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1CAN011304

January 28, 2013

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

SUBJECT: License Amendment Request
Adoption of Technical Specification Task Force (TSTF)-500, Revision 2
"DC Electrical Rewrite - Update to TSTF-360"
Arkansas Nuclear One, Unit 1
Docket No. 50-313
License No. DPR-51

REFERENCE: Entergy letter dated November 8, 2007, "Pending License Amendment Requests Affected by TSTF-500" (CNRO-2007-00039) (ML# 073180400)

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, Entergy Operations, Inc. (Entergy) hereby requests the following amendment to the Arkansas Nuclear One, Unit 1 (ANO-1) Technical Specifications (TS). In accordance with the provisions of Title 10 of the Code of Federal Regulations (10 CFR) Section 50.90, Entergy is submitting a request for an amendment to the ANO-1 TSs to incorporate the NRC-approved TSTF-500, Revision 2, "DC Electrical Rewrite - Update to TSTF-360."

Attachment 1 provides a description and assessment of the proposed changes including the requested confirmation of applicability and plant-specific verifications; technical analyses; regulatory analyses; and environmental considerations. Attachment 2 provides vendor verification related to the use of float current versus specific gravity for battery health monitoring. Attachment 3 provides a summary of the required Safety Analysis Report (SAR) descriptions. Attachment 4 provides markup pages of existing TSs and TS Bases to show the proposed change. Attachment 5 provides revised (clean) TS pages.

In Reference above, Entergy informed the NRC that TSTF-500, when approved for industry use, would be adopted by ANO-1 (among other Entergy plants) to reconcile non-conservative TSs associated with battery inter-cell connection resistances and battery terminal voltage. In accordance with NRC Administrative Letter 98-10, "Dispositioning of Technical Specifications that are Insufficient to Assure Plant Safety," administrative controls to ensure continued operability of the station vital battery banks have previously been established and will remain in place until TSTF-500 is approved for ANO-1.

Entergy requests approval of the proposed license amendment by February 1, 2014, with the amendment being implemented within 90 days of approval.

The proposed change has been evaluated in accordance with 10 CFR 50.91(a)(1) using criteria in 10 CFR 50.92(c) and it has been determined that the change involves no significant hazards consideration. The bases for these determinations are included in the attached submittal.

In accordance with 10 CFR 50.91(b)(1), a copy of this application and the reasoned analysis about no significant hazards consideration is being provided to the designated Arkansas state official.

The proposed change includes new commitments specified in Attachment 6.

If you have any questions or require additional information, please contact Stephenie Pyle at 479-858-4704.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on January 28, 2013.

Sincerely,

ORIGINAL SIGNED BY JEREMY G. BROWNING

JGB/dbb

Attachments:

1. Analysis of Proposed Technical Specification Change
2. Battery Manufacturer Letter Describing Use of Float Current
3. List of Required Safety Analysis Report Descriptions
4. Proposed Technical Specification and Bases Changes (mark-up)
5. Revised (clean) Technical Specification Pages
6. List of Regulatory Commitments

cc: Mr. Elmo E. Collins
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Attachment 1 to

1CAN011304

Analysis of Proposed Technical Specification Change

DESCRIPTION AND ASSESSMENT OF THE PROPOSED CHANGES

1.0 DESCRIPTION

This letter is a request to amend Operating License DPR-51 for Arkansas Nuclear One, Unit 1 (ANO-1).

The ANO-1 Technical Specification (TS) requirements are revised from requirements on battery cells to requirements on the battery. This focuses the requirements on the assumed safety function of the battery. The proposed amendment would revise TS requirements related to direct current (DC) electrical systems in TS Limiting Condition for Operation (LCO) 3.8.4, "DC Sources - Operating," LCO 3.8.5, "DC Sources - Shutdown," and LCO 3.8.6, "Battery Parameters." A new "Battery Monitoring and Maintenance Program" is being proposed for Section 5.5, "Administrative Controls - Programs and Manuals."

Specifically, the proposed changes relocate specific values in LCO 3.8.4, "DC Sources - Operating," Surveillance Requirement (SR) 3.8.4.1, to a licensee-controlled program and adopts a new action for an inoperable battery charger for LCO 3.8.5, "DC Sources - Shutdown."

The proposed changes also modify LCO 3.8.6, "Battery Parameters," by relocating Table 3.8.6-1, "Battery Cell Surveillance Requirements," to a licensee-controlled program, and that specific actions with associated Completion Times (CTs) for out-of-limit conditions for battery cell voltage, electrolyte level, and electrolyte temperature be added to TS 3.8.6. In addition, specific SRs are being proposed for verification of these parameters.

A new program is being proposed for Section 5.5 of the Administrative Controls for the maintenance and monitoring of station batteries. The items proposed to be relocated will be contained within this program, entitled "Battery Monitoring and Maintenance Program."

These changes are consistent with the U.S. Nuclear Regulatory Commission (NRC)-approved Technical Specifications Task Force (TSTF) Traveler TSTF-500, Revision 2. The availability of this TS improvement as part of the consolidated line item improvement process (CLIIP) was announced in the Federal Register on September 1, 2011 (76 FR 54510).

TSTF-500, Revision 2, is modeled after plants that have a non-qualified standby battery charger that could be aligned to support a DC distribution bus and the associated battery for a limited period of time when the fully qualified battery charger is out of service. Because ANO-1 has previously installed TS qualified backup chargers (one for each of the two DC distribution subsystems), the 72-hour allowance for operation with a non-qualified charger is not needed. In addition, the ANO-1 TSs are based on NUREG-1430, Revision 1, *Standard Technical Specifications for Babcock & Wilcox Plants* (STS), and ANO-1 has not adopted the older version of TSTF-500 (i.e., TSTF-360). Deviations, if any, will be discussed in detail later in this submittal. However, a summary list is provided below to enhance NRC review of the proposed TS changes. The first column represents the LCOs, Actions, and SRs impacted by the TSTF. The second column states whether the equivalent ANO-1 TS requires revision.

