Exelon Generation
4300 Winfield Road
Warrenville, IL 60555

www.exeloncorp.com

Exelon Nuclear

10 CFR 50.90

RS-03-140

July 29, 2003

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

Dresden Nuclear Power Station, Units 2 and 3
Facility Operating License Nos. DPR-19 and DPR-25
NRC Docket Nos. 50-237 and 50-249

Subject: Request for Amendment to Technical Specifications Associated With Direct Current Electrical Power

References:
(1) Institute of Electrical and Electronics Engineers (IEEE) Standard 450-1995, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications," dated January 24, 1995

(2) Technical Specifications Task Force (TSTF) Traveler TSTF-360, Revision 1, "DC Electrical Rewrite"

(3) Letter from W. D. Becker (U. S. NRC) to A. R. Pietrangelo (Nuclear Energy Institute), dated December 18, 2000

In accordance with 10 CFR 50.90, "Application for amendment of license or construction permit," Exelon Generation Company, LLC (EGC) requests an amendment to Facility Operating License Nos. DPR-19 and DPR-25 for Dresden Nuclear Power Station (DNPS), Units 2 and 3. The proposed changes modify Technical Specifications (TS) Sections 3.8.4, "DC Sources - Operating," 3.8.5, "DC Sources - Shutdown," 3.8.6, "Battery Cell Parameters," and 5.5, "Programs and Manuals." The proposed changes request new actions for an inoperable battery charger and alternate battery charger testing criteria for Limiting Condition for Operation (LCO) 3.8.4 and 3.8.5. The proposed changes also include the relocation of a number of Surveillance Requirements (SRs) in TS Section 3.8.4, that perform preventive maintenance on the safety related batteries, to a licensee controlled program. It is proposed that TS Table 3.8.6-1, "Battery Cell Parameter Requirements," be relocated to a licensee controlled program, and specific actions with associated completion times for out-of-limits conditions for battery cell voltage, electrolyte level, and electrolyte temperature be added to TS Section 3.8.6. In addition, specific SRs are being proposed for verification of these parameters.

A001

A new program is being proposed for the maintenance and monitoring of station batteries based on the recommendations of Institute of Electrical and Electronics Engineers (IEEE) Standard 450-1995, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications" (i.e., Reference 1). The items proposed to be relocated will be contained within this new program.

These proposed changes are consistent with Reference 2, which was approved by the NRC in Reference 3. There are some differences between the proposed changes and Reference 2 due to plant-specific design features (e.g., the need for the direct current sources TS to address both the 250 volts direct current (VDC) and 125 VDC subsystems) and ease of use considerations.

This request is subdivided as follows.

- Attachment 1 provides an evaluation supporting the proposed TS changes.
- Attachment 2 contains the marked-up TS pages with the proposed changes indicated.
- Attachment 3 provides the marked-up TS Bases pages with the proposed changes indicated. The TS Bases pages are provided for information only, and do not require NRC approval.
- Attachment 4 provides revised TS pages with the proposed changes incorporated.

The proposed changes have been reviewed by the DNPS Plant Operations Review Committee and approved by the Nuclear Safety Review Board in accordance with the requirements of the EGC Quality Assurance Program. EGC requests approval of these changes prior to May 15, 2004. Once approved, the amendments shall be implemented within 60 days. This implementation period will provide adequate time for station documents to be revised using the appropriate change control mechanisms.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), EGC is notifying the State of Illinois of this application for changes to the TS by transmitting a copy of this letter and its attachments to the designated State Official.

If you have any questions or require additional information, please contact Mr. Kenneth M. Nicely at (630) 657-2803.

I declare under penalty of perjury that the foregoing is true and correct.

Respectfully,

July 29, 2003
Executed on

Patrick R. Simpson
Manager – Licensing
Mid-West Regional Operating Group

Attachments:

Attachment 1: Description of Proposed Changes, Technical Analysis, and Regulatory Analysis
Attachment 2: Markup of Technical Specification Pages
Attachment 3: Markup of Technical Specification Bases Pages
Attachment 4: Retyped Technical Specification Pages

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Dresden Nuclear Power Station
Office of Nuclear Facility Safety – Illinois Department of Nuclear Safety

ATTACHMENT 1
Description of Proposed Changes, Technical Analysis, and Regulatory Analysis

ATTACHMENT 1
Description of Proposed Changes, Technical Analysis, and Regulatory Analysis

1.0 DESCRIPTION

In accordance with 10 CFR 50.90, "Application for amendment of license or construction permit," Exelon Generation Company, LLC (EGC) requests an amendment to Facility Operating License Nos. DPR-19 and DPR-25 for Dresden Nuclear Power Station (DNPS), Units 2 and 3. The proposed changes modify Technical Specifications (TS) Sections 3.8.4, "DC Sources - Operating," 3.8.5, "DC Sources - Shutdown," 3.8.6, "Battery Cell Parameters," and 5.5, "Programs and Manuals." The proposed changes request new actions for an inoperable battery charger and alternate battery charger testing criteria for Limiting Condition for Operation (LCO) 3.8.4 and 3.8.5. The proposed changes also include the relocation of a number of Surveillance Requirements (SRs) in TS Section 3.8.4, that perform preventive maintenance on the safety related batteries, to a licensee controlled program. It is proposed that TS Table 3.8.6-1, "Battery Cell Parameter Requirements," be relocated to a licensee controlled program, and specific actions with associated completion times for out-of-limits conditions for battery cell voltage, electrolyte level, and electrolyte temperature be added to TS Section 3.8.6. In addition, specific SRs are being proposed for verification of these parameters.

A new program is being proposed for the maintenance and monitoring of station batteries based on the recommendations of Institute of Electrical and Electronics Engineers (IEEE) Standard 450-1995, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications" (i.e., Reference 1). The items proposed to be relocated will be contained within this new program.

These proposed changes are consistent with Reference 2, which was approved by the NRC in Reference 3. There are some differences between the proposed changes and Reference 2 due to plant-specific design features (e.g., the need for the direct current (DC) sources TS to address both the 250 volts direct current (VDC) and 125 VDC subsystems) and ease of use considerations.

2.0 PROPOSED CHANGE

The proposed changes revise TS 3.8.4, TS 3.8.5, TS 3.8.6, and TS Section 5.5 to be consistent with Reference 2. Each related change is grouped and discussed in detail below. These groupings follow the general presentation found in Reference 2. Section 4.0, "Technical Analysis," presents subsections that are numbered following the below numbered summary of proposed changes.

(1) Provide Specific Actions and an Increased Completion Time for an Inoperable Battery Charger

TS 3.8.4 is being revised to add new Conditions A and E to address the condition where a required 250 VDC or 125 VDC battery charger, respectively, becomes inoperable. Required Actions are proposed that provide a tiered response that focuses on returning the battery to the fully charged state and restoring a fully qualified charger to operable status in a reasonable time. Required Actions A.1 and E.1 require that the battery terminal voltage be restored to greater than or equal to the minimum established float voltage within 2 hours. Required Actions A.2 and E.2 require verification that the battery float current be less than or equal to 2 amps once per 12 hours. Required Actions A.3

and E.3 limit the restoration time for the required inoperable battery charger to 7 days. Existing TS 3.8.4 Conditions A, B, C, D, E, F, G, and H are re-designated to reflect the addition of new Conditions A and E.

(2) Relocate Preventive Maintenance SRs to Licensee Controlled Programs

Existing SR 3.8.4.2, SR 3.8.4.4, SR 3.8.4.5, and SR 3.8.4.6 are being deleted from the DNPS TS and relocated to a licensee controlled program. These SRs are also listed in SR 3.8.5.1 and will be deleted from SR 3.8.5.1. This requires renumbering of SR 3.8.4.3 as SR 3.8.4.2, SR 3.8.4.7 as SR 3.8.4.3, and SR 3.8.4.8 as SR 3.8.4.4.

(3) Provide Alternative Testing Criteria for Battery Charger Testing

SR 3.8.4.3 (i.e., revised SR 3.8.4.2) for the 250 VDC battery chargers is being revised to permit alternative battery charger testing criteria. The revised SR 3.8.4.2 states:

> "Verify each required 250 VDC battery charger supplies $\geq$ 200 amps at greater than or equal to the minimum established float voltage for $\geq$ 4 hours for the 250 VDC subsystems.
>
> OR
>
> Verify each 250 VDC 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."

Similar changes are proposed for SR 3.8.4.7 (i.e., revised SR 3.8.4.3) for the 125 VDC battery chargers. The revised SR 3.8.4.3 states:

> "Verify each required 125 VDC battery charger supplies $\geq$ 200 amps at greater than or equal to the minimum established float voltage for $\geq$ 4 hours for the 125 VDC subsystems.
>
> OR
>
> Verify each 125 VDC 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."

In addition, SR 3.8.4.1 is being revised to require verification that battery terminal voltage is greater than or equal to the minimum established float voltage for each 250 VDC battery, each 125 VDC battery, and the Unit 2 alternate battery.

(4) Relocate SR 3.8.4.9 to SR 3.8.6.6

SR 3.8.4.9 is being relocated to TS Section 3.8.6 as SR 3.8.6.6. This SR is also listed in SR 3.8.5.1 and SR 3.8.4.8. No changes are proposed to SR 3.8.4.9 other than relocating the SR.

(5) Replace Battery Specific Gravity Monitoring with Float Current Monitoring

The specific gravity limits of Table 3.8.6-1 and associated Footnotes (b) and (c) are being deleted. Currently, verification of battery cell specific gravity is required by existing SR 3.8.6.1 and SR 3.8.6.2. Under the proposed changes, specific gravity monitoring will be replaced with float current monitoring. New SR 3.8.6.1 requires verification that each battery float current is less than or equal to 2 amps when battery terminal voltage is greater than or equal to the minimum established float voltage of SR 3.8.4.1. The Frequency of new SR 3.8.6.1 is 7 days.

(6) Relocate Limiting Values for Battery Cell Float Voltage, Electrolyte Level, and Electrolyte Temperature to a Licensee Controlled Program

The proposed changes delete Condition A of TS 3.8.6, SR 3.8.6.1, SR 3.8.6.2, SR 3.8.6.3, and Table 3.8.6-1 from TS Section 3.8.6. These requirements are being relocated to the licensee controlled program described in proposed TS Section 5.5.13, with the exception that battery specific gravity monitoring is being replaced with float current monitoring, as described above.

In addition, the title of TS Section 3.8.6 is being revised to "Battery Parameters" and the LCO is being revised to read: "Battery parameters for the 125 VDC and 250 VDC station batteries shall be within limits." A corresponding change to the TS Table of Contents is being made to be consistent with the revised TS Section 3.8.6 title.

(7) Create an Administrative Program Under TS Section 5.5.13 to Reference Actions for Cell Voltage and Electrolyte Level

A new program is being added to TS Section 5.5. Specifically, TS Section 5.5.13, "Battery Monitoring and Maintenance Program," is added to provide for restoration and maintenance actions for station batteries based on the recommendations of Reference 1.

(8) Provide Specific Actions with Increased Completion Times for Out-of-limits Conditions for Cell Voltage, Electrolyte Level, and Electrolyte Temperature

Six new conditions are being added to TS 3.8.6. These conditions with their associated required actions provide compensatory actions for a specific abnormal battery condition.

(a) Condition A addresses the condition where one battery has one or more battery cells with a float voltage less than 2.07 V.
(b) Condition B addresses the condition where one battery is found with a float current greater than 2 amps.

(c) Condition C addresses the condition where one battery has one or more battery cells with a float voltage less than 2.07 V and float current greater than 2 amps.
(d) Condition D addresses the condition where a battery is found with electrolyte level in one or more cells less than the minimum established design limits.
(e) Condition E addresses the condition where a battery is found with pilot cell electrolyte temperature less than minimum established design limits.
(f) Condition F addresses the condition where one or more batteries in redundant divisions are found with battery parameters not within limits.

As a result of the new conditions, Condition B is being re-designated as Condition G, and the condition is being revised to reference the six new conditions. In addition, the following new SRs are being added to TS 3.8.6.

(a) SR 3.8.6.2 requires verification that each battery pilot cell voltage is greater than or equal to 2.07 V every 31 days.
(b) SR 3.8.6.3 requires verification that each battery connected cell electrolyte level is greater than or equal to minimum established design limits every 31 days.
(c) SR 3.8.6.4 requires verification that each battery pilot cell temperature is greater than or equal to minimum established design limits every 31 days.
(d) SR 3.8.6.5 requires verification that each battery connected cell voltage is greater than or equal to 2.07 V every 92 days.

A markup of the affected TS pages is provided in Attachment 2. Attachment 3 provides a markup of the affected TS Bases pages. Information contained in Attachment 3 is provided for information only, and does not require NRC approval.

2.1 Need for Revision of the Requirements

The current TS limit restoration time for an inoperable battery charger to the same time as for an inoperable battery or a completely de-energized DC distribution subsystem. The 250 VDC system consists of two Class 1E battery chargers. In addition, DNPS has a swing (i.e., spare) 250 VDC full capacity battery charger that is available for use on either unit. The swing battery charger can be connected to supply only one of the 250 VDC batteries at a time. This swing charger can be used as a means of supplying backup DC power during periods when maintenance is being performed on the normal divisional charger or in conditions that cause the normal charger to be inoperable. Additionally, a portable 250 VDC battery charger is available, which is identical in size and operating characteristics to the normal and backup battery chargers. The portable charger can be used as a backup to any one of them using the same AC source and circuit breaker protection. The use of the portable charger as a substitute for one of the permanent chargers is described within plant procedures. Use of this charger does not result in the 250 VDC system being operated in a new or different manner compared with the existing battery chargers.

The 125 VDC system consists of four Class 1E divisional battery chargers. Two chargers supply each unit's DC electrical power system. One is the normal battery charger, while the other is the backup battery charger. Additionally, a portable 125 VDC battery charger is available, which is identical in size and operating characteristics to the normal battery chargers. The portable charger can be used as a backup to any one of them using the same AC source and circuit breaker protection. The use of the portable 125 VDC battery charger as a substitute

for one of the permanent chargers is described within plant procedures. Use of this charger does not result in the 125 VDC system being operated in a new or different manner compared with the existing battery chargers.

The proposed changes will allow additional time for maintenance and testing of the normal 250 VDC and 125 VDC divisional chargers based on the availability of the swing (i.e., for the 250 VDC system) and portable chargers. In addition, relocation of the preventive maintenance SRs and battery cell parameter requirements to a licensee controlled program will continue to provide an adequate level of control of these requirements, assure the batteries are maintained at current levels of performance, allow flexibility to monitor and control these limits at values directly related to the batteries' ability to perform their assumed function, and allow the TS to focus on parameter value degradations that approach levels that may impact battery operability.

