distribution centers. Each subsystem is located in an area separated physically and electrically from the other subsystem to ensure that a single failure in one subsystem does not cause a failure in a redundant subsystem. There is no sharing between redundant Class 1E distribution subsystems.

The batteries are sized to produce required capacity at 80% of nameplate rating, corresponding to warranted capacity at end of life cycles and the 100% design demand. Battery size is based on 125% of required capacity. The voltage limit is 2.13 V per cell; however, to ensure that the battery is maintained in a charged state, the charger voltage is maintained greater than 129.8 V for batteries D05 and D06 (59 cell batteries), and 132.0 V for batteries D105 and D106 (60 cell batteries). This corresponds to a minimum nominal cell voltage of 2.20 V per cell. ~~minimum cell voltage is 2.17 V per cell, which corresponds to a minimum voltage of 128 V for batteries D05 and D06, and 130.2 V for batteries D105 and D106.~~ The criteria for sizing large lead storage batteries are defined in IEEE-~~450~~ 485 (Ref. ~~6~~3).

Each DC electrical power subsystem has ample power output capacity for the steady-state operation of connected loads required during normal operation, while at the same time maintaining its battery bank fully charged. Each battery charger also has sufficient capacity to restore the battery from the design minimum charge to its fully charged state within 24 hours while supplying normal steady-state loads discussed in the FSAR, Chapter 8.7 (Ref. 2).

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the FSAR, Chapter 14 (Ref. 4), assume that Engineered Safety Feature (ESF) systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.4 and SR 3.8.4.5

Visual inspection and resistance measurements of inter-cell, inter-rack, inter-tier, and terminal connections provide an indication of physical damage or abnormal deterioration that could indicate degraded battery condition. The anticorrosion material is used to help ensure good electrical connections and to reduce terminal deterioration. The visual inspection for corrosion is not intended to require removal of and inspection under each terminal connection. The removal of visible corrosion is a preventive maintenance SR. The presence of visible corrosion does not necessarily represent a failure of this SR provided visible corrosion is removed during performance of SR 3.8.4.4.

The connection resistance limits for SR 3.8.4.5 shall be no more than 20% above the resistance as measured during installation, or not above the ceiling value established by the manufacturer.

The Surveillance Frequencies of 12 months is consistent with IEEE-450 (Ref. 6), which recommends cell to cell and terminal connection resistance measurement on a yearly basis.

SR 3.8.4.6

*[Existing first section moved to next paragraph]*This SR verifies the design capacity of the battery chargers. According to Regulatory Guide 1.32 (Ref. 7), the battery charger supply is ~~required~~ 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~~s~~ that these requirements can be satisfied.

This SR provides two options. One option requires that battery chargers D-07, D-08, and D-09 be capable of supplying ~~203~~ 320 amps at the minimum established float voltage ~~125 V~~ for ~~≥~~ 8 hours, and battery chargers D-107, D-108, and D-109 be capable of supplying ~~273~~ 420 amps at the minimum established float voltage ~~125 V~~ for ~~≥~~ 8 hours. These~~se~~ ampere and voltage requirements are based on the design capacity of the chargers (Ref. 2). The ampere requirements coupled with the settings of the current limiters ensure that the chargers are able to supply the largest coincident demands of the various continuous steady-state loads and recharge the battery (283 amps), while staying within the capacity of the supply breakers. The nominal current limiter setpoints are 350 amps for battery chargers D-07, D-08, and D-09; and 450 amps for battery chargers D-107, D-108, and D-109. A setting band (340 – 355 amps and 440 – 460 amps respectively), based on

BASES

these nominal values, is provided to allow for setting tolerances. The surveillance is performed by connecting sufficient resistive load to verify that the battery charger is operating at its as-left current limit setting without exceeding the supply breaker capacity even with increased loading. The time period is sufficient for the charger temperature to have stabilized and to have been maintained for at least 2 hours.