<u>TSTF-500</u> (STS Rev. 1 markup)	<u>ANO-1</u>
LCO 3.8.4 – All Actions	No change required due to qualified backup chargers
LCO 3.8.4 – SR 3.8.4.1	Revised – no deviation
LCO 3.8.4 – SRs 3.8.4.2 thru 3.8.4.5	No change – these SRs do not exist in ANO-1 TSs
LCO 3.8.4 – SRs 3.8.4.6	This SR does not exist in ANO-1 TSs; Entergy is adopting this SR with modification (see Section 2.1)
LCO 3.8.4 – SR 3.8.4.7 Note 1	No change – allowance is built into ANO-1 existing SR 3.8.4.2; however, the SR is revised as SR 3.8.4.3 to be consistent with the STS
LCO 3.8.4 – SR 3.8.4.8	No deviations
LCO 3.8.5 – new Action A	2-hour Completion Time adopted to allow time to place TS qualified backup charger in service; changes associated with 72-hour allowance not required for ANO-1
LCO 3.8.5 – old Action A	Revised – added “required” to second part of the Condition
LCO 3.8.5 – SR 3.8.5.1	No change required – SR currently exists as changed by TSTF-500.
LCO 3.8.6 – All	Revised – no deviation (minor wording difference proposed for new Action E and STS SR 3.8.4.8 not relocated from TS 3.8.4 to TS 3.8.6)
TS 5.5.17 – All	Revised – no deviation (ANO-1 TS will be 5.5.6)

2.0 ASSESSMENT

2.1 APPLICABILITY OF TSTF-500 AND MODEL SAFETY EVALUATION (SE)

Entergy has reviewed the model SE referenced in the Federal Register Notice of Availability published on September 1, 2011 (76 FR 54510), as part of the CLIP. The review included the NRC staff’s Safety Evaluation (SE), as well as the supporting information provided in TSTF-500, Revision 2. As described herein, Entergy has concluded that the technical bases for the proposed changes presented in TSTF-500, Revision 2, and the model SE prepared by the NRC staff are applicable to ANO-1 and support incorporation of this amendment into the ANO-1 TS. In a few cases, the ANO-1 TSs use different numbering than the NUREG-1430 STS on which TSTF-500, Revision 2, is based (in reference to TSTF markups associated with NUREG-1430, Revision 1). These differences are as follows (STS number is shown as revised by TSTF-500, unless otherwise stated):

<u>TSTF-500 #</u>	<u>ANO-1 #</u>
TS 3.8.4 Action A	Not adopted
TS 3.8.4 Action B	Not adopted
TS 3.8.4 Action C	TS 3.8.4 Action A (changes not adopted)
TS 3.8.4 Action D	TS 3.8.4 Action B (changes not adopted)

<u>TSTF-500 #</u>	<u>ANO-1 #</u>
SR 3.8.4.2	SR does not exist as approved in STS conversion; however, Entergy is adopting this SR with modification
SR 3.8.4.3	SR 3.8.4.2 number changed to SR 3.8.4.3
TS 3.8.5 Required Action A.2/A.3	Not adopted
TS 3.8.6.6 - ALL	SR 3.8.4.3 relocated and number changed to SR 3.8.6.6; STS version of TS adopted
5.5.17 (new)	5.5.6 (new)

Numerical differences are editorial and do not affect the applicability of TSTF-500, Revision 2, to the ANO-1 TSs. Other differences are discussed below in comparison with SE applicability to ANO-1.

72-hour Battery Charger Allowance

Portions of the SE that approve a 72-hour allowance during periods when a required battery charger is inoperable are not applicable to ANO-1. Each of the two safety related electrical trains at ANO-1 contain a redundant battery charger which can be placed in service to meet the associated TS requirements should the in-service charger fail. Therefore, the 72-hour CT and requirements associated with this allowance are not being adopted. Entergy considers this an insignificant difference between TSTF-500 and the proposed ANO-1 TS change since the TSTF allowance represents a less-restrictive change. This difference is associated with the Conditions and Required Actions of TSTF-500 TS 3.8.4, "DC Sources - Operating," specifically changes associated with Condition A.

The TSTF provides this same 72-hour CT for TS 3.8.5, "DC Sources – Shutdown." Consistent with the above, Entergy is not adopting this allowance. However, ANO-1 TS 3.8.5 does not currently contain the 2-hour CT to restore battery terminal voltage should the in-service charger fail. This 2-hour period would provide time for the standby charger to be placed in service before more restrictive actions would be required to be implemented. Therefore, this portion of the TSTF-500 TS 3.8.5 change is being adopted (specifically, new Condition A and Required Action A.1). Because placing the standby charger in service ensures battery terminal voltage will be restored, the conditions of the SE are met for this partial adoption.

Relocated Requirements

With reference to STS numbering, SR 3.8.4.2 through SR 3.8.4.5 do not exist in the ANO-1 TSs, nor did they exist in the ANO-1 TSs prior to conversion to the STS. During conversion to the STS, the NRC agreed that these SRs were more closely associated with preventative maintenance functions and that failure to meet the SR would not necessarily indicate the battery could not perform its specified safety function. Therefore, these SRs were not adopted during the ANO-1 conversion to STS. Nevertheless, ANO-1 is adopting the TSTF-500 Battery Monitoring and Maintenance Program (reference TSTF-500 STS 5.5.17, ANO-1 TS 5.5.6) which will ensure appropriate parameters are established and effective battery monitoring is performed. Based on the ANO-1 adoption of the Battery Monitoring and Maintenance Program, Entergy has concluded that the SE remains applicable to ANO-1 in this regard.

Battery Charger SR

SR 3.8.4.6 (TSTF-500 SR 3.8.4.2) does not exist in the ANO-1 TSs, nor did it exist in the ANO-1 TS prior to conversion to the STS. As part of the ANO-1 conversion to the STS, the NRC agreed that battery charger testing associated with this SR was not required for ANO-1 due to design and operation of the equipment. Discussion of Difference 48 of the ANO-1 STS (Reference 1) conversion package states:

NUREG SR 3.8.4.6 is not adopted. This NUREG Surveillance demonstrates the design capability of the charger and is not directly related to verification of the lowest functional level required to confirm the assumed safety related function, and is not a CTS (current licensing basis) requirement. Adopting this NUREG Surveillance at ANO-1 would result in an outage impact and/or non-trivial temporary test setup. The ANO-1 battery charger design includes a fully redundant spare charger for each of the two inservice chargers. It is standard practice to alternate chargers to equalize run times. This results in continuous verification of the charger's capability to carry nominal DC loads while maintaining the battery fully charged (which satisfies ITS SR 3.8.4.1). Furthermore, each outage (once per 18 months) one charger will be used to recharge the battery after its required service or performance discharge test. This test will confirm the charger capability to function at its current-limit, and continue to fully recharge the battery. This capability will be demonstrated by alternating chargers such that each charger is utilized once per 36 months (nominally). Together, the required ITS SR 3.8.4.1 and the other licensee-controlled performance tests and monitoring will continue to adequately verify the necessary safety function of the chargers. This is consistent with the current license basis.