2.2 Impact on Previous Submittals

EGC has reviewed the proposed changes for impact on previous submittals awaiting NRC approval for DNPS, and has determined that there is an impact to one of them. In Reference 4, EGC requested a license amendment for DNPS to support application of an alternative source term methodology. Reference 4 proposed a revision to TS page 5.5-12 to increase the maximum allowable primary containment leakage rate. The retyped TS pages provided in Attachment 4 of this submittal **do not** reflect the changes proposed in Reference 4.

3.0 BACKGROUND

Each DNPS unit includes a 125 VDC source consisting of a 125 VDC battery and two 125 VDC full capacity battery chargers (i.e., a total of four 125 VDC full capacity battery chargers), and associated control equipment and interconnecting cabling. Each 125 VDC unit source (i.e., 125 VDC battery and associated chargers) supplies power to the associated unit Division 1 125 VDC electrical power distribution subsystem and the opposite unit Division 2 125 VDC electrical power distribution subsystem. The Division 1 and Division 2 125 VDC electrical power distribution subsystems provide power to redundant loads, therefore both unit 125 VDC sources are needed to support the operation of both units.

Each DNPS unit also includes a 250 VDC source consisting of a 250 VDC battery and an associated 250 VDC full capacity battery charger (i.e., a total of two 250 VDC full capacity battery chargers), as well as associated control equipment and interconnecting cabling. An additional 250 VDC full capacity (i.e., swing) charger is available for use between the units. The swing charger can only be aligned to one battery at a time. Each 250 VDC battery and charger supplies power to both Unit 2 and Unit 3 loads. Therefore, each unit has two 250 VDC electrical power subsystems. One 250 VDC electrical power subsystem includes the associated unit 250 VDC battery and full capacity battery charger while the other 250 VDC electrical power subsystem includes the opposite unit 250 VDC battery and the full capacity charger.

Portable battery chargers are available for both 125 VDC and 250 VDC systems, which are identical in size and operating characteristics to the normal chargers.

During normal operation, the DC loads are powered from the battery chargers with the batteries floating on the system (i.e., float-charge mode). Float-charge is the condition in which the

charger is supplying the connected loads and the battery cells are receiving adequate current to optimally charge the battery. This assures the internal losses of a battery are overcome and the battery is maintained in a fully charged state. In the case of loss of normal power to the battery charger, the DC loads are automatically powered from the associated batteries.

Each battery has adequate storage capacity to start and carry the normal DC loads plus DC loads required for safe shutdown on one unit and operations required to limit the consequences of a design basis accident on the other unit for a period of four hours following a loss of offsite power plus a single active failure, without taking credit for the battery chargers. The batteries are designed with additional capacity above that required by the design duty cycle to allow for temperature variations and other factors. The batteries for the 125 VDC and 250 VDC electrical power subsystems are sized to produce required capacity at 80% of nameplate rating, corresponding to warranted capacity at end of life cycles and the 100% design demands.

Each DC electrical power subsystem battery charger, including the swing charger for the 250 VDC 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 has sufficient excess capacity to restore the battery from the design minimum charge to its fully charged state within 24 hours while supplying normal steady state loads.

Each DC electrical power subsystem is required to be operable to ensure the availability of the required power to shutdown the reactor and maintain it in a safe condition after an anticipated operational occurrence or a postulated design basis accident. The subsystems are arranged so that more than one failure is required before plant needs are not served. Thus, loss of an electrical power subsystem does not prevent the minimum safety function from being performed.

Each unit also has an alternate 125 VDC battery to allow the unit 125 VDC battery to undergo rated discharge testing with both units online. The alternate battery is available to supply system loads upon failure of a unit 125 VDC battery. The alternate battery is of similar type as the unit battery. Although the alternate battery is of different size than the unit battery, it is sized to support the same loads. The alternate battery is normally disconnected from the system and is maintained on float charge.

4.0 TECHNICAL ANALYSIS

(1) Provide Specific Actions and an Increased Completion Time for an Inoperable Battery Charger

Current TS 3.8.4 Condition C requires restoration of battery charger operability within 2 hours. This is the same Completion Time specified for an inoperable battery or a completely de-energized DC distribution subsystem.

New Conditions, with their associated Required Actions and Completion Times are being added to TS 3.8.4 to separately address battery charger inoperability (i.e., Condition A for the required 250 VDC battery chargers and Condition E for the required 125 VDC battery chargers). Each of these Conditions addresses the condition where one required

battery charger becomes inoperable. A proposed Completion Time of 7 days focuses on a tiered approach to assuring adequate battery capability is maintained.

The first priority with an inoperable battery charger is to minimize the battery discharge. Required Actions A.1 and E.1 assure the discharge is terminated by requiring that the battery terminal voltage be restored to greater than or equal to the minimum established float voltage within 2 hours. This time provides for returning the inoperable charger to operable status or providing an alternate means of restoring battery terminal voltage to greater than or equal to the minimum established float voltage. This provides assurance that the battery will be restored to its fully charged condition from any discharge that might have occurred due to the charger inoperability. A discharged battery having terminal voltage of at least the minimum established float voltage indicates that the battery is on the exponential charging current portion of its recharging cycle. There is no comparable limitation in the current DNPS TS. As such, including this action provides for continued safe plant operation.

The second tiered action (i.e., Required Actions A.2 and E.2) requires that once per 12 hours, battery float current be verified to be less than or equal to 2 amps. This indicates that, if the battery had been discharged as the result of the inoperable battery charger, it has now been fully charged. If at the expiration of the 12-hour period the battery float current is not less than or equal to 2 amps, there may be additional battery problems and the battery must be declared inoperable. This verification provides assurance that the battery has sufficient capacity to perform its assumed duty cycle.

Given that the DC bus remains energized, the battery discharge (i.e., if it was occurring) is terminated (i.e., Required Actions A.1 and E.1), and the battery is fully recharged (i.e., Required Actions A.2 and E.2), there is reasonable basis for extending the restoration time for an inoperable charger beyond the existing 2-hour limit to 7 days (i.e., Required Actions A.3 and E.3). Required Actions A.3 and E.3 are applicable if an alternate means of restoring battery terminal voltage to greater than or equal to the minimum established float voltage has been used (e.g., the portable battery chargers).

The revised actions are acceptable because they focus efforts on retaining battery capabilities, retaining the requirement for charger operability, and applying a reasonable restoration time for an inoperable battery charger to avoid an unnecessary plant shutdown transient.

(2) Relocate Preventive Maintenance SRs to Licensee Controlled Programs

In accordance with SR 3.0.1, when any SR is not met, the LCO is not met. This is based on the premise that SRs represent the minimum acceptable requirements for operability of the required equipment. However, for SR 3.8.4.2, SR 3.8.4.4, SR 3.8.4.5, and SR 3.8.4.6, failure to meet the SR does not necessarily mean that the equipment is not capable of performing its safety function, and the corrective action is generally a routine or preventive maintenance-type activity. For example, SR 3.8.4.2 requires visual inspection to detect corrosion of the battery cells and connections to provide an indication of physical damage or abnormal deterioration that could potentially degrade battery performance. This action is not required for the battery to perform its safety function, but reflects ongoing preventive maintenance activities. These activities are

inappropriate for operability SRs and are better controlled under the maintenance programs for batteries.

The proposed changes relocate preventive maintenance SRs to a licensee controlled program being added as TS Section 5.5.13. These activities will be included in the Technical Requirements Manual (TRM) and will continue to be performed consistent with recommendations in Reference 1. Changes to the TRM are evaluated under the provisions of 10 CFR 50.59, "Changes, tests, and experiments," to determine if the proposed changes require prior NRC review and approval. In addition, changes implemented which do not require prior NRC review and approval will be reported to the NRC in accordance with 10 CFR 50.71, "Maintenance of records, making of reports," paragraph (e). Based on the above, the proposed changes provide adequate assurance of system operability commensurate with the safety significance since the relocated SRs will continue to be performed, and any changes will be evaluated in accordance with 10 CFR 50.59.

(3) Provide Alternative Testing Criteria for Battery Charger Testing

Current SR 3.8.4.3, which is being re-designated as SR 3.8.4.2; and SR 3.8.4.7, which is being re-designated as SR 3.8.4.3; for the 250 VDC and 125 VDC battery chargers, respectively, require specific parameters for battery charger performance testing. This test is intended to confirm the charger design capacity. Alternate acceptance criteria are proposed that would allow an actual in service 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. This accomplishes the objective 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.

SR 3.8.4.1 requires verification that battery terminal voltage is within limits. This provides assurance that the battery will be restored to its fully charged condition from any discharge that might have occurred due to charger inoperability. The proposed changes relocate the specific terminal voltage values to the licensee controlled program being added as TS Section 5.5.13.

(4) Relocate SR 3.8.4.9 to SR 3.8.6.6

The relocation of SR 3.8.4.9 to SR 3.8.6.6 is editorial. This SR demonstrates the operability of the battery and is therefore proposed to be included in TS Section 3.8.6 related to battery operability. No changes are proposed to SR 3.8.4.9 other than the relocation.

(5) Replace Battery Specific Gravity Monitoring with Float Current Monitoring

Existing SR 3.8.6.1 and SR 3.8.6.2, in conjunction with Table 3.8.6-1, require monitoring of individual cell specific gravity. However, the provision of Table 3.8.6-1, Footnote (c), allows the use of a battery charging current less than 2 amps when on float charge to be used to satisfy specific gravity requirements.

New SR 3.8.6.1 requires verification that each battery float current is less than or equal to 2 amps every 7 days. This will replace the existing requirements for specific gravity monitoring. Use of float current to determine the state of charge of the battery is consistent with Section 4.5 of Reference 1. Therefore, deleting the requirement for specific gravity measurements will not have a significant impact on safety or the ability to accurately determine the operability of the batteries. Reference 2 provides further detailed generic technical support, which the NRC found acceptable in Reference 3, for this change.

(6) Relocate Limiting Values for Battery Cell Float Voltage, Electrolyte Level, and Electrolyte Temperature to a Licensee Controlled Program

The proposed relocate TS 3.8.6 Condition A, SR 3.8.6.1, SR 3.8.6.2, SR 3.8.6.3, and Table 3.8.6-1 to the licensee controlled program described in proposed TS Section 5.5.13, with the exception that battery specific gravity monitoring is being replaced with float current monitoring, as described above.

TS Table 3.8.6-1 contains various levels (i.e., Categories) of limitations on battery cell voltage, electrolyte level, and specific gravity parameters. The Category A and B limits reflect nominal fully charged battery parameter values which provide significant margin above that required for declaration of an operable battery. These Category A and B values represent appropriate monitoring levels and appropriate preventive maintenance levels for long-term battery quality and extended battery life. These limits, however, do not reflect the 10 CFR 50.36, "Technical specifications," criteria for LCOs of the lowest functional capability or performance levels of equipment required for the safe operation of the facility. It is proposed that these values and the actions associated with restoration be relocated to a licensee controlled program being added as TS Section 5.5.13 that is under the control of 10 CFR 50.59. Required actions associated with Category C limits in TS Table 3.8.6-1 are retained in the TS as discussed in changes numbered (5) and (8).

The proposed changes provide adequate assurance of system operability commensurate with the safety significance since the relocated SRs will continue to be performed, and any changes will be evaluated in accordance with 10 CFR 50.59.

The proposed changes to delete the word "cell" from the title of TS Section 3.8.6 and to revise the wording of the LCO are editorial changes.

(7) Create an Administrative Program Under TS Section 5.5.13 to Reference Actions for Cell Voltage and Electrolyte Level

The proposed changes create an administrative program for maintenance, monitoring, and restoration actions for batteries by adding TS Section 5.5.13. This program will be based on the recommendations of Reference 1. This program will contain the elements relocated from the affected TS LCOs. The parameter values will continue to be controlled at their current level, and any corrective actions will be implemented in accordance with the EGC Corrective Action Program. Furthermore, preventive maintenance and monitoring of batteries are in part governed by the regulatory

requirements of 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants." The relocation of the elements from TS will not compromise the current levels of battery performance, and allows the TS to focus on parameter value degradations that approach values that may impact battery operability.

The program will require actions to restore battery cells with float voltage less than 2.13 V and actions to equalize and test battery cells that have been discovered with electrolyte level below the minimum established design limits. Testing of these cells will be based on Annex D of Reference 1.

The items proposed to be relocated will be contained in the TRM, which is incorporated by reference in the DNPS Updated Final Safety Analysis Report (UFSAR). Thus, changes to the program will be subject to review under 10 CFR 50.59 to determine if the proposed changes require prior NRC review and approval. In addition, changes will be reported to the NRC in accordance with 10 CFR 50.71(e).

Based on the above, the proposed Battery Monitoring and Maintenance Program will contain the necessary elements to ensure that the batteries continue to be maintained in a highly reliable condition.

(8) Provide Specific Actions with Increased Completion Times for Out-of-limits Conditions for Cell Voltage, Electrolyte Level, and Electrolyte Temperature

Specific Required Actions are proposed for parameters that have a unique impact on the battery and its continued operability. The proposed changes to TS Section 3.8.6 provide specific Required Actions and increased Completion Times for out-of-limit conditions for cell voltage, electrolyte level, and electrolyte temperature. These Completion Times recognize the margins available, the minimal impact on battery capacity and the capability to perform its intended function, and the likelihood of effecting restoration in a timely fashion avoiding an unnecessary plant shutdown. In addition, SRs are proposed to verify that the batteries are maintained within the established limitations. The bases for the specific actions and SRs are as follows.

A. Condition A addresses the condition where a battery has one or more cells with a float voltage of less than 2.07 V. With a float voltage of less than 2.07 V, the battery cell must be considered degraded. Within 2 hours, verification of the required battery charger operability is made by monitoring the battery terminal voltage (i.e., performance of SR 3.8.4.1), and determining the overall state of charge by monitoring the battery float current (i.e., performance of SR 3.8.6.1). These actions assure that there is still sufficient battery capacity to perform the intended function. Therefore, the affected battery is not required to be considered inoperable solely as a result of one or more cells in one or more batteries being less than 2.07 V, and continued operation is permitted for a limited period up to 24 hours. This is considered a reasonable time to effect restoration of the out-of-limit condition.