The other option requires that each 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 will be obtained using a resistance load bank. The duration for this test may be longer than the charger design capacity test discussed in the first option 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 ≤2 amps.

SR 3.8.4.7

A battery service test is a special test of 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~~2.

The Surveillance Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.32 (Ref. 7) and Regulatory Guide 1.129 (Ref. 8).

BASES

SURVEILLANCE REQUIREMENTS (continued)

This SR is modified by a Note which allows the performance of a modified performance discharge test in lieu of a service test ~~once per 60 months~~.

The modified performance discharge test is a simulated duty cycle consisting of just two rates; the one minute rate published 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 rated 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. The battery terminal voltage for the modified performance discharge test should 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. [*This paragraph is moved to the Bases for SR 3.8.4.8 as indicated therein (after the paragraph below)*]

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. [*This paragraph is moved to SR 3.8.4.8 (before above)*]

SR 3.8.4.8

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.

~~A battery modified performance discharge test is described in the Bases for SR 3.8.4.7.~~ Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.4.8; however, only the modified performance discharge test may be used to satisfy SR 3.8.4.8 while satisfying the requirements of SR 3.8.4.7 at the same time.

[*Insert specified items from SR 3.8.4.7*]

The acceptance criteria for this Surveillance are consistent with IEEE-450 (Ref. 6) and IEEE-485 (Ref. 3). 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

BASES

SURVEILLANCE REQUIREMENTS (continued)

rate of deterioration is increasing, even if there is ample capacity to meet the load requirements.

The Surveillance Frequency for this test is normally 60 months. 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 rating. Degradation is indicated, according to IEEE-450 (Ref. 6), 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. 6).

REFERENCES

1. FSAR. Chapter 8.0.
2. FSAR. Chapter 8.7.
3. IEEE-485-1978.
4. FSAR. Chapter 14.
5. Regulatory Guide 1.93, December 1974.
6. IEEE-450-1987.
7. Regulatory Guide 1.32, February 1977.
8. Regulatory Guide 1.129, December 1974.

ENCLOSURE 5

REVISED TECHNICAL SPECIFICATION PAGES
SUPPLEMENT 2 TO LICENSE AMENDMENT REQUEST 239
TECHNICAL SPECIFICATION SURVEILLANCE REQUIREMENTS
SR 3.8.4.6 AND SR 3.8.4.7, DC SOURCES – OPERATING
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

(8 Pages Follow)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.2	Verify no visible corrosion at battery terminals and connectors. OR Verify battery connection resistance is within limits.	92 days
SR 3.8.4.3	Verify battery cells, cell plates, and racks show no visual indication of physical damage or abnormal deterioration that could degrade battery performance.	12 months
SR 3.8.4.4	Remove visible terminal corrosion, and verify battery cell to cell and terminal connections are coated with anti-corrosion material.	12 months
SR 3.8.4.5	Verify battery connection resistance is within limits.	12 months
SR 3.8.4.6	Verify battery chargers D-07, D-08, and D-09, while operating at the current limit setting, each supply ≥ 320 amps at greater than or equal to the minimum established float voltage for ≥ 8 hours, and battery chargers D-107, D-108, and D-109, while operating at the current limit setting, each supply ≥ 420 amps at greater than or equal to the minimum established float voltage for ≥ 8 hours. OR Verify each battery charger can recharge the battery to the fully charged state within 24 hours while supplying the largest combined demands of the various continuous steady-state loads, after a battery discharge to the bounding design basis event discharge state.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.4.7	-------------------------NOTES------------------------- The modified performance discharge test in SR 3.8.4.8 may be performed in lieu of SR 3.8.4.7. --- Verify battery capacity is adequate to supply, and maintain in OPERABLE status, the required emergency loads for the design duty cycle when subjected to a battery service test.	 18 months
SR 3.8.4.8	Verify battery capacity is ≥ 80% of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.	60 months <u>AND</u> 12 months when battery shows degradation or has reached 85% of expected life with capacity < 100% of manufacturer's rating <u>AND</u> 24 months when battery has reached 85% of the expected life with capacity ≥ 100% of manufacturer's rating

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.4 DC Sources-Operating

BASES

BACKGROUND

The station DC electrical power system provides the AC emergency power system with control power. It also provides both motive and control power to selected safety related equipment and preferred AC vital instrument bus power (via inverters). As required by the Point Beach Design Criteria (Ref. 1), the DC electrical power system is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure.