Notwithstanding the above, the ANO, Unit 2 (ANO-2) TSs contain such an SR. The original ANO-2 TSs contained a 200-amp value associated with the battery charger testing requirements. In 1999 (Reference 2), the NRC approved a change to this requirement (ANO-2 SR 4.8.2.3.c.4), increasing the value to 300 amps. The increase was necessary due to the planned replacement of the ANO-2 inverters which would contain a rectifier circuit and, therefore, be normally powered from the 125 VDC distribution system. The new inverters would create an increase in loading on the 125 VDC distribution system. The following is an excerpt from the NRC Safety Evaluation Report (Reference 2):

The existing chargers will be replaced with chargers of 400 ampere design capacity. The sizing of the new battery chargers will satisfy the R.G. 1.32 requirement as each charger will be able to furnish the energy for the largest combined demands of the loads while restoring the battery capacity from minimal charged state to the fully charged state.

The proposed periodic testing requirement of SR 4.8.2.3.c.4 of ≥ 300 ampere limits ensure that the chargers will perform their function. The additional 100 amperes will allow a faster battery recharge time and will allow available capacity for potential load growth of the dc system. This design change will adequately compensate for the inverter replacement and is acceptable. This change does not reduce the margin of safety specified in the TSs and does not represent a condition adverse to the health and safety of the public.

The vital battery chargers and vital inverters on both ANO-1 and ANO-2 are essentially identical (400 amp battery chargers and 10 kVA inverters). As noted in the excerpt above, the design capacity of the chargers is 400 amps. Therefore, it is not reasonable to adopt the STS SR requiring the chargers to be tested at ≥ 400 amps (at or greater than design capacity). Also note that this value is “bracketed” in the STS, indicating that a plant-specific value may be justified in lieu of the value presented. Given the similarities in this equipment on both units, Entergy proposes to adopt the STS SR for battery charger testing, revising the amp limit to ≥ 300 amps, consistent with the ANO-2 TSs. As in the ANO-2 case above, the ≥ 300 amp value demonstrates that each ANO-1 battery charger is capable of furnishing the energy needed for the largest combined demands of the various continuous steady state loads while restoring the battery capacity from the minimal charged state to the fully charged state. This nominal value was also chosen to be low enough to ensure successful completion of this test. The ≥ 300 amp value takes into consideration the tolerances associated with the charger current limit setting of approximately 400 amps and the current measurement devices ability to determine that the battery charger amperage output is greater than the TS value. The battery chargers are discussed in Section 8.3.2.1.2 of the ANO-1 Safety Analysis Report (SAR).

Because no such SR is currently required for ANO-1, the adoption of this SR, even with consideration of the proposed amp value, remains a more restrictive change, especially in light of the 8-hour time requirement for which this load must be maintained during testing. Therefore, Entergy has concluded that this difference between the STS and the ANO-1 proposed SR is acceptable.

Other Differences

With reference to STS numbering, battery SR 3.8.4.7 Note 1 is not adopted. This note allows a modified performance discharge test to be completed in lieu of a battery service test. This allowance already exists in ANO-1 SR 3.8.4.2; therefore, this note is not needed. This difference does not impact the ANO-1 ability to continue to meet the conditions of the SE.

Model SE – Regulatory Evaluation

Section 2.0, “Regulatory Evaluation,” of the model SE

The Traveler and model Safety Evaluation discuss the applicable regulatory requirements and guidance, including the 10 CFR 50, Appendix A, General Design Criteria (GDC). ANO-1 was not licensed to the 10 CFR 50, Appendix A, GDC. The ANO-1 equivalent of the referenced GDCs (1, 17, and 18) are discussed below. This difference does not alter the conclusion that the proposed change is applicable to ANO-1.

- GDC 1 As provided in discussion of GDC 17 below, ANO-1 is constructed such that structures, systems, and components (SSCs) important to safety are designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. The separate offsite power sources, Emergency Diesel Generators (EDGs), and vital electrical AC and DC distribution systems are maintained and tested in accordance with the ANO-1 TSs as required by 10 CFR 50.36.

GDC 17 As documented in Section 1.4 and Chapter 8 of the Safety Analysis Report (SAR), ANO-1 maintains two independent offsite and two onsite power sources along with two independent vital electrical distribution systems. Power for normal Mode 1 operations is fed from the Main Generator via a Unit Auxiliary transformer. Upon loss of the Main Generator (plant trip), power is automatically transferred to one of two startup transformers (offsite power sources). Power for plant startup, and shutdown is supplied by either of the two startup transformers. In the event of non-availability of these two power sources, power to the Engineered Safety Features (ESF) buses can be furnished by the two fully redundant EDGs. Upon loss of all onsite and offsite AC power, i.e., station blackout, one of the ESF buses A3 or A4 can be manually energized from the Alternate AC Diesel Generator (AACDG).

A 120-volt uninterruptible AC power system is provided for reactor protection and ESF control channels. The AC power system consists of four channelized distribution panels. Each distribution panel is fed from a power supply that includes an inverter, static switch, manual load switches, and alternate source transformer. In addition, two independent and physically separated Class 1E 125-volt batteries with respective control panels and four battery chargers provide the necessary vital DC power sources for the plant.

GDC 18 ANO-1 Electric power systems important to safety are designed to permit appropriate periodic inspection and testing of important areas and features.