B. Condition B represents the condition where a battery is found with float current greater than 2 amps, and indicates that a partial discharge of the battery capacity has occurred. This may be due to a temporary loss of the battery charger, or

possibly due to one or more battery cells in a low voltage condition reflecting some loss of capacity. Within 2 hours, verification of the required battery charger operability is made by monitoring the battery terminal voltage (i.e., performance of SR 3.8.4.1). If the terminal voltage is found to be less than the minimum established float voltage, there are two possibilities: the battery charger is inoperable or is operating in the current limit mode. Conditions A and E of LCO 3.8.4 address charger inoperability. If the charger is operating in the current limit mode after 2 hours, that is an indication that the battery has been substantially discharged and likely cannot perform its required design functions. The time to return the battery to its fully charged condition in this case is a function of the battery charger capacity, the amount of loads on the associated DC system, the amount of the previous discharge, and the recharge characteristic of the battery. The charge time can be extensive, and there is not adequate assurance that it can be recharged within 12 hours (Required Action B.2). The battery must therefore be declared inoperable.

If the float voltage is found to be satisfactory but there are one or more battery cells with float voltage less than 2.07 V, Condition C is applicable and the battery must be declared inoperable immediately. If float voltage is satisfactory and there are no cells less than 2.07 V, there is assurance that, within 12 hours, the battery will be restored to its fully charged condition (Required Action B.2) from any discharge that might have occurred due to a temporary loss of the battery charger. The time to return a battery to its fully charged state under this condition is simply a function of the amount of the previous discharge and the recharge characteristic of the battery. Thus, there is assurance of fully recharging the battery within 12 hours, avoiding a premature unit shutdown with its own attendant risk.

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

C. Condition C specifies actions to take when a battery with one or more battery cells is found with float voltage less than 2.07 V and float current greater than 2 amps. Discovering a battery with one or more battery cells float voltage less than 2.07 V and float current greater than 2 amps indicates that the battery capacity may not be sufficient to perform the intended functions. The battery must therefore be declared inoperable immediately.

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

With electrolyte level below the top of the plates, there is a potential for dryout and plate degradation. Required Actions D.1 and D.2 address this potential as well as provisions in TS Section 5.5.13. These actions are only applicable if electrolyte level was below the top of the plates. Within 8 hours, level is required to be restored to above the top of the plates. The Required Action D.2 requirement to verify that there is no leakage by visual inspection and the Specification 5.5.13, Item b, to initiate action to equalize and test in accordance with manufacturer's recommendation are taken from Annex D of Reference 1. They are performed following the restoration of the electrolyte level to above the top of the plates. Based on the results of the manufacturer's recommended testing, the battery may have to be declared inoperable and the affected cell(s) replaced.

E. Condition E addresses the condition where a battery is found with a pilot cell temperature less than the minimum established design limits. A low electrolyte temperature limits the current and power available from the battery. Since the battery is sized with margin, while battery capacity is degraded, sufficient capacity exists to perform the intended function. Therefore, the affected battery is not required to be considered inoperable solely as a result of the pilot cell temperature not met, and the 12 hour Completion Time provides a reasonable time to restore the temperature within established limits.

F. Condition F addresses the condition with one or more batteries in redundant divisions with battery parameters not within limits. Given this condition, there is not sufficient assurance that battery capacity has not been affected to the degree that the batteries can still perform their required function, given that redundant batteries are involved. With redundant batteries involved, this potentially could result in a total loss of function on multiple systems that rely upon the batteries. The longer completion times specified for battery parameters on non-redundant batteries not within limits are therefore not appropriate, and the parameters must be restored to within limits on at least one division within 2 hours.

G. Condition G specifies actions to take when the Required Action and associated Completion Time of Condition A, B, D, E, or F are not met. When any battery parameter is outside the allowances of the Required Actions for Condition A, B, D, E, or F, sufficient capacity to supply the maximum expected load requirement is not ensured and the corresponding battery must be declared inoperable. The battery must therefore be declared inoperable immediately.

H. SR 3.8.6.1 requires verification that each battery float current is less than or equal to 2 amps. Verifying battery float current while on float charge is used to determine the state of charge of the battery. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery and maintain the battery in a charged state. The float current requirements are based on the float current indicative of a charged battery. Use of float current to determine the state of charge of the battery and the 7-day Frequency is consistent with Reference 1.

I. SR 3.8.6.2 and SR 3.8.6.5 verify that the cell voltage of either pilot cells or each connected cell are equal to or greater than the short-term absolute minimum voltage, representing the point where battery operability is in question. Optimal long-term battery performance is obtained by maintaining a float voltage greater than or equal to the minimum established design limits provided by the battery manufacturer, which corresponds to 260.4 V at the 250 VDC battery terminals and 125.9 V at the 125 VDC battery terminals, or 2.17 volts per cell (Vpc). This provides adequate over-potential, which limits the formation of lead sulfate and self-discharge, which could eventually render the battery inoperable. Float voltage in this range or less, but greater than 2.07 Vpc, are addressed in new TS Section 5.5.13. The Frequency for cell voltage verification every 31 days for pilot cells and 92 days for each connected cell is consistent with Reference 1.

J. SR 3.8.6.3 requires verification that each battery connected cell electrolyte level is greater than or equal to minimum established design limits. The limit specified for electrolyte level ensures that the plates suffer no physical damage and that the cell maintains adequate electron transfer capability. The Frequency of 31 days is consistent with Reference 1.

K. SR 3.8.6.4 requires verification that each battery pilot cell temperature is greater than or equal to the minimum established design limit (i.e., 65°F). Pilot cell electrolyte temperature is maintained above this temperature to assure the battery can provide the required current and voltage to meet design requirements. Temperatures lower than assumed in battery sizing calculations act to inhibit or reduce battery capacity. The Frequency of 31 days is consistent with Reference 1.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

According to 10 CFR 50.92, "Issuance of amendment," paragraph (c), a proposed amendment to an operating license involves no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or

(2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or

(3) Involve a significant reduction in a margin of safety.

The proposed changes are to Technical Specifications (TS) Section 3.8.4, "DC Sources – Operating," Section 3.8.5, "DC Sources – Shutdown," Section 3.8.6, "Battery Cell Parameters," and Section 5.5, "Programs and Manuals." The proposed changes request new actions for an inoperable battery charger and alternate battery charger testing criteria for limiting condition for operation (LCO) 3.8.4 and LCO 3.8.5. The proposed changes also include the relocation of a

number of surveillance requirements (SRs) in TS Section 3.8.4, that perform preventive maintenance on the safety related batteries, to a licensee controlled program. It is proposed that TS Table 3.8.6-1, "Battery Cell Parameter Requirements," be relocated to a licensee controlled program, and specific Required Actions with associated Completion Times for out-of-limits conditions for battery cell voltage, electrolyte level, and electrolyte temperature be added to TS Section 3.8.6. In addition, specific SRs are being proposed for verification of these parameters.

A new program is being proposed for the maintenance and monitoring of station batteries based on the recommendations of Institute of Electrical and Electronics Engineers (IEEE) Standard 450-1995, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications." This program will be described in new TS Section 5.5.13, "Battery Monitoring and Maintenance Program." The items proposed to be relocated will be contained within this new program.

Exelon Generation Company, LLC (EGC) has evaluated the proposed changes to the TS for DNPS, Units 2 and 3, using the criteria in 10 CFR 50.92, and has determined that the proposed changes do not involve a significant hazards consideration. The following information is provided to support a finding of no significant hazards consideration.

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

   Response: No

   The proposed changes restructure the Technical Specifications (TS) for the direct current (DC) electrical power system. The proposed changes add actions to specifically address battery charger inoperability. This change will rely upon the capability of providing the battery charger function by an alternate means (e.g., a 125 volts direct current (VDC) portable battery charger or a 250 VDC portable battery charger) to justify the proposed Completion Times. The DC electrical power system, including associated battery chargers, is not an initiator to any accident sequence analyzed in the Updated Final Safety Analysis Report (UFSAR). Operation in accordance with the proposed TS ensures that the DC electrical power system is capable of performing its function as described in the UFSAR. Therefore, the mitigative functions supported by the DC electrical power system will continue to provide the protection assumed by the analysis.

   The relocation of preventive maintenance surveillances, and certain operating limits and actions, to a newly-created licensee controlled Battery Monitoring and Maintenance Program will not challenge the ability of the DC electrical power system to perform its design function. Appropriate monitoring and maintenance, consistent with industry standards, will continue to be performed. In addition, the DC electrical power system is within the scope of 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," which will ensure the control of maintenance activities associated with the DC electrical power system.

   The integrity of fission product barriers, plant configuration, and operating procedures as described in the UFSAR will not be affected by the proposed changes. Therefore, the

consequences of previously analyzed accidents will not increase by implementing these changes.

Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

Response: No

The proposed changes involve restructuring the TS for the DC electrical power system. This change will rely upon the capability of providing the battery charger function by an alternate means (e.g., a swing charger or a portable battery charger) to justify the proposed Completion Times. The DC electrical power system, including associated battery chargers, is not an initiator to any accident sequence analyzed in the UFSAR. Rather, the DC electrical power system is used to supply equipment used to mitigate an accident.

The 125 VDC portable battery charger will be utilized as a common spare to feed the Division 1 or Division 2 125 VDC bus of Unit 2 or Unit 3. For the 250 VDC system, a full capacity swing charger is available for use between the units, and can be aligned to any one of the 250 VDC batteries. In addition, the 250 VDC portable battery charger can be utilized as a common spare to feed the 250 VDC safety related batteries of Unit 2 or Unit 3. This portable charger is identical to the existing chargers and is non-safety related. The output of the portable charger will be capable of being connected to any one of the Class 1E DC buses for Division 1 or Division 2 of Unit 2 or Unit 3. Allowing the use of a portable spare and swing battery chargers will increase the reliability of the DC electrical power system. The mitigative functions supported by the DC electrical power system will continue to provide the protection assumed by the safety analyses described in the UFSAR. Therefore, there are no new types of failures that could be created by a failure of the portable battery charger. As such, no new or different kind of accident or transient is expected by these changes.

Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any previously evaluated.

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

Response: No

The margin of safety is established through equipment design, operating parameters, and the setpoints at which automatic actions are initiated. The proposed changes will not adversely affect operation of plant equipment. These changes will not result in a change to the setpoints at which protective actions are initiated. Sufficient DC capacity to support operation of mitigation equipment is ensured. The changes associated with the new Battery Maintenance and Monitoring Program will ensure that the station batteries are maintained in a highly reliable manner. The use of a portable battery charger will increase the reliability of the DC system during periods of normal battery

charger inoperability. The equipment fed by the DC electrical sources will continue to provide adequate power to safety related loads in accordance with analysis assumptions.

Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

Based upon the above, EGC concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c). Accordingly, a finding of no significant hazards consideration is justified.

5.2 Applicable Regulatory Requirements/Criteria

10 CFR 50.36 provides the regulatory requirements for the content required in a licensee's TS. Criterion 3 of 10 CFR 50.36(c)(2)(ii) requires a limiting condition for operation to be established for a structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The DC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

The proposed changes:

(a) do not alter the design or function of any DC electrical power system;
(b) do not result in any change in the qualifications of any component; and
(c) do not result in the reclassification of any component's status in the areas of shared, safety related, independent, redundant, or physical or electrical separation.

Portions of the proposed license amendment request result in relocating certain surveillances, surveillance acceptance criteria, and Required Actions that do not meet the criteria of 10 CFR 50.36(c)(2)(ii). Existing TS Table 3.8.6-1 limits reflect nominal fully charged battery parameter values, with margin above that required for declaration of an operable battery. These limits represent appropriate monitoring levels and appropriate preventive maintenance criteria for long-term battery quality and extended battery life. As such, they do not reflect the 10 CFR 50.36 criteria for LCOs of the lowest functional capability or performance levels of equipment required for safe operation of the facility. The proposed changes relocate these values and actions associated with restoration to a licensee controlled program under the control of 10 CFR 50.59.

The proposed items to be relocated to a licensee controlled program will have changes subject to review under 10 CFR 50.59 to determine if the proposed changes will require prior NRC review and approval, and will require reporting of all changes to the NRC in accordance with 10 CFR 50.71(e). This provides sufficient control of the requirements to assure the batteries are maintained in a highly reliable condition.

The increased restoration times and revised criteria for monitoring the capacity of the batteries and battery chargers to perform their intended functions, are reasonable and consistent with approved standards, guidance, and regulations. The revised testing criteria ensure that full functionality is maintained and that Criterion 3 of 10 CFR 50.36(c)(2)(ii) is met.

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.

The NRC has granted similar license amendments for Clinton Power Station, Unit 1, in Reference 5 and Limerick Generating Station, Units 1 and 2, in Reference 6.

6.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, "Standards for Protection Against Radiation," or would change an inspection or surveillance requirement. However, the proposed amendment does not involve: (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22, "Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review," paragraph (c)(9). Therefore, pursuant to 10 CFR 51.22, paragraph (b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

7.0 REFERENCES

1. Institute of Electrical and Electronics Engineers (IEEE) Standard 450-1995, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications," dated January 24, 1995

2. Technical Specifications Task Force (TSTF) Traveler TSTF-360, Revision 1, "DC Electrical Rewrite"

3. Letter from W. D. Becker (U. S. NRC) to A. R. Pietrangelo (Nuclear Energy Institute), dated December 18, 2000

4. Letter from K. R. Jury (Exelon Generation Company, LLC) to U. S. NRC, "Request for License Amendments Related to Application of Alternative Source Term," dated October 10, 2002

5. Letter from J. B. Hopkins (U. S. NRC) to O. D. Kingsley (Exelon Generation Company, LLC), "Clinton Power Station, Unit 1 – Issuance of Amendment (TAC No. MB3071)," dated February 15, 2002

6. Letter from S. P. Wall (U. S. NRC) to J. L. Skolds (Exelon Generation Company, LLC), "Limerick Generating Station, Units 1 and 2 – Issuance of Amendment Re: DC Electrical Power Sources Based on TSTF-360 (TAC Nos. MB5257 and MB5258)," dated January 29, 2003

ATTACHMENT 2
Markup of Technical Specification Pages

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3

FACILITY OPERATING LICENSE NOS. DPR-19 AND DPR-25

Request for Amendment to Technical Specifications
Associated With Direct Current Electrical Power

REVISED TECHNICAL SPECIFICATIONS PAGES

iii
3.8.4-1
3.8.4-2
3.8.4-3
3.8.4-4
3.8.4-5
3.8.4-6
3.8.4-7
3.8.5-2
3.8.6-1
3.8.6-2
3.8.6-3
3.8.6-4
5.5-12

TABLE OF CONTENTS (continued)

(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources – Operating

LCO 3.8.4 The following DC electrical power subsystems shall be OPERABLE:

a. Two 250 VDC electrical power subsystems;

b. Division 1 and Division 2 125 VDC electrical power subsystems; and

c. The opposite unit's Division 2 125 VDC electrical power subsystem capable of supporting equipment required to be OPERABLE by LCO 3.6.4.3, "Standby Gas Treatment (SGT) System," LCO 3.7.4, "Control Room Emergency Ventilation (CREV) System" (Unit 3 only), LCO 3.7.5, "Control Room Emergency Ventilation Air Conditioning (AC) System" (Unit 3 only), and LCO 3.8.1, "AC Sources – Operating."