The safety-related 125 VDC system consists of four main distribution buses: D01, D02, D03, and D04, in addition to two swing buses (D301 and D302) each capable of supplying one of the four 125 VDC buses.

Each of the four main distribution buses is powered by a battery charger (D07, D08, D107 and D108) and a station battery (D05, D06, D105, and D106). The function of the battery chargers is to supply their respective DC loads, while maintaining the batteries at full charge. All of the battery chargers are powered from the 480 VAC Engineered Safety Feature (ESF) system.

The battery chargers are interlocked such that a loss of offsite power will disconnect the battery chargers from their 480 VAC source. A coincident safety injection signal would prevent restoration of the battery chargers unless offsite power is restored to the safeguards buses. This limits the loading on the standby emergency power supply during the period immediately following a safety injection signal. During this period, the 125 VDC loads are supplied by their associated station battery until such time as power to the chargers is restored.

Two swing battery chargers are available through one of the swing DC distribution buses. Swing charger D09 is connected to swing DC distribution bus D301 and can provide a source of DC power to distribution buses D01 or D02. Likewise, swing charger D109 is connected to swing DC distribution bus D302 and can provide a source of DC power to distribution buses D03 or D04. In addition, there exists a swing safety-related battery D305 which is connected to swing DC distribution bus D301. This swing battery is capable of being aligned to any one of the four main distribution buses to take the place of the normal battery. Interlocks exist on swing DC distribution buses D301 and D302 which prevent the paralleling of redundant DC buses.

The station batteries have been sized to carry their expected shutdown loads following a plant trip/LOCA and loss of offsite power, or following

BACKGROUND (continued)

a station blackout for a period of one hour, without battery terminal voltage falling below 105 volts (for battery considerations) and while maintaining voltage at the fed components sufficient for them to operate. Load profiles for batteries D05, D06 and D305 are shown in FSAR Figure 8.7-2 and for batteries D105 and D106 in FSAR Figure 8.7-3 (Ref. 2). The swing station battery, D305, has been sized to provide an equivalent voltage at each of the four main DC buses. The swing battery chargers and the swing battery allow the normally on-line battery chargers and batteries to be removed from service for maintenance or testing that can not be performed with the equipment on-line.

Each 125 VDC battery is separately housed in a ventilated room apart from its charger and distribution centers. Each subsystem is located in an area separated physically and electrically from the other subsystem to ensure that a single failure in one subsystem does not cause a failure in a redundant subsystem. There is no sharing between redundant Class 1E distribution subsystems.

The batteries are sized to produce required capacity at 80% of nameplate rating, corresponding to warranted capacity at end of life cycles and the 100% design demand. Battery size is based on 125% of required capacity. The voltage limit is 2.13 V per cell; however, to ensure that the battery is maintained in a charged state, the charger voltage is maintained greater than 129.8 V for batteries D05 and D06 (59 cell batteries), and 132.0 V for batteries D105 and D106 (60 cell batteries). This corresponds to a minimum nominal cell voltage of 2.20 V per cell. The criteria for sizing large lead storage batteries are defined in IEEE-485 (Ref. 3).

Each DC electrical power subsystem has ample power output capacity for the steady-state operation of connected loads required during normal operation, while at the same time maintaining its battery bank fully charged. Each battery charger also has sufficient capacity to restore the battery from the design minimum charge to its fully charged state within 24 hours while supplying normal steady-state loads discussed in the FSAR, Chapter 8.7 (Ref. 2).