Regulatory Guide (RG) 1.75, Revision 3, "Criteria for Independence of Electrical Safety Systems," describes a method acceptable to the NRC staff for complying with the NRC regulations with respect to the physical independence requirements of the circuits and electric equipment that comprise or are associated with safety systems. RG 1.75 states that for nuclear power plants with construction permits issued before January 1, 1971, protection systems must be consistent with their licensing basis or may meet the requirements of Institute of Electrical and Electronics Engineers (IEEE) Standard 603-1991. The ANO-1 construction permit was issued on December 6, 1968. The ANO-1 DC distribution system design is consistent with the licensing basis as described in Section 1.4 and Chapter 8 of the ANO-1 SAR.

The model SE supporting this TSTF refers to RG 1.129, Revision 2, "Maintenance, Testing, and Replacement of Vented Lead-Acid Storage Batteries for Nuclear Power Plants," which provides guidance for meeting the intent of GDC 1, 17, and 18 with respect to the maintenance, testing, and replacement of vented lead-acid storage batteries in nuclear power plants. This RG endorses, in part, IEEE Standard 450-2002, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications." A review of IEEE Standard 450-2002 was performed during LAR development. The maintenance of the ANO-2 DC distribution system, given the program modifications committed to via adoption of TSTF-500, meets the intent of the referenced guidance.

In addition to the above, electrical SSCs important to safety are included in the ANO-1 program applying 10 CFR 50.65(a)(3), "Requirements for monitoring the effectiveness of maintenance at nuclear power plants."

2.2 VERIFICATIONS AND REQUIRED FINAL SAFETY ANALYSIS REPORT CHANGES

As described in Section 4.7.1, "Verifications," in TSTF-500, Entergy provides the following verifications:

1. Attachment 2 contains a letter from the manufacturer of the batteries used at ANO-1 verifying the acceptability of using float current monitoring instead of specific gravity monitoring as a reliable and accurate indication of the state-of-charge of the battery and that this will hold true over the life of the battery.
2. Entergy has verified that the equipment used to monitor float current under SR 3.8.6.1 has the necessary accuracy and capability to measure electrical currents in the expected range. Additionally, Entergy will ensure that the minimum required procedural time to measure battery float current will be 30 seconds. This minimum float current measurement time is required to provide a more accurate battery float current reading.
3. Entergy has verified that battery room temperature is routinely monitored as part of the Battery Monitoring and Maintenance Program development such that a room temperature excursion could reasonably expect to be detected and corrected prior to the average battery electrolyte temperature dropping below the minimum electrolyte temperature.
4. The cell resistance limits in STS SR 3.8.4.5 do not exist in the ANO-1 TSs; however, cell resistance limits will be adopted into the Battery Monitoring and Maintenance Program. The connection resistance limit is 50 μ Ohm based on ANO-1 DC voltage drop calculations. The calculations illustrate that the minimum DC voltage is maintained for all required loads assuming a resistance of 50 μ Ohms per connection.
5. Monitoring of battery parameters (i.e., specific gravity, electrolyte level, cell temperature, float voltage, connection resistance, and physical condition) will be included in the licensee-controlled program, required and described in TS Section 5.5, "Programs and Manuals," and titled the "Battery Monitoring and Maintenance Program."
6. Entergy verifies that plant procedures will require verification of the selection of the pilot cell or cells when performing SR 3.8.6.5 as required by the new Battery Monitoring and Maintenance Program described in TS 5.5.6.

As described in Attachment 3, "List of Required Safety Analysis Report (SAR) Descriptions," Entergy will revise the ANO-1 SAR to include the following, as part of the adoption of TSTF-500, Revision 2 (also see Attachment 6, "List of Regulatory Commitments"):

1. How a 2 percent design margin for the batteries corresponds to a 2 amp float current value indicating that the battery is 98 percent charged.
2. How 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.
3. How the batteries are sized with correction margins that include temperature and aging and how these margins are maintained.
4. The minimum established design limit for battery terminal float voltage.

5. The minimum established design limit for electrolyte level.
6. The minimum established design limit for electrolyte temperature.
7. How each battery is designed with additional capacity above that required by the design duty cycles to allow for temperature variations and other factors.
8. Normal DC system operation i.e., powered from the battery chargers with the batteries floating on the system, and with a loss of normal power to the battery charger.

Attachment 4 contains a markup of the affected TS and TS Bases pages. Attachment 5 contains a revised (clean) version of each affected TS page.

2.3 OPTIONAL CHANGES AND VARIATIONS

The second portion of TS 3.8.5 (DC Sources – Shutdown) Condition A is modified to state the “required” *redundant subsystem battery and charger are operable*. This change brings consistency with the LCO, which may not require two operable DC trains depending on plant conditions at the time, and was recognized as a deficiency by the TSTF in 2011. Because this change does not alter the intended application of the LCO and its related Actions, the change is considered a minor variation from TSTF-500.

In addition, adoption of the new Battery Monitoring Program (ANO-1 Specification 5.5.6) results in all page numbers changing in the Administrative Section of the ANO-1 TSs following insertion of this program. These pages, therefore, are included in the TS markup and clean pages found in Attachments 4 and 5 of this submittal, respectively. The revised page numbers are administrative in nature and are not evaluated further in this submittal.

3.0 **REGULATORY ANALYSIS**

3.1 NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

Entergy Operations, Inc. (Entergy) has evaluated the proposed changes to the TS using the criteria in Section 50.92 to Title 10 of the *Code of Federal Regulations* (10 CFR) and has determined that the proposed changes do not involve a significant hazards consideration.

The proposed amendment would revise TS requirements related to direct current (DC) electrical systems in TS Limiting Condition for Operation (LCO) 3.8.4, “DC Sources - Operating,” LCO 3.8.5, “DC Sources - Shutdown,” and LCO 3.8.6, “Battery Parameters.” A new “Battery Monitoring and Maintenance Program” is being proposed for Section 5.5, “Administrative Controls - Programs and Manuals.”