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One 250 VDC battery inoperable as a result of maintenance or testing. B.	B.1 Restore 250 VDC battery to OPERABLE status. B	Prior to exceeding 7 cumulative days per operating cycle of battery inoperability, on a per battery basis, as a result of maintenance or testing

(continued)

INSERT 3.8.4 Action A

DRESDEN UNITS 2 AND 3 INSERTS

INSERT: 3.8.4 ACTION A

ACTIONS

CONDITION		REQUIRED ACTION		COMPLETION TIME
A.	One required 250 VDC battery charger inoperable.	A.1	Restore 250 VDC battery terminal voltage to greater than or equal to the minimum established float voltage.	2 hours
		AND		
		A.2	Verify 250 VDC battery float current is ≤ 2 amps.	Once per 12 hours
		AND		
		A.3	Restore the required 250 VDC battery charger to OPERABLE status.	7 days

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One 250 VDC battery inoperable, due to the need to replace the battery, as determined by maintenance or testing.	C.1 Restore 250 VDC battery to OPERABLE status.	7 days
D. One 250 VDC electrical power subsystem inoperable for reasons other than Conditions ~~A or B~~ A, B, or C.	D.1 Restore 250 VDC electrical power subsystem to OPERABLE status.	2 hours
F. ---------NOTE--------- Only applicable if the opposite unit is in MODE 1, 2, or 3. ---------- Division 1 or 2 125 VDC battery inoperable as a result of maintenance or testing.	F.1 Place associated OPERABLE alternate 125 VDC electrical power subsystem in service. AND F.2 Restore Division 1 or 2 125 VDC battery to OPERABLE status.	2 hours Prior to exceeding 7 cumulative days per operating cycle on a per battery basis

(continued)

INSERT 3.8.4 ACTION E

DRESDEN UNITS 2 AND 3 INSERTS

INSERT: 3.8.4 ACTION E

ACTIONS

CONDITION		REQUIRED ACTION		COMPLETION TIME
E.	One required Division 1 or 2 125 VDC battery charger inoperable.	E.1	Restore 125 VDC battery terminal voltage to greater than or equal to the *minimum* established float voltage.	2 hours
		AND		
		E.2	Verify 125 VDC battery float current is ≤ 2 amps.	Once per 12 hours
		AND		
		E.3	Restore the required Division 1 or 2 125 VDC battery charger to OPERABLE status.	7 days

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. --------NOTE-------- Only applicable if the opposite unit is in MODE 1, 2, or 3. ---------- Division 1 or 2 125 VDC battery inoperable, due to the need to replace the battery, as determined by maintenance or testing.	F.1 Place associated OPERABLE alternate 125 VDC electrical power subsystem in service. AND F.2 Restore Division 1 or 2 125 VDC battery to OPERABLE status.	2 hours 7 days
F. Division 1 or 2 125 VDC electrical power subsystem inoperable for reasons other than Condition D or E. Conditions E, F, or G.	F.1 Restore Division 1 or 2 125 VDC electrical power subsystem to OPERABLE status. OR F.2 --------NOTE-------- Only applicable if the opposite unit is not in MODE 1, 2, or 3. ---------- Place associated OPERABLE alternate 125 VDC electrical power subsystem in service.	2 hours 2 hours

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
G. Opposite unit Division 2 125 VDC electrical power subsystem inoperable.	G.1 Restore opposite unit Division 2 125 VDC electrical power subsystem to OPERABLE status.	7 days
H. Required Action and associated Completion Time not met.	H.1 Be in MODE 3. AND H.2 Be in MODE 4.	12 hours 36 hours

greater than or equal to the minimum established float voltage

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage on float charge is: a. ≥ 260.4 VDC for each 250 VDC subsystem; b. ≥ 125.9 VDC for each 125 VDC subsystem; and c. ----------NOTE---------- Only required to be met when the Unit 2 alternate battery is required to be OPERABLE. ---------- ≥ 134.5 VDC for Unit 2 alternate battery.	7 days
SR 3.8.4.2	Verify no visible corrosion at battery terminals and connectors. OR Verify battery connection resistance is ≤ 1.5E-4 ohm for inter-cell connections and ≤ 1.5E-4 ohm for terminal connections.	92 days
SR 3.8.4.6 (2)	Verify each required 250 VDC battery charger supplies ≥ 200 amps at ≥ 260 VDC for ≥ 4 hours for the 250 VDC subsystems.	18 months
SR 3.8.4.4	Verify battery cells, cell plates, and racks show no visual indication of physical damage or abnormal deterioration that could degrade battery performance.	24 months

greater than or equal to the minimum established float voltage

VDC

(continued)

INSERT SR 3.8.4.2

DRESDEN UNITS 2 AND 3 INSERTS

INSERT: SR 3.8.4.2

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.4.2	... OR Verify each 250 VDC 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.	...

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.5	Remove visible corrosion and verify battery cell to cell and terminal connections are coated with anti-corrosion material.	24 months
SR 3.8.4.6	Verify battery connection resistance is ≤ 1.5E-4 ohm for inter-cell connections and ≤ 1.5E-4 ohm for terminal connections.	24 months
SR 3.8.4.7	Verify each required 125 V battery charger supplies ≥ 200 amps at ≥ 130 VDC for ≥ 4 hours for the 125 VDC subsystems.	24 months
SR 3.8.4.8	----------NOTE---------- The modified performance discharge test in SR 3.8.4.9 may be performed in lieu of the service test in SR 3.8.4.8 provided the modified performance discharge test completely envelopes the service test. ---------- 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.	24 months

(continued)

INSERT SR 3.8.4.3

greater than or equal to the minimum established float voltage

DRESDEN UNITS 2 AND 3 INSERTS

INSERT: SR 3.8.4.3

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.4.3	... OR Verify each 125 VDC 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.	...

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.9	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 AND 12 months when battery shows degradation or has reached 85% of expected life with capacity < 100% of manufacturer's rating AND 24 months when battery has reached 85% of the expected life with capacity ≥ 100% of manufacturer's rating

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.3 Initiate action to suspend operations with a potential for draining the reactor vessel. AND	Immediately
	A.2.4 Initiate action to restore required DC electrical power subsystems to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.5.1	----------NOTE---------- The following SRs are not required to be performed for the 250 VDC electrical power subsystem: SR 3.8.4.3, SR 3.8.4.8 and SR 3.8.4.9. ----------	
	For DC electrical power subsystems required to be OPERABLE the following SRs are applicable: SR 3.8.4.1, SR 3.8.4.2, SR 3.8.4.3, SR 3.8.4.4, SR 3.8.4.5, SR 3.8.4.6, SR 3.8.4.7, SR 3.8.4.8, and SR 3.8.4.9.	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Cell Parameters

VDC

LCO 3.8.6 Battery cell parameters for the 125 V and 250 V station batteries shall be within limits.

APPLICABILITY: When associated DC electrical power subsystems are required to be OPERABLE.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each battery.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more batteries with one or more battery cell parameters not within Table 3.8.6-1 Category A or B limits.	A.1 Verify pilot cell(s) electrolyte level and float voltage meet Table 3.8.6-1 Category C limits.	1 hour
	AND	
	A.2 Verify battery cell parameters meet Table 3.8.6-1 Category C limits.	24 hours AND Once per 7 days thereafter
	AND	
	A.3 Restore battery cell parameters to Table 3.8.6-1 Category A and B limits.	31 days

INSERT 3.8.6 ACTIONS

(continued)

DRESDEN UNITS 2 AND 3 INSERTS

INSERT: 3.8.6 ACTIONS

ACTIONS

CONDITION		REQUIRED ACTION		COMPLETION TIME
A.	One 250 VDC or 125 VDC battery with one or more battery cells float voltage < 2.07 V.	A.1	Perform SR 3.8.4.1.	2 hours
		AND		
		A.2	Perform SR 3.8.6.1.	2 hours
		AND		
		A.3	Restore affected cell voltage to ≥ 2.07 V.	24 hours
B.	One 250 VDC or 125 VDC battery with float current > 2 amps.	B.1	Perform SR 3.8.4.1.	2 hours
		AND		
		B.2	Restore battery float current to ≤ 2 amps.	12 hours
C.	One 250 VDC or 125 VDC battery with one or more battery cells float voltage < 2.07 V and float current > 2 amps.	C.1	Declare associated battery inoperable.	Immediately

DRESDEN UNITS 2 AND 3 INSERTS

INSERT: 3.8.6 ACTIONS (cont.)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
----------NOTE---------- Required Action D.2 shall be completed if electrolyte level was below the top of plates. ----------	----------NOTE---------- Required Actions D.1 and D.2 are only applicable if electrolyte level was below the top of plates. ----------	
D. One 250 VDC or 125 VDC battery with one or more cells electrolyte level less than minimum established design limits.	D.1 Restore electrolyte level to above top of plates. AND D.2 Verify no evidence of leakage. AND D.3 Restore electrolyte level to greater than or equal to minimum established design limits.	8 hours 12 hours 31 days
E. One 250 VDC or 125 VDC battery with pilot cell electrolyte temperature less than minimum established design limits.	E.1 Restore battery pilot cell temperature to greater than or equal to minimum established design limits.	12 hours
F. One or more batteries in redundant divisions with battery parameters not within limits.	F.1 Restore battery parameters for batteries in one division to within limits.	2 hours

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time of Condition A not met. OR One or more batteries with average electrolyte temperature of the representative cells not within limits. OR One or more batteries with one or more battery cell parameters not within Table 3.8.6-1 Category C limits.	B.1 Declare associated battery inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.6.1	Verify battery cell parameters meet Table 3.8.6-1 Category A limits.	7 days
SR 3.8.6.2	Verify battery cell parameters meet Table 3.8.6-1 Category B limits.	92 days AND Once within 7 days after battery discharge < 105 V for 125 V batteries and < 210 V for 250 V batteries AND Once within 7 days after battery overcharge > 150 V for 125 V batteries and > 300 V for 250 V batteries
SR 3.8.6.3	Verify average electrolyte temperature of representative cells is > 65°F.	92 days

INSERT 3.8.6 SRs

DRESDEN UNITS 2 AND 3 INSERTS

INSERT: 3.8.6 SRs

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.6.1	----------NOTE---------- Not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.4.1. ---------- Verify each battery float current is ≤ 2 amps.	7 days
SR 3.8.6.2	Verify each battery pilot cell voltage is ≥ 2.07 V.	31 days
SR 3.8.6.3	Verify each battery connected cell electrolyte level is greater than or equal to minimum established design limits.	31 days
SR 3.8.6.4	Verify each battery pilot cell temperature is greater than or equal to minimum established design limits.	31 days
SR 3.8.6.5	Verify each battery connected cell voltage is ≥ 2.07 V.	92 days
SR 3.8.6.6	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 AND 12 months when battery shows degradation or has reached 85% of expected life with capacity < 100% of manufacturer's rating AND 24 months when battery has reached 85% of the expected life with capacity ≥ 100% of manufacturer's rating

Table 3.8.6-1 (page 1 of 1)
Battery Cell Parameter Requirements

PARAMETER	CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B: LIMITS FOR EACH CONNECTED CELL	CATEGORY C: LIMITS FOR EACH CONNECTED CELL
Electrolyte Level	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark[a]	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark[a]	Above top of plates, and not overflowing
Float Voltage	≥ 2.13 V	≥ 2.13 V	> 2.07 V
Specific Gravity[b][c]	≥ 1.200	≥ 1.195 AND Average of all connected cells > 1.205	Not more than 0.020 below average of all connected cells AND Average of all connected cells ≥ 1.195

(a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum level during and, for a limited time, following equalizing charges provided it is not overflowing.

(b) Corrected for electrolyte temperature and level.

(c) A battery charging current of < 2 amps when on float charge is acceptable for meeting specific gravity limits following a battery recharge, for a maximum of 7 days. When charging current is used to satisfy specific gravity requirements, specific gravity of each connected cell shall be measured prior to expiration of the 7 day allowance.

5.5 Programs and Manuals

5.5.12 Primary Containment Leakage Rate Testing Program (continued)

c. The maximum allowable primary containment leakage rate, L_a, at P_a, is 1.6% of primary containment air weight per day.

d. Leakage rate acceptance criteria are:

1. Primary containment overall leakage rate acceptance criterion is $\leq$ 1.0 L_a. During the first unit startup following testing in accordance with this program, the leakage rate acceptance criteria are $\leq$ 0.60 L_a for the combined Type B and Type C tests, and $\leq$ 0.75 L_a for Type A tests.

2. Air lock testing acceptance criteria is the overall air lock leakage rate is $\leq$ 0.05 L_a when tested at $\geq$ P_a.

e. The provisions of SR 3.0.3 are applicable to the Primary Containment Leakage Rate Testing Program.

INSERT 5.5.13 PROGRAM

DRESDEN UNITS 2 AND 3 INSERTS

INSERT: 5.5.13 Program

5.5.13 Battery Monitoring and Maintenance Program

This Program provides for restoration and maintenance, based on the recommendations of IEEE Standard 450-1995, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications," including the following:

a. Actions to restore battery cells with float voltage < 2.13 V, and

b. Actions to equalize and test battery cells that had been discovered with electrolyte level below the minimum established design limit.

ATTACHMENT 3
Markup of Technical Specification Bases Pages

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3

FACILITY OPERATING LICENSE NOS. DPR-19 AND DPR-25

Request for Amendment to Technical Specifications
Associated With Direct Current Electrical Power

REVISED TECHNICAL SPECIFICATIONS BASES PAGES

B 3.8.4-3
B 3.8.4-5
B 3.8.4-6
B 3.8.4-7
B 3.8.4-8
B 3.8.4-9
B 3.8.4-10
B 3.8.4-11
B 3.8.4-12
B 3.8.4-13
B 3.8.4-14
B 3.8.4-15
B 3.8.4-16
B 3.8.4-17
B 3.8.5-4
B 3.8.6-1
B 3.8.6-2
B 3.8.6-3
B 3.8.6-4
B 3.8.6-5
B 3.8.6-6
B 3.8.6-7

BASES

BACKGROUND (continued)

Each battery has adequate storage capacity to carry the normal loads plus all loads required for safe shutdown on one unit and operational loads required to limit the consequences of a design basis event on the other unit for a period of 4 hours (Ref. 4).

Each DC 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 subsystems 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 subsystems such as batteries, battery chargers, or distribution panels.