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the FSAR, Chapter 14 (Ref. 4), assume that Engineered Safety Feature (ESF) systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the standby emergency power sources, emergency auxiliaries, and control and switching during all MODES of operation.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.4 and SR 3.8.4.5

Visual inspection and resistance measurements of inter-cell, inter-rack, inter-tier, and terminal connections provide an indication of physical damage or abnormal deterioration that could indicate degraded battery condition. The anticorrosion material is used to help ensure good electrical connections and to reduce terminal deterioration. The visual inspection for corrosion is not intended to require removal of and inspection under each terminal connection. The removal of visible corrosion is a preventive maintenance SR. The presence of visible corrosion does not necessarily represent a failure of this SR provided visible corrosion is removed during performance of SR 3.8.4.4.

The connection resistance limits for SR 3.8.4.5 shall be no more than 20% above the resistance as measured during installation, or not above the ceiling value established by the manufacturer.

The Surveillance Frequencies of 12 months is consistent with IEEE-450 (Ref. 6), which recommends cell to cell and terminal connection resistance measurement on a yearly basis.

SR 3.8.4.6

This SR verifies the design capacity of the battery chargers. According to Regulatory Guide 1.32 (Ref. 7), 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 ensures that these requirements can be satisfied.

This SR provides two options. One option requires that battery chargers D-07, D-08, and D-09 be capable of supplying 320 amps at the minimum established float voltage for 8 hours, and battery chargers D-107, D-108, and D-109 be capable of supplying 420 amps at the minimum established float voltage for 8 hours. The ampere and voltage requirements are based on the design capacity of the chargers (Ref. 2). The ampere requirements coupled with the settings of the current limiters ensure that the chargers are able to supply the largest coincident demands of the various continuous steady-state loads and recharge the battery (283 amps), while staying within the capacity of the supply breakers. The nominal current limiter setpoints are 350 amps for battery chargers D-07, D-08, and D-09; and 450 amps for battery chargers D-107, D-108, and D-109. A setting band (340 - 355 amps and 440 - 460 amps respectively), based on these nominal values, is provided to allow for setting tolerances. The surveillance is performed

BASES

SURVEILLANCE REQUIREMENTS (continued)

by connecting sufficient resistive load to verify that the battery charger is operating at its as-left current limit setting without exceeding the supply breaker capacity even with increased loading. The time period is sufficient for the charger temperature to have stabilized and to have been maintained for at least 2 hours.

The other option requires that each 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 will be obtained using a resistance load bank. The duration for this test may be longer than the charger design capacity test discussed in the first option 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 ≤2 amps.

<u>SR 3.8.4.7</u>

A battery service test is a special test of 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 2.

The Surveillance Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.32 (Ref. 7) and Regulatory Guide 1.129 (Ref. 8).

This SR is modified by a Note which allows the performance of a modified performance discharge test in lieu of a service test.

<u>SR 3.8.4.8</u>

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 3.8.4.8; however, only the modified performance discharge test may be used to satisfy SR 3.8.4.8 while satisfying the requirements of SR 3.8.4.7 at the same time.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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 performance discharge test is a simulated duty cycle consisting of just two rates; the one minute rate published 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 rated 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. The battery terminal voltage for the modified performance discharge test should 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. 6) and IEEE-485 (Ref. 3). 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.

The Surveillance Frequency for this test is normally 60 months. 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 rating. Degradation is indicated, according to IEEE-450 (Ref. 6), 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. 6).

BASES

REFERENCES

1. FSAR. Chapter 8.0.
2. FSAR. Chapter 8.7.
3. IEEE-485-1978.
4. FSAR. Chapter 14.
5. Regulatory Guide 1.93, December 1974.
6. IEEE-450-1987.
7. Regulatory Guide 1.32, February 1977.
8. Regulatory Guide 1.129, December 1974.