As required by 10 CFR 50.91(a), the Entergy analysis of the issue of no significant hazards consideration is presented below:

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 and are consistent with TSTF-500, Revision 2. The proposed changes modify TS Actions relating to battery and battery charger operability requirements. The DC electrical power system, including associated battery chargers, is not an initiator of any accident sequence analyzed in the Safety Analysis Report (SAR). Rather, the DC electrical power system supports equipment used to mitigate accidents. The proposed changes to restructure TS and change surveillances for batteries and chargers to incorporate the applicable updates included in TSTF-500, Revision 2, will maintain the same level of equipment performance required for mitigating accidents assumed in the SAR. Operation in accordance with the proposed TS would ensure that the DC electrical power system is capable of performing its specified safety function as described in the SAR. Therefore, the mitigating functions supported by the DC electrical power system will continue to provide the protection assumed by the analysis. A new licensee-controlled Battery Monitoring and Maintenance Program will ensure appropriate monitoring and maintenance that is consistent with industry standards. 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 SAR 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. The DC electrical power system, including associated battery chargers, is not an initiator to any accident sequence analyzed in the SAR. Rather, the DC electrical power system supports equipment used to mitigate accidents. The proposed changes to restructure the TS and change surveillances for batteries and chargers to incorporate the applicable updates included in TSTF-500, Revision 2, will maintain the same level of equipment performance required for mitigating accidents assumed in the SAR. Administrative and mechanical controls are in place to ensure the design and operation of the DC systems continues to meet the plant design basis described in the SAR. Therefore, operation of the facility in accordance with this proposed change will not create the possibility of a new or different kind of accident from any accident 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 equipment margins will be maintained in accordance with the plant-specific design bases as a result of the proposed changes. 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 equipment fed by the DC electrical sources will continue to provide adequate power to safety-related loads in accordance with analysis assumptions.

TS changes made in accordance with TSTF-500, Revision 2, maintain the same level of equipment performance stated in the SAR and the current TSs. Therefore, the proposed changes do not involve a significant reduction of safety.

3.2 APPLICABLE REGULATORY REQUIREMENTS/CRITERIA

Entergy has reviewed the NRC staff's model SE referenced in the Notice of Availability and concluded that the Regulatory Evaluation section is applicable to ANO-1. ANO-1 was not licensed to the 10 CFR 50, Appendix A, General Design Criteria (GDC), but is designed to be consistent with the GDCs applicable to this application as described in Section 2.1 above.

4.0 ENVIRONMENTAL CONSIDERATION

The proposed TS change would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR Part 20, and would change an inspection or surveillance requirement. However, the proposed change 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 TS change meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed TS change.

5.0 REFERENCES

1. Entergy letter dated January 28, 2000, "Arkansas Nuclear One - Unit 1 Conversion to Improved Standard Technical Specifications"
2. NRC Safety Evaluation Report dated January 13, 1999, *ANO-2 Inverters and Battery Chargers Replacement*, (2CNA019902) (ML# 021560233)

Attachment 2

1CAN011304

Battery Manufacturer Letter Describing Use of Float Current



1400 Union Meeting Road
Blue Bell, PA 19422
Phone: (215) 775-1314
Fax: (215) 619-7887

Sent via Email to: JMILLE3@entergy.com

May 22, 2012

Mr. Brad Miller
Arkansas Nuclear One
Entergy

Subject: Float Current vs Specific Gravity Monitoring

Dear Brad:

In regards to the C&D batteries used in safety related (Class 1-E) applications at Arkansas Nuclear One, it is acceptable to use float current monitoring instead of specific gravity monitoring as a reliable and accurate indication of the state of charge of the battery. This relationship remains valid for the life of these batteries.

I hope that this information meets your needs. If you require any additional information, please contact me.

Regards,

A handwritten signature in black ink that reads 'Larry A. Carson'. The signature is written in a cursive style.

Larry A. Carson
Nuclear Project Manager
C&D Technologies, Inc.

Attachment 3 to

1CAN011304

List of Required Safety Analysis Report Descriptions

List of Required Safety Analysis Report Descriptions

The following table identifies Safety Analysis Report (SAR) descriptions required by Entergy as part of the adoption of TSTF-500, Revision 2. Upon implementation of the approved Technical Specification amendment, Entergy will change or verify that the SAR:

1. Describes how a 2 percent design margin for the batteries corresponds to a 2 amp float current value indicating that the battery is 98 percent charged.
2. States that long term battery performance is supported by maintaining a float voltage greater than or equal to the minimum established design limits provided by the battery manufacturer, which corresponds to 2.20 V per connected cell and that there are 58 connected cells in the battery, which corresponds to 127.6 V at the battery terminals.
3. Describes how the batteries are sized with correction margins that include temperature and aging and how these margins are maintained.
4. States the minimum established design limit for battery terminal float voltage.
5. States the minimum established design limit for electrolyte level.
6. States the minimum established design limit for electrolyte temperature.
7. Describes how each battery is designed with additional capacity above that required by the design duty cycles to allow for [temperature variations and other factors].
8. Describes normal DC system operation i.e., powered from the battery chargers with the batteries floating on the system, and with a loss of normal power to the battery charger.

Attachment 4 to

1CAN011304

Proposed Technical Specification and Bases Changes (mark-up)

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources - Operating

LCO 3.8.4 Both DC electrical power subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One DC electrical power subsystem inoperable.	A.1 Restore DC electrical power subsystem to OPERABLE status.	8 hours
B. Required Action and Associated Completion Time not met.	B.1 Be in MODE 3.	12 hours
	<u>AND</u> B.2 Be in MODE 5.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.4.1 Verify battery terminal voltage is <u>greater than or equal to the minimum established ≥ 124.7 V on-float voltage charge.</u>	7 days
<u>SR 3.8.4.2</u> Verify each battery charger supplies ≥ 300 amps at <u>greater than or equal to the minimum established float voltage for ≥ 8 hours.</u> <u>OR</u> <u>Verify each battery charger can recharge the battery to the fully charged state within 24 hours while supplying the largest combined demands of the various continuous steady state loads, after a battery discharge to the bounding design basis event discharge state.</u>	<u>18 months</u>

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.4.32 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 or a modified performance discharge test.</p>	<p>18 months</p>
<p>SR 3.8.4.3 Verify battery capacity is \geq 80% of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.</p>	<p>60 months</p> <p>AND</p> <p>12 months when battery shows degradation, or has reached 85% of the expected life with capacity < 100% of manufacturer's rating</p> <p>AND</p> <p>24 months when battery has reached 85% of the expected life with capacity \geq 100% of manufacturer's rating</p>

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources - Shutdown

LCO 3.8.5 The DC electrical power subsystem shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems – Shutdown."