INSERT B 3.8.4-1

The batteries for DC electrical power subsystems 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. The minimum design voltage limit is 105/210 V.

INSERT B 3.8.4-2

Each DC electrical power subsystem battery charger 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 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 (Ref. 4).

excess

INSERT B 3.8.4-3

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 5) and Chapter 15 (Ref. 6), assume that Engineered Safety Feature (ESF) systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the DGs, emergency auxiliaries, and control and switching during all MODES of operation.

The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining DC sources OPERABLE during accident conditions in the event of:

(continued)

DRESDEN UNITS 2 AND 3 INSERTS

INSERT: B 3.8.4-1

Each battery has adequate storage capacity to meet the duty cycle(s) discussed in UFSAR Chapter 8 (Ref. 4). The battery is designed with additional capacity above that required by the design duty cycle to allow for temperature variations and other factors.

INSERT: B 3.8.4-2

The battery cells are flooded lead acid construction with a nominal specific gravity of 1.215. This specific gravity corresponds to an open circuit battery voltage of approximately 120 V for a 58 cell battery (i.e., cell voltage of 2.07 volts per cell (Vpc)). The open circuit voltage is the voltage maintained when there is no charging or discharging. Once fully charged with its open circuit voltage $\geq$ 2.07 Vpc, the battery cell will maintain its capacity for 30 days without further charging per manufacturer's instructions. Optimal long term performance however, is obtained by maintaining a float voltage of 2.17 to 2.25 Vpc. This provides adequate over-potential, which limits the formation of lead sulfate and self-discharge. The nominal float voltage of 2.22 Vpc corresponds to a total float voltage output of 128.8 V for a 58 cell battery as discussed in UFSAR Chapter 8 (Ref. 4).

INSERT: B 3.8.4-3

The battery charger is normally in the float-charge mode. Float-charge is the condition in which the charger is supplying the connected loads and the battery cells are receiving adequate current to optimally charge the battery. This assures the internal losses of a battery are overcome and the battery is maintained in a fully charged state.

When desired, the charger can be placed in the equalize mode. The equalize mode is at a higher voltage than the float mode and charging current is correspondingly higher. The battery charger is operated in the equalize mode after a battery discharge or for routine maintenance. Following a battery discharge, the battery recharge characteristic accepts current at the current limit of the battery charger (if the discharge was significant, e.g., following a battery service test) until the battery terminal voltage approaches the charger voltage setpoint. Charging current then reduces exponentially during the remainder of the recharge cycle. Lead-calcium batteries have recharge efficiencies of greater than 95%, so once at least 105% of the ampere-hours discharged have been returned, the battery capacity would be restored to the same condition as it was prior to the discharge. This can be monitored by direct observation of the exponentially decaying charging current or by evaluating the amp-hours discharged from the battery and amp-hours returned to the battery.

INSERT B 3.8.4 ACTION A

BASES

APPLICABILITY (continued)

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

The DC electrical power requirements for MODES 4 and 5 and other conditions in which the DC electrical power sources are required are addressed in LCO 3.8.5, "DC Sources – Shutdown."

ACTIONS

A.1

B

Condition A, 250 VDC battery inoperable as a result of maintenance or testing, represents one subsystem with a loss of ability to completely respond to an event. It is therefore imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for complete loss of 250 VDC power to the affected subsystem. Operation in this Condition is needed during the operating cycle to ensure the battery is maintained OPERABLE.

for reasons other than Condition A

If one of the 250 VDC batteries is inoperable for reasons other than Condition A, the remaining 250 VDC electrical power subsystem has the capacity to support a safe shutdown of one unit and to mitigate an accident condition in the other unit. Since a subsequent worst case single failure could, however, result in the loss of minimum necessary DC electrical subsystems to mitigate a worst case accident, continued power operation is limited.

B

Required Action A.1 limits the time the unit can operate in this condition to 7 cumulative days per operating cycle, for any one battery. Therefore, each 250 VDC battery can be removed from service to perform maintenance or testing as long as the cumulative time is not exceeded for that battery.

The 7 day cumulative Completion Time is based on the capacity and capability of the remaining DC sources to supply the required loads.

(continued)

DRESDEN UNITS 2 AND 3 INSERTS

INSERT: B 3.8.4 ACTION A

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

Condition A represents one required 250 VDC battery charger inoperable (e.g., the voltage limit of SR 3.8.4.1 is not maintained as both the unit and swing chargers are inoperable). The ACTIONS provide a tiered response that focuses on returning the battery to the fully charged state and restoring a fully qualified charger to OPERABLE status in a reasonable time period. Required Action A.1 requires that the battery terminal voltage be restored to greater than or equal to the minimum established float voltage within 2 hours. This time provides for returning the inoperable charger to OPERABLE status or providing an alternate means of restoring battery terminal voltage to greater than or equal to the minimum established float voltage. Restoring the battery terminal voltage to greater than or equal to the minimum established float voltage provides good assurance that, within 12 hours, the battery will be restored to its fully charged condition (Required Action A.2) from any discharge that might have occurred due to the charger inoperability. A discharged battery having terminal voltage of at least the minimum established float voltage indicates that the battery is on the exponential charging current portion (the second part) of its recharging cycle. The time to return a battery to its fully charged state under this condition is simply a function of the amount of the previous discharge and the recharge characteristic of the battery. Thus, there is good assurance of fully recharging the battery within 12 hours, avoiding a premature shutdown with its own attendant risk.

If established battery terminal float voltage cannot be restored to greater than or equal to the minimum established float voltage within 2 hours, and the charger is not operating in the current-limiting mode, a faulty charger is indicated. Current-limiting mode is the condition in which the maximum charger output is limited to ensure that the AC current drawn by the charger is within design limits. The charger output in current-limiting mode is greater than or equal to 220 amps. A faulty charger that is incapable of maintaining established battery terminal float voltage does not provide assurance that it can revert to and operate properly in the current limit mode that is necessary during the recovery period following a battery discharge event that the DC system is designed for.

If the charger is operating in the current limit mode after 2 hours, that is an indication that the battery is partially discharged and its capacity margins will be reduced. The time to return the battery to its fully charged condition in this case is a function of the battery charger capacity, the amount of loads on the associated DC system, the amount of the previous discharge, and the recharge characteristic of the battery. The charge time can be extensive, and there is not adequate assurance that it can be recharged within 12 hours (Required Action A.2).

DRESDEN UNITS 2 AND 3 INSERTS

INSERT: B 3.8.4 ACTION A (cont.)

Required Action A.2 requires that the battery float current be verified as less than or equal to 2 amps. This indicates that, if the battery had been discharged as the result of the inoperable battery charger, it has now been fully recharged. If at the expiration of the initial 12-hour period the battery float current is not less than or equal to 2 amps, this indicates there may be additional battery problems and the battery must be declared inoperable.

Required Action A.3 limits the restoration time for the inoperable battery charger to 7 days. This action is applicable if an alternate means of restoring battery terminal voltage to greater than or equal to the minimum established float voltage has been used (e.g., balance of plant non-Class 1E battery charger). The 7-day completion time reflects a reasonable time to effect restoration of the qualified battery charger to operable status.

BASES

ACTIONS
(continued)

B.1

C

Condition B, 250 VDC battery inoperable due to the need to replace the battery as determined by maintenance or testing, represents one subsystem with a loss of ability to completely respond to an event. It is therefore imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for complete loss of 250 VDC power to the affected subsystem. Operation in this Condition may be needed during the operating cycle to completely replace a battery to maintain the 250 VDC subsystem OPERABLE for the remainder of the cycle.

If one of the 250 VDC batteries is inoperable, the remaining 250 VDC electrical power subsystem has the capacity to support a safe shutdown of one unit and to mitigate an accident condition in the other unit. Since a subsequent worst case single failure could, however, result in the loss of minimum necessary DC electrical subsystems to mitigate a worst case accident, continued power operation is limited. Required Action B.1 limits the time the unit can operate in this condition to 7 days. Therefore, each 250 VDC battery can be removed from service to completely replace a battery.

C

B.1

The 7 day Completion Time to restore the 250 VDC battery is based on the capacity and capability of the remaining DC sources to supply the required loads.

D

D.1

A, B, or C

D

With one 250 VDC electrical power subsystem inoperable for reasons other than Condition A or B, Condition D represents one 250 VDC electrical power subsystem with a loss of ability to completely respond to an event and a potential loss of ability to remain energized during normal operation. It is therefore imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for complete loss of 250 VDC power to the affected buses. The 2 hour limit is consistent with the allowed time for an inoperable DC Distribution System subsystem.

If one 250 VDC electrical power subsystem is inoperable (e.g., inoperable battery, inoperable required battery charger(s), or inoperable required battery charger and

for reasons other than Condition A, B, or C

(continued)

BASES

ACTIONS D.1 (continued)

associated inoperable battery), the remaining DC electrical power subsystems have the capacity to support a safe shutdown of one unit and to mitigate an accident condition. Since a subsequent worst case single failure could, however, result in the loss of minimum necessary DC electrical subsystems to mitigate a worst case accident, continued power operation should not exceed 2 hours. The 2 hour Completion Time is based on Regulatory Guide 1.93 (Ref. 7) and reflects a reasonable time to assess unit status as a function of the inoperable DC electrical power subsystem and, if the DC electrical power subsystem is not restored to OPERABLE status, to prepare to effect an orderly and safe unit shutdown.

INSERT B 3.8.4 ACTION E

D.1 and D.2

Condition D, Division 1 or 2 125 VDC battery inoperable as a result of maintenance or testing, represents one division with a loss of ability to completely respond to an event. It is therefore imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for complete loss of DC power to the affected division. Operation in this Condition is needed during the operating cycle to ensure the battery is maintained OPERABLE. Condition D is modified by a Note indicating that the Condition is only applicable when the opposite unit is in MODE 1, 2, or 3.

If one of the 125 VDC batteries is inoperable, the remaining 125 VDC electrical power subsystem has the capacity to support a safe shutdown of one unit and to mitigate an accident condition in the other unit. Since a subsequent worst case single failure could, however, result in the loss of minimum necessary DC electrical subsystems to mitigate a worst case accident, continued power operation is limited. Required Action D.2 limits the time the unit can operate in this condition to 7 cumulative days per operating cycle, for any one battery. Therefore, each 125 VDC battery can be removed from service to perform maintenance or testing as long as the cumulative time is not exceeded for that battery. In addition, Required Action D.1 requires the

(continued)

DRESDEN UNITS 2 AND 3 INSERTS

INSERT: B 3.8.4 ACTION E

ACTIONS E.1, E.2, and E.3

Condition E represents one required Division 1 or 2 125 VDC battery charger inoperable (e.g., the voltage limit of SR 3.8.4.1 is not maintained as both the installed Class 1E battery chargers are inoperable). The ACTIONS provide a tiered response that focuses on returning the battery to the fully charged state and restoring a fully qualified charger to OPERABLE status in a reasonable time period. Required Action E.1 requires that the battery terminal voltage be restored to greater than or equal to the minimum established float voltage within 2 hours. This time provides for returning the inoperable charger to OPERABLE status or providing an alternate means of restoring battery terminal voltage to greater than or equal to the minimum established float voltage. Restoring the battery terminal voltage to greater than or equal to the minimum established float voltage provides good assurance that, within 12 hours, the battery will be restored to its fully charged condition (Required Action E.2) from any discharge that might have occurred due to the charger inoperability. A discharged battery having terminal voltage of at least the minimum established float voltage indicates that the battery is on the exponential charging current portion (the second part) of its recharging cycle. The time to return a battery to its fully charged state under this condition is simply a function of the amount of the previous discharge and the recharge characteristic of the battery. Thus, there is good assurance of fully recharging the battery within 12 hours, avoiding a premature shutdown with its own attendant risk.

If established battery terminal float voltage cannot be restored to greater than or equal to the minimum established float voltage within 2 hours, and the charger is not operating in the current-limiting mode, a faulty charger is indicated. Current-limiting mode is the condition in which the maximum charger output is limited to ensure that the AC current drawn by the charger is within design limits. The charger output in current-limiting mode is greater than or equal to 220 amps. A faulty charger that is incapable of maintaining established battery terminal float voltage does not provide assurance that it can revert to and operate properly in the current limit mode that is necessary during the recovery period following a battery discharge event that the DC system is designed for.

If the charger is operating in the current limit mode after 2 hours, that is an indication that the battery is partially discharged and its capacity margins will be reduced. The time to return the battery to its fully charged condition in this case is a function of the battery charger capacity, the amount of loads on the associated DC system, the amount of the previous discharge, and the recharge characteristic of the battery. The charge time can be extensive, and there is not adequate assurance that it can be recharged within 12 hours (Required Action E.2).

DRESDEN UNITS 2 AND 3 INSERTS

INSERT: B 3.8.4 ACTION E (cont.)

Required Action E.2 requires that the battery float current be verified as less than or equal to 2 amps. This indicates that, if the battery had been discharged as the result of the inoperable battery charger, it has now been fully recharged. If at the expiration of the initial 12-hour period the battery float current is not less than or equal to 2 amps, this indicates there may be additional battery problems and the battery must be declared inoperable.

Required Action E.3 limits the restoration time for the inoperable battery charger to 7 days. This action is applicable if an alternate means of restoring battery terminal voltage to greater than or equal to the minimum established float voltage has been used (e.g., balance of plant non-Class 1E battery charger). The 7-day completion time reflects a reasonable time to effect restoration of the qualified battery charger to operable status.

BASES

ACTIONS D.1 and D.2 (continued)

associated OPERABLE alternate 125 VDC electrical power subsystem to be placed in service. An OPERABLE alternate 125 VDC electrical power subsystem consists of the alternate 125 VDC battery and one full capacity battery charger. For the alternate 125 VDC battery to be considered OPERABLE, all SR requirements associated with the alternate 125 VDC battery must be met. Therefore, placement of the OPERABLE alternate 125 VDC electrical power subsystem in service will help ensure that the design basis can be met. (The full capacity battery charger is the same battery charger (normal or spare) associated with the normal 125 VDC electrical power subsystem.) However, the design configuration of the alternate battery is susceptible to single failure and hence, is not as reliable as the normal battery. Therefore, only a limited time of operation is allowed in this condition.

The 2 hour Completion Time to place the associated OPERABLE alternate 125 VDC electrical power subsystem in service provides sufficient time to safely remove the Division 1 or 2 125 VDC electrical power subsystem from service and place the alternate supply in service. The 7 day cumulative Completion Time is based on the capacity and capability of the remaining DC Sources, including the enhanced capability afforded by the capability of the alternate 125 VDC electrical power subsystem to supply the required loads.