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

-----NOTE-----
LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p><u>A. Required battery charger on one subsystem inoperable.</u></p> <p><u>AND</u></p> <p><u>The required redundant subsystem battery and charger are OPERABLE.</u></p>	<p><u>A.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage.</u></p>	<p><u>2 hours</u></p>
<p><u>BA. One or more required DC electrical power subsystems inoperable for reasons other than Condition A.</u></p> <p><u>OR</u></p> <p><u>Required Action and associated Completion Time of Condition A not met.</u></p>	<p><u>BA.1.1 Suspend CORE ALTERATIONS.</u></p> <p><u>AND</u></p> <p><u>BA.1.2 Suspend movement of irradiated fuel assemblies.</u></p> <p><u>AND</u></p> <p><u>BA.1.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.</u></p> <p><u>AND</u></p>	<p>Immediately</p> <p>Immediately</p> <p>Immediately</p>

CONDITION	REQUIRED ACTION	COMPLETION TIME
	BA.1.4 Initiate action to restore required DC electrical power subsystems to OPERABLE status. <u>AND</u>	Immediately

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<u>BA.</u> (continued)	<u>BA.</u> 1.5 Enter applicable Conditions and Required Actions of LCO 3.4.11, "Low Temperature Overpressure Protection (LTOP) System," for LTOP features made inoperable by Condition <u>BA.</u>	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.5.1</p> <p>-----NOTE----- The following SRs are not required to be performed: SR 3.8.4.2 and SR 3.8.4.3. -----</p> <p>For DC sources required to be OPERABLE, the following SRs are applicable:</p> <p>SR 3.8.4.1, SR 3.8.4.2, and SR 3.8.4.3.</p>	<p>In accordance with applicable SRs</p>

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery ~~Cell~~ Parameters

LCO 3.8.6 Battery ~~cell~~ parameters for the Train A and Train B electrical power subsystem 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 battery ies with one or more battery cell parameters <u>float voltage < 2.07 V</u> not within Table 3.8.6-1 Category A or B limits.	A.1 Perform SR 3.8.4.1 <u>Verify pilot cell electrolyte level and float voltage meet Table 3.8.6-1 Category C limits.</u>	<u>24 hours</u>
	<u>AND</u>	24 hours
	A.2 Perform SR 3.8.6.1 <u>Verify battery cell parameters meet Table 3.8.6-1 Category C limits.</u>	<u>AND</u> <u>Once per 7 days thereafter</u>
	<u>AND</u>	<u>24 hours</u> <u>31 days</u>
	A.3 Restore affected battery cell <u>voltage ≥ 2.07 V</u> parameters to Table 3.8.6-1 Category A and B limits.	
<u>B. One battery with float current > 2 amps.</u>	<u>B.1 Perform SR 3.8.4.1</u>	<u>2 hours</u>
	<u>AND</u> <u>B.2 Restore battery float current to ≤ 2 amps.</u>	<u>12 hours</u>

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p><u>-----NOTE-----</u> <u>Required Action C.2 shall be completed if electrolyte level was below the top of the plates.</u> <u>-----</u></p> <p><u>C. One battery with one or more cells electrolyte level less than minimum established design limits.</u></p>	<p><u>-----NOTE-----</u> <u>Required Actions C.1 and C.2 are only applicable if electrolyte level was below the top of the plates.</u> <u>-----</u></p> <p><u>C.1 Restore electrolyte level to above top of plates.</u> <u>AND</u> <u>C.2 Verify no evidence of leakage.</u> <u>AND</u> <u>C.3 Restore electrolyte level to greater than or equal to minimum established design limits.</u></p>	<p><u>8 hours</u></p> <p><u>12 hours</u></p> <p><u>31 days</u></p>
<p><u>D. One battery with pilot cell electrolyte temperature less than minimum established design limits.</u></p>	<p><u>D.1 Restore battery pilot cell temperature to greater than or equal to minimum established design limits.</u></p>	<p><u>12 hours</u></p>
<p><u>E. Two batteries with battery parameters not within limits.</u></p>	<p><u>E.1 Restore at least one battery to within limits.</u></p>	<p><u>2 hours</u></p>
<p><u>FB. Required Actions and associated Completion Times of Condition A, B, C, D, or E not met.</u></p> <p><u>OR</u></p> <p><u>One or more batteries with one or more pilot battery cells float voltage < 2.07 V and float current > 2 amps or average electrolyte temperature of the representative cells</u></p>	<p><u>FB.1 Declare associated battery inoperable.</u></p>	<p><u>Immediately</u></p>

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>< 60°F.</p> <p><u>OR</u></p> <p>One or more batteries with one or more battery cell parameters not within Table 3.8.6-1 Category C values.</p>		

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.6.1	<p>-----<u>NOTE</u>-----</p> <p><u>Not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.4.1. Verify battery cell parameters meet Table 3.8.6-1 Category A limits.</u></p> <p>-----</p> <p><u>Verify each battery float current is ≤ 2 amps.</u></p>	7 days
SR 3.8.6.2	Verify <u>each battery electrolyte temperature of the</u> pilot cell <u>float voltage</u> is ≥ <u>2.07 V</u> 60°F.	31 days

SURVEILLANCE		FREQUENCY
SR 3.8.6.3	Verify <u>each battery connected cell electrolyte level is greater than or equal to minimum established design parameters meet Table 3.8.6-1 Category B limits.</u>	<u>3192 days</u> <u>AND</u> <u>Once within 24 hours after a battery discharge < 110 V</u> <u>AND</u> <u>Once within 24 hours after a battery overcharge > 145 V</u>
SR 3.8.6.4	Verify <u>each battery pilot cell average electrolyte temperature is greater than or equal to minimum established design limits of representative cells is $\geq 60^{\circ}\text{F}$.</u>	<u>3192 days</u>
<u>SR 3.8.6.5</u>	<u>Verify each battery connected cell float voltage is $\geq 2.07 \text{ V}$.</u>	<u>92 days</u>
<u>SR 3.8.6.6</u>	<u>Verify battery capacity is $\geq 80\%$ of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.</u>	<u>60 months</u> <u>AND</u> <u>12 months when battery shows degradation, or has reached 85% of the expected life with capacity < 100% of manufacturer's rating</u> <u>AND</u> <u>24 months when battery has reached 85% of the expected life with capacity $\geq 100\%$ of manufacturer's rating</u>