E.1 and E.2

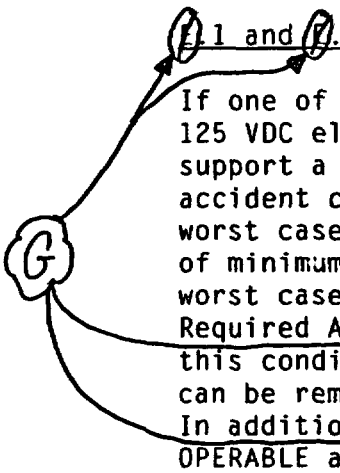
Condition E Division 1 or 2 125 VDC battery inoperable due to the need to replace the battery as determined by maintenance or testing, represents one division with a loss of ability to completely respond to an event. It is therefore imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for complete loss of DC power to the affected division. Operation in this Condition may be needed during the operating cycle to completely replace a battery to maintain the Division 1 or 2 VDC subsystem OPERABLE for the remainder of the cycle. Condition E is modified by a Note indicating that the Condition is only applicable when the opposite unit is in MODE 1, 2, or 3.

(continued)

BASES

ACTIONS

F.1 and F.2 (continued)



If one of the 125 VDC batteries is inoperable, the remaining 125 VDC electrical power subsystem has the capacity to support a safe shutdown of one unit and to mitigate an accident condition in the other unit. Since a subsequent worst case single failure could, however, result in the loss of minimum necessary DC electrical subsystems to mitigate a worst case accident, continued power operation is limited. Required Action F.2 limits the time the unit can operate in this condition to 7 days. Therefore, each 125 VDC battery can be removed from service to completely replace a battery. In addition, Required Action F.1 requires the associated OPERABLE alternate 125 VDC electrical power subsystem to be placed in service. An OPERABLE alternate 125 VDC electrical power subsystem consists of the alternate 125 VDC battery and one full capacity battery charger. For the alternate 125 VDC battery to be considered OPERABLE, all SR requirements associated with the alternate 125 VDC battery must be met. Therefore, placement of the OPERABLE alternate 125 VDC electrical power subsystem in service will help ensure that the design basis can be met. (The full capacity battery charger is the same battery charger (normal or space) associated with the normal 125 VDC electrical power subsystem.) However, the design configuration of the alternate battery is susceptible to single failure and hence, is not as reliable as the normal battery. Therefore, only a limited time of operation is allowed in this condition.

The 2 hour Completion Time to place the associated OPERABLE alternate 125 VDC electrical power subsystem in service provides sufficient time to safely remove the Division 1 or 2 125 VDC electrical power subsystem from service and place the alternate supply in service. The 7 day Completion Time to restore the 125 VDC battery is based on the capacity and capability of the remaining DC Sources, including the enhanced capability afforded by the capability of the alternate 125 VDC electrical power subsystem to supply the required loads.

(continued)

BASES

ACTIONS (continued)

With one Division 1 or Division 2 125 VDC electrical power subsystem inoperable for reasons other than Conditions D or E, Condition F represents one division with a loss of ability to completely respond to an event, and a potential loss of ability to remain energized during normal operation. It is therefore imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for complete loss of DC power to the affected division. The 2 hour limit is consistent with the allowed time for an inoperable DC Distribution System division.

If one 125 VDC electrical power subsystem is inoperable (e.g., inoperable battery, inoperable required battery charger, or inoperable required battery charger and associated inoperable battery), the remaining DC electrical power subsystems have the capacity to support a safe shutdown and to mitigate an accident condition. Since a subsequent worst case single failure could, however, result in the loss of minimum necessary DC electrical subsystems to mitigate a worst case accident, continued power operation should not exceed 2 hours. The 2 hour Completion Time is based on Regulatory Guide 1.93 (Ref. 7) and reflects a reasonable time to assess unit status as a function of the inoperable DC electrical power subsystem and, if the DC electrical power subsystem is not restored to OPERABLE status, to prepare to effect an orderly and safe unit shutdown.

Required Action F.2 is modified by a Note indicating that the action is only applicable if the opposite unit is not in MODE 1, 2, or 3. In this condition, the shutdown unit is under maintenance and a complete test of at least one 125 VDC subsystem may be necessary. Required Action F.2 requires the OPERABLE alternate 125 VDC electrical power subsystem to be placed in service in 2 hours. The 2 hour Completion Time to place associated OPERABLE alternate 125 VDC electrical power subsystem in service provides sufficient time to safely remove the Division 1 and 2 125 VDC electrical power subsystem from service and place the alternate supply in service. An OPERABLE alternate 125 VDC electrical power subsystem consists of the alternate 125 VDC battery and one full capacity battery charger. For

(continued)

BASES

ACTIONS H.1 and H.2 (continued)

the alternate 125 VDC battery to be considered OPERABLE all SR requirements associated with the 125 VDC battery must be met. (The full capacity battery charger is the same battery charger (normal or spare) associated with the normal 125 VDC electrical power subsystem.) Upon completing this Required Action continuous operation is allowed, since if the opposite unit associated OPERABLE alternate 125 VDC electrical power subsystem is placed in service supplying the unit Division 2 loads, the design configuration will not be susceptible to single failure and hence, the reliability is consistent with the normal battery.

I.1

With the opposite unit Division 2 125 VDC electrical power system inoperable, certain redundant Division 2 features (e.g., Standby Gas Treatment System) will not function if a design basis event were to occur. With a standby gas treatment subsystem inoperable, LCO 3.6.4.3, "Standby Gas Treatment System" requires restoration of the inoperable SGT subsystem to OPERABLE status in 7 days. Therefore, a 7 day Completion Time is provided to restore the opposite unit Division 2 125 VDC electrical power subsystem to OPERABLE status. The 7 day Completion Time is based on consideration of such factors as the availability of the OPERABLE redundant system(s) and the low probability of a DBA occurring during this time period.

J.1 and J.2 inoperable

If the DC electrical power subsystem cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. The Completion Time to bring the unit to MODE 4 is consistent with the time required in Regulatory Guide 1.93 (Ref. 7).

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1

Verifying battery terminal voltage while on float charge for the batteries helps to ensure the effectiveness of the charging system and the ability of the batteries to perform their intended function. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery and maintain the battery in a fully charged state. The voltage requirements are based on the nominal design voltage of the battery and are consistent with the initial voltages assumed in the battery sizing calculations. The 7 day Frequency is conservative when compared with manufacturers recommendations and IEEE-450 (Ref. 8). SR 3.8.4.1.c is modified by a Note. The Note requires the Unit 2 alternate battery to meet the specified voltage limit only when it is required to be OPERABLE. This battery is required to be OPERABLE when it is being used to meet Required Actions D.1, E.1, or E.2.

battery chargers, which support

INSERT B SR 3.8.4.1

G

H

F

SR 3.8.4.2

Visual inspection to detect corrosion of the battery cells and connections, or measurement of the resistance of each intercell and terminal connection, provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance.

The connection resistance limits established for this SR are within the values established by industry practice. The connection resistance limits of this SR are related to the resistance of individual bolted connections, and do not include the resistance of conductive components (e.g., cables or conductors located between cells, racks, or tiers).

The Frequency for these inspections, which can detect conditions that can cause power losses due to resistance heating, is 92 days. This Frequency is considered acceptable based on operating experience related to detecting corrosion trends.

(continued)

DRESDEN UNITS 2 AND 3 INSERTS

INSERT: B SR 3.8.4.1

..., while supplying the continuous steady state loads of the associated DC subsystem. On float charge, battery cells will receive adequate current to optimally charge the battery. The voltage requirements are based on the nominal design voltage of the battery and are consistent with the minimum float established by the battery manufacturer (2.17 Vpc or 260.4 V at the 250 VDC battery terminals and 125.9 V at the 125 VDC battery terminals). This voltage maintains the battery plates in a condition that supports maintaining the grid life (expected to be approximately 20 years).

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.3 and SR 3.8.4.7

Battery charger capability requirements are based on the design capacity of the chargers (Ref. 4). According to Regulatory Guide 1.32 (Ref. 9), the battery charger supply is required 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.

The 18 month Frequency for SR 3.8.4.3 is acceptable based on engineering judgement. Operating experience has shown that the 250 V battery chargers usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

The 24 Frequency for SR 3.8.4.7 is acceptable given the administrative controls existing to ensure adequate charger performance during these 24 month intervals. In addition, this Frequency is intended to be consistent with expected fuel cycle lengths.

SR 3.8.4.4

Visual inspection of the battery cells, cell plates, and battery racks provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance. The presence of physical damage or deterioration does not necessarily represent a failure of this SR, provided an evaluation determines that the physical damage or deterioration does not affect the OPERABILITY of the battery (its ability to perform its design function).

The 24 month Frequency for the Surveillance is based on engineering judgement. Operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

(continued)

DRESDEN UNITS 2 AND 3 INSERTS

INSERT: B SR 3.8.4.2

This SR provides two options. One option requires that each battery charger be capable of supplying 200 amps at the minimum established float voltage for 4 hours. The ampere requirements are based on the output rating of the chargers. The voltage requirements are based on the charger voltage level after a response to a loss of AC power. The time period is sufficient for the charger temperature to have stabilized and to have been maintained for at least 2 hours.

The other option requires 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 may not normally be available following the battery service test and will need to be supplemented with additional loads. The duration for this test may be longer than the charger sizing criteria since the battery recharge is affected by float voltage, temperature, and the exponential decay in charging current. The battery is recharged when the measured charging current is $\leq$ 2 amps.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.5 and SR 3.8.4.6

Visual inspection and resistance measurements of intercell and terminal connections provides an indication of physical damage or abnormal deterioration that could indicate degraded battery condition. The anti-corrosion 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 this Surveillance.

The connection resistance limits are within the values established by industry practice. The connection resistance limits of this SR are related to the resistance of individual bolted connections, and do not include the resistance of conductive components (e.g., cables or conductors located between cells, racks, or tiers).

The 24 month Frequency for the Surveillance is based on engineering judgement. Operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.8.4.8 (4)

A battery service test is a special test of the battery's capability, as found, to satisfy the design requirements (battery duty cycle) of the DC electrical power system. The test can be performed using simulated or actual loads. The discharge rate and test length corresponds to the design duty cycle requirements as specified in Reference 4.

The Frequency of 24 months is acceptable, given unit conditions required to perform the test and the other requirements existing to ensure adequate battery performance during these 24 month intervals. In addition, this Frequency is intended to be consistent with expected fuel cycle lengths.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.8 (continued)

This SR is modified by a Note. The Note allows the performance of a modified performance discharge test in lieu of a service test provided the modified performance discharge test completely envelopes the service test. This substitution is acceptable because a modified performance discharge test represents a more severe test of battery capacity than SR 3.8.4.8.

SR 3.8.4.9

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 a simulated duty cycle normally 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 discharge test, both of which envelope the duty cycle of the service test. (The test can consist of a single rate if the test rate employed for the performance discharge test exceeds the 1 minute rate and continues to 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.

A modified performance 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

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.9 (continued)

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 when the modified performance discharge test is performed in lieu of a service test. Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.4.9; however, only the modified performance discharge test may be used to satisfy SR 3.8.4.9 while satisfying the requirements of SR 3.8.4.8 at the same time.

The acceptance criteria for this Surveillance is consistent with IEEE-450 (Ref. 8) and IEEE-485 (Ref. 10). These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating, since IEEE-485 (Ref. 10) recommends using an aging factor of 125% in the battery size calculation. 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 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 $\geq$ 100% of the manufacturer's rating. Degradation is indicated, consistent with IEEE-450 (Ref. 8), when the battery capacity drops by more than 10% relative to its capacity on the previous performance test or when it is $\geq$ 10% below the manufacturer's rating. The 12 month and 60 month Frequencies are consistent with the recommendations in IEEE-450 (Ref. 8). The 24 month Frequency is derived from the recommendations of IEEE-450 (Ref. 8).

(continued)

BASES (continued)

REFERENCES

1. UFSAR, Section 3.1.2.2.8.
2. Safety Guide 6, March 10, 1971.
3. IEEE Standard 308, 1974.
4. UFSAR, Section 8.3.2.
5. UFSAR, Chapter 6.
6. UFSAR, Chapter 15.
7. Regulatory Guide 1.93, Revision 0, December 1974.
8. IEEE Standard 450, 1995.
9. Regulatory Guide 1.32, Revision 2, February 1977.
10. IEEE Standard 485, 1978.

BASES

ACTIONS (continued)

would require the unit to be shutdown, but would not require immediate suspension of movement of irradiated fuel assemblies. The Note to the ACTIONS, "LCO 3.0.3 is not applicable," ensures that the actions for immediate suspension of irradiated fuel assembly movement are not postponed due to entry into LCO 3.0.3.

A.1, A.2.1, A.2.2, A.2.3, and A.2.4

By allowance of the option to declare required features inoperable with associated DC electrical power subsystem(s) inoperable, appropriate restrictions are implemented in accordance with the affected system LCOs' ACTIONS. However, in many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies in the secondary containment, and any activities that could result in inadvertent draining of the reactor vessel).

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required DC electrical power subsystems and to continue this action until restoration is accomplished in order to provide the necessary DC electrical power to the plant safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required DC electrical power subsystems should be completed as quickly as possible in order to minimize the time during which the plant safety systems may be without sufficient power.

SURVEILLANCE REQUIREMENTS

SR 3.8.5.1

SR 3.8.5.1 requires all Surveillances required by SR 3.8.4.1 through SR 3.8.4.4 to be applicable. Therefore, see the corresponding Bases for LCO 3.8.4 for a discussion of each SR.

(continued)

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.6 Battery Cell Parameters

BASES

BACKGROUND

This LCO delineates the limits on electrolyte temperature, level, float voltage, and specific gravity for the DC electrical power subsystems batteries. A discussion of these batteries and their OPERABILITY requirements is provided in the Bases for LCO 3.8.4, "DC Sources – Operating," and LCO 3.8.5, "DC Sources – Shutdown."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in UFSAR, Chapter 6 (Ref. 1) and Chapter 15 (Ref. 2), assume Engineered Safety Feature systems are OPERABLE. The DC electrical power subsystems provide normal and emergency DC electrical power for the diesel generators (DGs), emergency auxiliaries, and control and switching during all MODES of operation.

The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit as discussed in the Bases for LCO 3.8.4 and LCO 3.8.5.

Since battery cell parameters support the operation of the DC electrical power subsystems, they satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

Battery cell parameters must remain within acceptable limits to ensure availability of the required DC power to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence or a postulated DBA. Electrolyte limits are conservatively established, allowing continued DC electrical system function even with Category A and B limits not met.