Table 3.8.6-1
Battery Cell Surveillance Requirements

PARAMETER	CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B: LIMITS FOR EACH CONNECTED CELL	CATEGORY C: ALLOWABLE LIMITS FOR EACH CONNECTED CELL
Electrolyte Level	> Minimum level indication mark, and \leq 1/4 inch above maximum level indication mark ^(a)	> Minimum level indication mark, and \leq 1/4 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)}	≥ 1.195	≥ 1.190 <u>AND</u> Average of all connected cells > 1.195	Not more than 0.020 below average connected cells <u>AND</u> Average of all connected cells ≥ 1.190

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

(b) ~~Corrected for electrolyte temperature.~~

(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.~~

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.6 ~~(Not Used)~~ Battery Monitoring and Maintenance Program

This Program provides controls for battery restoration and maintenance. The program shall be in accordance with IEEE Standard (Std) 450-2002, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications," as endorsed by Regulatory Guide 1.129, Revision 2 (RG), with RG exceptions and program provisions as identified below:

a. The program allows the following RG 1.129, Revision 2 exceptions:

1. Battery temperature correction may be performed before or after conducting discharge tests.
2. RG 1.129, Regulatory Position 1, Subsection 2, "References," is not applicable to this program.
3. In lieu of RG 1.129, Regulatory Position 2, Subsection 5.2, "Inspections," the following shall be used: "Where reference is made to the pilot cell, pilot cell selection shall be based on the lowest voltage cell in the battery."
4. In Regulatory Guide 1.129, Regulatory Position 3, Subsection 5.4.1, "State of Charge Indicator," the following statements in paragraph (d) may be omitted: "When it has been recorded that the charging current has stabilized at the charging voltage for three consecutive hourly measurements, the battery is near full charge. These measurements shall be made after the initially high charging current decreases sharply and the battery voltage rises to approach the charger output voltage."
5. In lieu of RG 1.129, Regulatory Position 7, Subsection 7.6, "Restoration", the following may be used: "Following the test, record the float voltage of each cell of the string."

b. The program shall include the following provisions:

1. Actions to restore battery cells with float voltage < 2.13 V;
2. Actions to determine whether the float voltage of the remaining battery cells is ≥ 2.13 V when the float voltage of a battery cell has been found to be < 2.13 V;
3. Actions to equalize and test battery cells that had been discovered with electrolyte level below the top of the plates;
4. Limits on average electrolyte temperature, battery connection resistance, and battery terminal voltage; and
5. A requirement to obtain specific gravity readings of all cells at each discharge test, consistent with manufacturer recommendations.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.7 Reactor Coolant Pump Flywheel Inspection Program

This program shall provide for the inspection of each reactor coolant pump flywheel. Surface and volumetric examination of the reactor coolant pump flywheels will be conducted coincident with refueling or maintenance shutdowns such that during 10 year intervals all four reactor coolant pump flywheels will be examined. Such examinations will be performed to the extent possible through the access ports, i.e., those areas of the flywheel accessible without motor disassembly. The surface and volumetric examination may be accomplished by Acoustic Emission Examination as an initial examination method. Should the results of the Acoustic Emission Examination indicate that additional examination is necessary to ensure the structural integrity of the flywheel, then other appropriate NDE methods will be performed on the area of concern.

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the Reactor Coolant Pump Flywheel Inspection Program inspection frequencies.

5.5.8 Inservice Testing Program

This program provides controls for inservice testing of ASME Code Class 1, 2, and 3 components. The program shall include the following:

- a. Testing frequencies applicable to the ASME Code For Operation and Maintenance (OM) of Nuclear Power Plants and applicable Addenda as follows:

<u>ASME OM Code terminology for inservice testing activities</u>	<u>Required Frequencies for performing inservice testing activities</u>
Monthly	At least once per 31 days
Every 6 weeks	At least once per 42 days
Quarterly or every 3 months	At least once per 92 days
Semiannually or every 6 months	At least once per 184 days
Every 9 months	At least once per 276 days
Yearly or annually	At least once per 366 days
Biennially or every 2 years	At least once per 731 days

- b. The provisions of SR 3.0.2 are applicable to the above required Frequencies and to other normal and accelerated Frequencies specified as 2 years or less in the Inservice Testing Program for performing inservice testing activities;
- c. The provisions of SR 3.0.3 are applicable to inservice testing activities; and
- d. Nothing in the ASME OM Code shall be construed to supersede the requirements of any TS.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Program

A Steam Generator Program shall be established and implemented to ensure that SG tube integrity is maintained. In addition, the Steam Generator Program shall include the following provisions:

- a. Provisions for condition monitoring assessments. Condition monitoring assessment means an evaluation of the “as found” condition of the tubing with respect to the performance criteria for structural integrity and accident induced leakage. The “as found” condition refers to the condition of the tubing during an SG inspection outage, as determined from the inservice inspection results or by other means, prior to the plugging of tubes. Condition monitoring assessments shall be conducted during each outage during which the SG tubes are inspected or plugged to confirm that the performance criteria are being met.
- b. Performance criteria for SG tube integrity. SG tube integrity shall be maintained by meeting the performance criteria for tube structural integrity, accident induced leakage, and operational LEAKAGE.
 1. Structural integrity performance criterion: All in-service steam generator tubes shall retain structural integrity over the full range of normal operating conditions (including startup, operation in the power range, hot standby, and cool down and all anticipated transients included in the design specification) and design basis accidents. This includes retaining a safety factor of 3.0 against burst under normal steady state full power operation primary to secondary pressure differential and a safety factor of 1.4 against burst applied to the design basis accident primary to secondary pressure differentials. Apart from the above requirements, additional loading conditions associated with the design basis accidents, or combination of accidents in accordance with the design and licensing basis, shall also be evaluated to determine if the associated loads contribute significantly to burst or collapse. In the assessment of tube integrity, those loads that do significantly affect burst or collapse shall be determined and assessed in combination with the loads due to pressure with a safety factor of 1.2 on the combined primary loads and 1.0 on axial secondary loads.
 2. Accident induced leakage performance criterion: The primary to secondary accident induced leakage rate for any design basis accident, other than a SG tube rupture, shall not exceed the leakage rate assumed in the accident analysis in terms of total leakage rate for all SGs and leakage rate for an individual SG. Leakage is not to exceed 1 gpm.
 3. The operational LEAKAGE performance criterion is specified in LCO 3.4.13, “RCS Operational LEAKAGE.”