APPLICABILITY

The battery cell parameters are required solely for the support of the associated DC electrical power subsystem. Therefore, these cell parameters are only required when the associated DC electrical power subsystem is required to be OPERABLE. Refer to the Applicability discussions in Bases for LCO 3.8.4 and LCO 3.8.5.

(continued)

DRESDEN UNITS 2 AND 3 INSERTS

INSERT: B 3.8.6 BACKGROUND

In addition to the limitations of this Specification, the "Battery Monitoring and Maintenance Program," specified in Specification 5.5.13, is a program that monitors various battery parameters based on the recommendations of IEEE Standard 450-1995, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications" (Ref. 1).

The battery cells are of flooded lead acid construction with a nominal specific gravity of 1.215. This specific gravity corresponds to an open circuit battery voltage of approximately 120 V for a 58 cell battery (i.e., cell voltage of 2.07 volts per cell (Vpc)). The open circuit voltage is the voltage maintained when there is no charging or discharging. Once fully charged with its open circuit voltage $\geq$ 2.07 Vpc, the battery cell will maintain its capacity for 30 days without further charging per manufacturer's instructions. Optimal long-term performance however, is obtained by maintaining a float voltage of 2.17 to 2.25 Vpc. This provides adequate over-potential which limits the formation of lead sulfate and self-discharge. The nominal float voltage of 2.22 Vpc corresponds to a total float voltage output of 128.8 V for a 58 cell battery as discussed in UFSAR Chapter 8 (Ref. 2).

INSERT: B 3.8.6 LCO

Additional preventive maintenance, testing, and monitoring is performed in accordance with the "Battery Monitoring and Maintenance Program" as specified in Specification 5.5.13.

BASES (continued)

ACTIONS

The ACTIONS Table is modified by a Note which indicates that separate Condition entry is allowed for each battery. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable DC electrical power subsystem. Complying with the Required Actions for one inoperable DC electrical power subsystem may allow for continued operation, and subsequent inoperable DC electrical power subsystem(s) are governed by separate Condition entry and application of associated Required Actions.

INSERT B 3.8.6 ACTIONS

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

With parameters of one or more cells in one or more batteries not within Table 3.8.6-1 limits (i.e., Category A limits not met or Category B limits not met, or Category A and B limits not met) but within the Category C limits specified in Table 3.8.6-1, the battery is degraded but there is still sufficient capacity to perform the intended function. Therefore, the affected battery is not required to be considered inoperable solely as a result of Category A or B limits not met, and continued operation is permitted for a limited period.

The pilot cell(s) electrolyte level and float voltage are required to be verified to meet the Category C limits within 1 hour (Required Action A.1). This check provides a quick indication of the status of the remainder of the battery cells. One hour provides time to inspect the electrolyte level and to confirm the float voltage of the pilot cell(s). One hour is considered a reasonable amount of time to perform the required verification.

Verification that the Category C limits are met (Required Action A.2) provides assurance that during the time needed to restore the parameters to the Category A and B limits, the battery is still capable of performing its intended function. A period of 24 hours is allowed to complete the initial verification because specific gravity measurements must be obtained for each connected cell. Taking into consideration both the time required to perform the required verification and the assurance that the battery cell parameters are not severely degraded, this time is

(continued)

DRESDEN UNITS 2 AND 3 INSERTS

INSERT B 3.8.6 ACTIONS

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

With one or more cells in one 250 VDC or 125 VDC battery < 2.07 V, the battery cell is degraded. Within 2 hours, verification of the required battery charger OPERABILITY is made by monitoring the battery terminal voltage (SR 3.8.4.1) and of the overall battery state of charge by monitoring the battery float charge current (SR 3.8.6.1). This assures that there is still sufficient battery capacity to perform the intended function. Therefore, the affected battery is not required to be considered inoperable solely as a result of one or more battery cells < 2.07 V, and continued operation is permitted for a limited period up to 24 hours.

Since the Required Actions only specify "perform," a failure of SR 3.8.4.1 or SR 3.8.6.1 acceptance criteria does not result in this Required Action not met. However, if one of the SRs is failed, the appropriate Condition(s), depending on the cause of the failures, is entered. If SR 3.8.6.1 is failed, then there is not assurance that there is still sufficient battery capacity to perform the intended function and the battery must be declared inoperable immediately.

B.1 and B.2

One 250 VDC or 125 VDC battery with float current > 2 amps indicates that a partial discharge of the battery capacity has occurred. This may be due to a temporary loss of a battery charger, or possibly due to one or more battery cells in a low voltage condition reflecting some loss of capacity. Within 2 hours, verification of the required battery charger OPERABILITY is made by monitoring the battery terminal voltage. If the terminal voltage is found to be less than the minimum established float voltage, there are two possibilities; the battery charger is inoperable or is operating in the current limit mode. Conditions A and E of LCO 3.8.4 address charger inoperability. If the charger is operating in the current limit mode after 2 hours, that is an indication that the battery has been substantially discharged and likely cannot perform its required design functions. The time to return the battery to its fully charged condition in this case is a function of the battery charger capacity, the amount of loads on the associated DC system, the amount of the previous discharge, and the recharge characteristic of the battery. The charge time can be extensive, and there is not adequate assurance that it can be recharged within 12 hours (Required Action B.2). The battery must therefore be declared inoperable.

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

charger. The time to return a battery to its fully charged state under this condition is simply a function of the amount of the previous discharge and the recharge characteristic of the battery. Thus, there is good assurance of fully recharging the battery within 12 hours, avoiding a premature shutdown with its own attendant risk.

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

Since Required Action B.1 only specifies "perform," a failure of SR 3.8.4.1 acceptance criteria does not result in the Required Action not met. However, if SR 3.8.4.1 is failed, the appropriate Condition(s), depending on the cause of the failure, is entered.

C.1

Discovering one 250 VDC or 125 VDC battery with one or more battery cells float voltage < 2.07 V and float current > 2 amps indicates that the battery capacity may not be sufficient to perform the intended functions. The battery must therefore be declared inoperable immediately.

D.1, D.2, and D.3

With one 250 VDC or 125 VDC battery with one or more cells electrolyte level above the top of the plates, but below the minimum established design limits, the battery still retains sufficient capacity to perform the intended function. Therefore, the affected battery is not required to be considered inoperable solely as a result of electrolyte level not met. Within 31 days, the minimum established design limits for electrolyte level must be re-established.

With electrolyte level below the top of the plates, there is a potential for dryout and plate degradation. Required Actions D.1 and D.2 address this potential (as well as provisions in Specification 5.5.13, Battery Monitoring and Maintenance Program). They are modified by a Note that indicates they are only applicable if electrolyte level is below the top of the plates. Within 8 hours, level is required to be restored to above the top of the plates. The Required Action D.2 requirement to verify that there is no leakage by visual inspection and the Specification 5.5.13, Item b, to initiate action to equalize and test in accordance with manufacturer's recommendation are taken from Annex D of IEEE-450 (Ref. 1). They are performed following the restoration of the electrolyte level to above the top of the plates. Based on the results of the manufacturer's recommended testing, the battery may have to be declared inoperable and the affected cell(s) replaced.

DRESDEN UNITS 2 AND 3 INSERTS

INSERT B 3.8.6 ACTIONS (cont.)

E.1

With one 250 VDC or 125 VDC battery with pilot cell temperature less than the minimum established design limits, 12 hours is allowed to restore the temperature to within limits. A low electrolyte temperature limits the current and power available. Since the battery is sized with margin, while battery capacity is degraded, sufficient capacity exists to perform the intended function and the affected battery is not required to be considered inoperable solely as a result of the pilot cell temperature not met.

F.1

With one or more batteries in redundant divisions with battery parameters not within limits, there is not sufficient assurance that battery capacity has not been affected to the degree that the batteries can still perform their required function, given that redundant batteries are involved. With redundant batteries involved, this potential could result in a total loss of function on multiple systems that rely upon the batteries. The longer completion times specified for battery parameters on non-redundant batteries not within limits are therefore not appropriate, and the parameters must be restored to within limits on at least one division within 2 hours.

G.1

When any battery parameter is outside the allowances of the Required Actions for Condition A, B, D, E, or F, sufficient capacity to supply the maximum expected load requirement is not ensured and the corresponding battery must be declared inoperable. The battery must therefore be declared inoperable immediately.

BASES

ACTIONS

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

considered reasonable. The verification is repeated at 7 day intervals until the parameters are restored to Category A and B limits. This periodic verification is consistent with the normal Frequency of pilot cell Surveillances.

Continued operation is only permitted for 31 days before battery cell parameters must be restored to within Category A and B limits. Taking into consideration that, while battery capacity is degraded, sufficient capacity exists to perform the intended function and to allow time to fully restore the battery cell parameters to normal limits, this time is acceptable for operation prior to declaring the associated DC batteries inoperable.

B.1

When any battery parameter is outside the Table 3.8.6-1 Category C limit for any connected cell, sufficient capacity to supply the maximum expected load requirement is not ensured and the corresponding DC electrical power subsystem must be declared inoperable. Additionally, other potentially extreme conditions, such as any Required Actions of Condition A and associated Completion Time not met or average electrolyte temperature of representative cells $\leq$ 65°F, also are cause for immediately declaring the associated DC electrical power subsystem inoperable.

SURVEILLANCE REQUIREMENTS

INSERT B 3.8.6 SRs

SR 3.8.6.1

This SR verifies that Table 3.8.6-1 Category A battery cell parameters are consistent with IEEE-450 (Ref. 3), which recommends regular battery inspections (at least one per month) including voltage, specific gravity, and electrolyte level of pilot cells.

SR 3.8.6.2

The quarterly inspection of specific gravity, voltage, and electrolyte level for each connected cell is consistent with IEEE-450 (Ref. 3). In addition, within 7 days of a battery

(continued)

DRESDEN UNITS 2 AND 3 INSERTS

INSERT B 3.8.6 SRs

SURVEILLANCE REQUIREMENTS

SR 3.8.6.1

Verifying battery float current while on float charge is used to determine the state of charge of the battery. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery and maintain the battery in a charged state. The float current requirements are based on the float current indicative of a charged battery. Use of float current to determine the state of charge of the battery is consistent with IEEE-450 (Ref. 1). The 7-day Frequency is consistent with IEEE-450.

This SR is modified by a Note that states the float current requirement is not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.4.1. When this float voltage is not maintained, the Required Actions of LCO 3.8.4, Action A, are being taken, which provide the necessary and appropriate verifications of the battery condition. Furthermore, the float current limit of 2 amps is established based on the nominal float voltage value and is not directly applicable when this voltage is not maintained.

SR 3.8.6.2 and SR 3.8.6.5

Optimal long-term battery performance is obtained by maintaining a float voltage greater than or equal to the minimum established design limits provided by the battery manufacturer, which corresponds to 260.4 V at the 250 VDC battery terminal and 125.9 V at the 125 VDC battery terminals, or 2.17 Vpc. This provides adequate over-potential, which limits the formation of lead sulfate and self-discharge, which could eventually render the battery inoperable. Float voltage in this range or less, but > 2.07 Vpc, are addressed in Specification 5.5.13. Failure of SR 3.8.6.2 does not constitute inoperability. SRs 3.8.6.2 and 3.8.6.5 require verification that the cell float voltages are equal to or greater than the short-term absolute minimum voltage. The Frequency for cell voltage verification every 31 days for pilot cell and 92 days for each connected cell is consistent with IEEE-450 (Ref. 1).

SR 3.8.6.3

The limit specified for electrolyte level ensures that the plates suffer no physical damage and maintains adequate electron transfer capability. The Frequency is consistent with IEEE-450 (Ref. 1).

DRESDEN UNITS 2 AND 3 INSERTS

INSERT B 3.8.6 SRs (cont.)

SR 3.8.6.4

This SR verifies that the pilot cell temperature is greater than or equal to the minimum established design limit (i.e., 65°F). Pilot cell electrolyte temperature is maintained above this temperature to assure the battery can provide the required current and voltage to meet the design requirements. Temperatures lower than assumed in battery sizing calculations act to inhibit or reduce battery capacity. The Frequency is consistent with IEEE-450 (Ref. 1).

SR 3.8.6.6

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

Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.6.6; however, only the modified performance discharge test may be used to satisfy the battery service test requirements of SR 3.8.4.4.

A battery modified performance 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 when the modified performance discharge test is performed in lieu of a service test.

The modified performance discharge test normally consists of just two rates; for instance, the one minute rate for the battery or the largest current load of the duty cycle, followed by the test rate employed for the performance discharge test, both of which envelope the duty cycle of the service test. (The test can consist of a single rate if the test rate employed for the performance discharge test exceeds the 1 minute rate and continues to envelope the duty cycle of the service test.) Since the ampere-hours removed by a one minute discharge represents a very small portion of the battery capacity, the test rate can be changed to that for the performance test without compromising the results of the performance discharge test. The battery terminal voltage for the modified performance discharge test must remain above the minimum battery terminal voltage specified in the battery service test for the duration of time equal to that of the service test.

DRESDEN UNITS 2 AND 3 INSERTS

INSERT B 3.8.6 SRs (cont.)

The acceptance criteria for this Surveillance is consistent with IEEE-450 (Ref. 1) and IEEE-485 (Ref. 5). These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating, since IEEE-485 (Ref. 5) recommends using an aging factor of 125% in the battery size calculation. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements. Furthermore, the battery is sized to meet the assumed duty cycle loads when the battery design capacity reaches this 80% limit.

The 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 $\geq$ 100% of the manufacturer's rating. Degradation is indicated, consistent with IEEE-450 (Ref. 1), when the battery capacity drops by more than 10% relative to its capacity on the previous performance test or when it is $\geq$ 10% below the manufacturer's rating. The 12 month and 60 month Frequencies are consistent with the recommendations in IEEE-450 (Ref. 1). The 24 month Frequency is derived from the recommendations of IEEE-450 (Ref. 1).

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.6.2 (continued)

discharge < 105 V for a 125 V battery and < 210 V for a 250 V battery, or a battery overcharge > 150 V for a 125 V battery and > 300 V for a 250 V battery, the battery must be demonstrated to meet Table 3.8.6-1 Category B limits. Transients, such as motor starting transients, which may momentarily cause battery voltage to drop to < 105 V or < 210 V, as applicable, do not constitute a battery discharge provided the battery terminal voltage and float current return to pre-transient values. This inspection is also consistent with IEEE-450 (Ref. 3), which recommends special inspections following a severe discharge or overcharge, to ensure that no significant degradation of the battery occurs as a consequence of such discharge or overcharge. The 7 day requirement is based on engineering judgement.

SR 3.8.6.3

This Surveillance verification that the average temperature of representative cells is within limits is consistent with a recommendation of IEEE-450 (Ref. 3) that states that the temperature of electrolytes in representative cells should be determined on a quarterly basis. For this SR, a check of 10% of the connected cells is considered representative.

Lower than normal temperatures act to inhibit or reduce battery capacity. This SR ensures that the operating temperatures remain within an acceptable operating range. This limit is based on manufacturer's recommendations and the battery sizing calculation.

Table 3.8.6-1

This Table delineates the limits on electrolyte level, float voltage, and specific gravity for three different categories. The meaning of each category is discussed below.

Category A defines the normal parameter limit for each designed pilot cell in each battery. The cells selected as pilot cells are those whose temperature, voltage, and

(continued)

BASES

SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

electrolyte specific gravity approximate the state of charge of the entire battery.

The Category A limits specified for electrolyte level are based on manufacturer's recommendations and are consistent with the guidance in IEEE-450 (Ref. 3), with the extra ¼ inch allowance above the high water level indication for operating margin to account for temperature and charge effects. In addition to this allowance, footnote (a) to Table 3.8.6-1 permits the electrolyte level to be temporarily above the specified maximum level during and, for a limited time, following an equalizing charge (normally up to 3 days following the completion of an equalize charge to allow electrolyte stabilization), provided it is not overflowing. These limits ensure that the plates suffer no physical damage, and that adequate electron transfer capability is maintained in the event of transient conditions. IEEE-450 (Ref. 3) recommends that electrolyte level readings should be made only after the battery has been at float charge for at least 72 hours.

The Category A limit specified for float voltage is $\geq$ 2.13 V per cell. This value is based on the recommendation of IEEE-450 (Ref. 3), which states that prolonged operation of cells below 2.13 V can reduce the life expectancy of cells.

The Category A limit specified for specific gravity for each pilot cell is $\geq$ 1.200 (0.015 below the manufacturer's fully charged nominal specific gravity or a battery charging current that had stabilized at a low value). This value is characteristic of a charged cell with adequate capacity. According to IEEE-450 (Ref. 3), the specific gravity readings are based on a temperature of 77°F (25°C).

The specific gravity readings are corrected for actual electrolyte temperature and level. For each 3°F (1.67°C) above 77°F (25°C), 1 point (0.001) is added to the reading; 1 point is subtracted for each 3°F below 77°F. The specific gravity of the electrolyte in a cell increases with a loss of water due to electrolysis or evaporation. Level correction will be in accordance with manufacturer's recommendations.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

Category B defines the normal parameter limits for each connected cell. The term "connected cell" excludes any battery cell that may be jumpered out.

The Category B limits specified for electrolyte level and float voltage are the same as those specified for Category A and have been discussed above. The Category B limit specified for specific gravity for each connected cell is $\geq$ 1.195 (0.020 below the manufacturer's fully charged, nominal specific gravity) with the average of all connected cells 1.205 (0.010 below the manufacturer's fully charged, nominal specific gravity). These values are based on manufacturer's recommendations. The minimum specific gravity value required for each cell ensures that a cell with a marginal or unacceptable specific gravity is not masked by averaging with cells having higher specific gravities.

Category C defines the limits for each connected cell. These values, although reduced, provide assurance that sufficient capacity exists to perform the intended function and maintain a margin of safety. When any battery parameter is outside the Category C limits, the assurance of sufficient capacity described above no longer exists, and the battery must be declared inoperable.

The Category C limit specified for electrolyte level (above the top of the plates and not overflowing) ensures that the plates suffer no physical damage and maintain adequate electron transfer capability. The Category C limit for voltage is based on IEEE-450 (Ref. 3), which states that a cell voltage of 2.07 V or below, under float conditions and not caused by elevated temperature of the cell, indicates internal cell problems and may require cell replacement.

The Category C limit on average specific gravity $\geq$ 1.195, is based on manufacturer's recommendations (0.020 below the manufacturer's recommended fully charged, nominal specific gravity). In addition to that limit, it is required that the specific gravity for each connected cell must be no more than 0.020 below the average of all connected cells. This limit ensures that a cell with a marginal or unacceptable specific gravity is not masked by averaging with cells having higher specific gravities.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

The footnotes to Table 3.8.6-1 that apply to specific gravity are applicable to Category A, B, and C specific gravity. Footnote (b) requires the above mentioned correction for electrolyte level and temperature.

Because of specific gravity gradients that are produced during the recharging process, delays of several days may occur while waiting for the specific gravity to stabilize. A stabilized charging current is an acceptable alternative to specific gravity measurement for determining the state of charge of the designated pilot cell. This phenomenon is discussed in IEEE-450 (Ref. 3). Footnote (c) allows the float charge current to be used as an alternate to specific gravity for up to 7 days following a battery recharge. Within 7 days, each connected cell's specific gravity must be measured to confirm the state of charge. Following a minor battery recharge (such as equalizing charge that does not follow a deep discharge) specific gravity gradients are not significant, and confirming measurements may be made in less than 7 days.

REFERENCES

3 → 1. UFSAR, Chapter 6.

4 → 2. UFSAR, Chapter 15.

1 → 3. IEEE Standard 450, 1995.

2. UFSAR, Chapter 8.

5. IEEE Standard 485, 1983.

ATTACHMENT 4
Retyped Technical Specification Pages

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3

FACILITY OPERATING LICENSE NOS. DPR-19 AND DPR-25

Request for Amendment to Technical Specifications
Associated With Direct Current Electrical Power

REVISED TECHNICAL SPECIFICATIONS PAGES

iii
3.8.4-1
3.8.4-2
3.8.4-3
3.8.4-4
3.8.4-5
3.8.4-6
3.8.5-2
3.8.6-1
3.8.6-2
3.8.6-3
3.8.6-4
5.5-12

TABLE OF CONTENTS (continued)

(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources–Operating

LCO 3.8.4 The following DC electrical power subsystems shall be OPERABLE:

a. Two 250 VDC electrical power subsystems;

b. Division 1 and Division 2 125 VDC electrical power subsystems; and

c. The opposite unit's Division 2 125 VDC electrical power subsystem capable of supporting equipment required to be OPERABLE by LCO 3.6.4.3, "Standby Gas Treatment (SGT) System," LCO 3.7.4, "Control Room Emergency Ventilation (CREV) System" (Unit 3 only), LCO 3.7.5, "Control Room Emergency Ventilation Air Conditioning (AC) System" (Unit 3 only), and LCO 3.8.1, "AC Sources–Operating."

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required 250 VDC battery charger inoperable.	A.1 Restore 250 VDC battery terminal voltage to greater than or equal to the minimum established float voltage.	2 hours
	AND	
	A.2 Verify 250 VDC battery float current is ≤ 2 amps.	Once per 12 hours
	AND	

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.3 Restore the required 250 VDC battery charger to OPERABLE status.	7 days
B. One 250 VDC battery inoperable as a result of maintenance or testing.	B.1 Restore 250 VDC battery to OPERABLE status.	Prior to exceeding 7 cumulative days per operating cycle of battery inoperability, on a per battery basis, as a result of maintenance or testing
C. One 250 VDC battery inoperable, due to the need to replace the battery, as determined by maintenance or testing.	C.1 Restore 250 VDC battery to OPERABLE status.	7 days
D. One 250 VDC electrical power subsystem inoperable for reasons other than Conditions A, B, or C.	D.1 Restore 250 VDC electrical power subsystem to OPERABLE status.	2 hours
E. One required Division 1 or 2 125 VDC battery charger inoperable.	E.1 Restore 125 VDC battery terminal voltage to greater than or equal to the minimum established float voltage. AND	2 hours (continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
E. (continued)	E.2	Verify 125 VDC battery float current is ≤ 2 amps.	Once per 12 hours
	AND		
	E.3	Restore required the Division 1 or 2 125 VDC battery charger to OPERABLE status.	7 days
F. ---------NOTE--------- Only applicable if the opposite unit is in MODE 1, 2, or 3. ---------- Division 1 or 2 125 VDC battery inoperable as a result of maintenance or testing.	F.1	Place associated OPERABLE alternate 125 VDC electrical power subsystem in service.	2 hours
	AND		
	F.2	Restore Division 1 or 2 125 VDC battery to OPERABLE status.	Prior to exceeding 7 cumulative days per operating cycle on a per battery basis
G. ---------NOTE--------- Only applicable if the opposite unit is in MODE 1, 2, or 3. ---------- Division 1 or 2 125 VDC battery inoperable, due to the need to replace the battery, as determined by maintenance or testing.	G.1	Place associated OPERABLE alternate 125 VDC electrical power subsystem in service.	2 hours
	AND		
	G.2	Restore Division 1 or 2 125 VDC battery to OPERABLE status.	7 days

(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
H. Division 1 or 2 125 VDC electrical power subsystem inoperable for reasons other than Conditions E, F, or G.	H.1	Restore Division 1 or 2 125 VDC electrical power subsystem to OPERABLE status.	2 hours
	OR		
	H.2	--------NOTE-------- Only applicable if the opposite unit is not in MODE 1, 2, or 3. ---------- Place associated OPERABLE alternate 125 VDC electrical power subsystem in service.	2 hours
I. Opposite unit Division 2 125 VDC electrical power subsystem inoperable.	I.1	Restore opposite unit Division 2 125 VDC electrical power subsystem to OPERABLE status.	7 days
J. Required Action and associated Completion Time not met.	J.1	Be in MODE 3.	12 hours
	AND		
	J.2	Be in MODE 4.	36 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is greater than or equal to the minimum established float voltage: a. for each 250 VDC subsystem; b. for each 125 VDC subsystem; and c. ----------NOTE---------- Only required to be met when the Unit 2 alternate battery is required to be OPERABLE. ---------- for Unit 2 alternate battery.	7 days
SR 3.8.4.2	Verify each required 250 VDC battery charger supplies ≥ 200 amps at greater than or equal to the minimum established float voltage for ≥ 4 hours for the 250 VDC subsystems. OR Verify each 250 VDC 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

	SURVEILLANCE	FREQUENCY
SR 3.8.4.3	Verify each required 125 VDC battery charger supplies ≥ 200 amps at greater than or equal to the minimum established float voltage for ≥ 4 hours for the 125 VDC subsystems. OR Verify each 125 VDC 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.	24 months
SR 3.8.4.4	----------NOTE---------- The modified performance discharge test in SR 3.8.6.6 may be performed in lieu of SR 3.8.4.4 provided the modified performance discharge test completely envelopes the service test. ---------- 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.	24 months

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.3 Initiate action to suspend operations with a potential for draining the reactor vessel.	Immediately
	AND	
	A.2.4 Initiate action to restore required DC electrical power subsystems to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.5.1	----------NOTE---------- The following SRs are not required to be performed for the 250 VDC electrical power subsystem: SR 3.8.4.2 and SR 3.8.4.4. ----------	
	For DC electrical power subsystems required to be OPERABLE the following SRs are applicable: SR 3.8.4.1, SR 3.8.4.2, SR 3.8.4.3, and SR 3.8.4.4.	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Parameters

LCO 3.8.6 Battery parameters for the 125 VDC and 250 VDC station batteries shall be within limits.

APPLICABILITY: When associated DC electrical power subsystems are required to be OPERABLE.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each battery.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One 250 VDC or 125 VDC battery with one or more battery cells float voltage < 2.07 V.	A.1 Perform SR 3.8.4.1. AND A.2 Perform SR 3.8.6.1. AND A.3 Restore affected cell voltage to ≥ 2.07 V.	2 hours 2 hours 24 hours
B. One 250 VDC or 125 VDC battery with float current > 2 amps.	B.1 Perform SR 3.8.4.1. AND B.2 Restore battery float current to ≤ 2 amps.	2 hours 12 hours

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One 250 VDC or 125 VDC battery with one or more battery cells float voltage < 2.07 V and float current > 2 amps.	C.1 Declare associated battery inoperable.	Immediately
----------NOTE---------- Required Action D.2 shall be completed if electrolyte level was below the top of plates. ----------	----------NOTE---------- Required Actions D.1 and D.2 are only applicable if electrolyte level was below the top of plates. ----------	
D. One 250 VDC or 125 VDC battery with one or more cells electrolyte level less than minimum established design limits.	D.1 Restore electrolyte level to above top of plates. AND D.2 Verify no evidence of leakage. AND D.3 Restore electrolyte level to greater than or equal to minimum established design limits.	8 hours 12 hours 31 days
E. One 250 VDC or 125 VDC battery with pilot cell electrolyte temperature less than minimum established design limits.	E.1 Restore battery pilot cell temperature to greater than or equal to minimum established design limits.	12 hours

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. One or more batteries in redundant divisions with battery parameters not within limits.	F.1 Restore battery parameters for batteries in one division to within limits.	2 hours
G. Required Action and associated Completion Time of Condition A, B, D, E, or F not met.	G.1 Declare associated battery inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.6.1	----------NOTE---------- Not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.4.1. ---------- Verify each battery float current is $\leq$ 2 amps.	7 days
SR 3.8.6.2	Verify each battery pilot cell voltage is $\geq$ 2.07 V.	31 days
SR 3.8.6.3	Verify each battery connected cell electrolyte level is greater than or equal to minimum established design limits.	31 days

(continued)

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.6.4	Verify each battery pilot cell temperature is greater than or equal to minimum established design limits.	31 days
SR 3.8.6.5	Verify each battery connected cell voltage is $\geq$ 2.07 V.	92 days
SR 3.8.6.6	Verify battery capacity is $\geq$ 80% of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.	60 months AND 12 months when battery shows degradation or has reached 85% of expected life with capacity < 100% of manufacturer's rating AND 24 months when battery has reached 85% of the expected life with capacity $\geq$ 100% of manufacturer's rating

5.5 Programs and Manuals

5.5.12 Primary Containment Leakage Rate Testing Program (continued)

c. The maximum allowable primary containment leakage rate, L_a, at P_a, is 1.6% of primary containment air weight per day.

d. Leakage rate acceptance criteria are:

1. Primary containment overall leakage rate acceptance criterion is $\leq 1.0\ L_a$. During the first unit startup following testing in accordance with this program, the leakage rate acceptance criteria are $\leq 0.60\ L_a$ for the combined Type B and Type C tests, and $\leq 0.75\ L_a$ for Type A tests.

2. Air lock testing acceptance criteria is the overall air lock leakage rate is $\leq 0.05\ L_a$ when tested at $\geq P_a$.

e. The provisions of SR 3.0.3 are applicable to the Primary Containment Leakage Rate Testing Program.

5.5.13 Battery Monitoring and Maintenance Program

This Program provides for restoration and maintenance, based on the recommendations of IEEE Standard 450-1995, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications," including the following:

a. Actions to restore battery cells with float voltage < 2.13 V, and

b. Actions to equalize and test battery cells that had been discovered with electrolyte level below the minimum established design limit.