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

- c. Provisions for SG tube repair criteria. Tubes found by inservice inspection to contain flaws with a depth equal to or exceeding 40% of the nominal tube wall thickness shall be plugged.
- d. Provisions for SG tube inspections. Periodic SG tube inspections shall be performed. The number and portions of the tubes inspected and methods of inspection shall be performed with the objective of detecting flaws of any type (e.g., volumetric flaws, axial and circumferential cracks) that may be present along the length of the tube, from the tube-to-tubesheet weld at the tube inlet to the tube-to-tubesheet weld at the tube outlet, and that may satisfy the applicable tube repair criteria. The tube-to-tubesheet weld is not part of the tube. In addition to meeting the requirements of d.1, d.2, and d.3 below, the inspection scope, inspection methods, and inspection intervals shall be such as to ensure that SG tube integrity is maintained until the next SG inspection. An assessment of degradation shall be performed to determine the type and location of flaws to which the tubes may be susceptible and, based on this assessment, to determine which inspection methods need to be employed and at what locations.
 - 1. Inspect 100% of the tubes in each SG during the first refueling outage following SG replacement.
 - 2. Inspect 100% of the tubes at sequential periods of 144, 108, 72, and, thereafter, 60 effective full power months. The first sequential period shall be considered to begin after the first inservice inspection of the SGs. In addition, inspect 50% of the tubes by the refueling outage nearest the midpoint of the period and the remaining 50% by the refueling outage nearest the end of the period. No SG shall operate for more than 72 effective full power months or three refueling outages (whichever is less) without being inspected.
 - 3. If crack indications are found in any SG tube, then the next inspection for each SG for the degradation mechanism that caused the crack indication shall not exceed 24 effective full power months or one refueling outage (whichever is less). If definitive information, such as from examination of a pulled tube, diagnostic non-destructive testing, or engineering evaluation indicates that a crack-like indication is not associated with a crack(s), then the indication need not be treated as a crack.
- e. Provisions for monitoring operational primary to secondary LEAKAGE.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.10 Secondary Water Chemistry

This program provides controls for monitoring secondary water chemistry to inhibit SG tube degradation. The program shall include:

- a. Identification of a sampling schedule for the critical variables and control points for these variables;
- b. Identification of the procedures used to measure the values of the critical variables;
- c. Identification of process sampling points;
- d. Procedures for the recording and management of data;
- e. Procedures defining corrective actions for all off control point chemistry conditions; and
- f. A procedure identifying the authority responsible for the interpretation of the data and the sequence and timing of administrative events required to initiate corrective action.

5.5.11 Ventilation Filter Testing Program (VFTP)

A program shall be established to implement the following required testing of Engineered Safeguards (ES) ventilation systems filters at the frequencies specified in Regulatory Guide 1.52, Revision 2. The VFTP is applicable to the Penetration Room Ventilation System (PRVS) and the Control Room Emergency Ventilation System (CREVS).

- a. Demonstrate that an inplace cold DOP test of the high efficiency particulate (HEPA) filters shows:
 1. $\geq 99\%$ DOP removal for the PRVS when tested at the system design flowrate of $1800 \text{ scfm} \pm 10\%$; and
 2. $\geq 99.95\%$ DOP removal for the CREVS when tested in accordance with Regulatory Guide 1.52, Revision 2, at the system design flowrate of $2000 \text{ cfm} \pm 10\%$.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

- b. Demonstrate that an in-place halogenated hydrocarbon test of the charcoal adsorbers shows:
 - 1. $\geq 99\%$ halogenated hydrocarbon removal for the PRVS when tested at the system design flowrate of $1800 \text{ cfm} \pm 10\%$; and
 - 2. $\geq 99.95\%$ halogenated hydrocarbon removal for the CREVS when tested in accordance with Regulatory Guide 1.52, Revision 2, at the system design flowrate of $2000 \text{ cfm} \pm 10\%$.
- c. Demonstrate that a laboratory test of a sample of the charcoal adsorber meets the laboratory testing criteria of ASTM D3803-1989 when tested at 30°C and 95% relative humidity for a methyl iodide penetration of:
 - 1. $< 5\%$ for the PRVS;
 - 2. when obtained as described in Regulatory Guide 1.52, Revision 2, for CREVS
 - i. $\leq 2.5\%$ for 2 inch charcoal adsorber beds; and
 - ii. $\leq 0.5\%$ for 4 inch charcoal adsorber beds.
- d. Demonstrate for the PRVS and CREVS, that the pressure drop across the combined HEPA filters, other filters in the system, and the charcoal adsorbers is < 6 inches of water when tested at the following system design flowrates $\pm 10\%$:

PRVS	1800 cfm
CREVS	2000 cfm

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the VFTP test frequencies.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.12 Explosive Gas and Storage Tank Radioactivity Monitoring Program

This program provides controls for potentially explosive gas mixtures contained in the Waste Gas System, the quantity of radioactivity contained in gas storage tanks, and the quantity of radioactivity contained in unprotected temporary outdoor liquid storage tanks. The gaseous radioactivity quantities shall be determined following the methodology in Branch Technical Position (BTP) ETSB 11-5, "Postulated Radioactive Release due to Waste Gas System Leak or Failure." The liquid radwaste quantities shall be determined in accordance with the ODCM.

The program shall include:

- a. The limits for concentrations of hydrogen and oxygen in the Waste Gas System and a surveillance program to ensure the limits are maintained. Such limits shall be appropriate to the system's design criteria (i.e., whether or not the system is designed to withstand a hydrogen explosion);
- b. A surveillance program to ensure that the quantity of radioactivity contained in each gas storage tank is less than the amount that would result in a whole body exposure of ≥ 0.5 rem to any individual in an unrestricted area, in the event of an uncontrolled release of the tanks' contents;
- c. A surveillance program to ensure that the quantity of radioactivity contained in all temporary outdoor liquid radwaste tanks: 1) that are not surrounded by liners, dikes, or walls, capable of holding the tanks' contents; and 2) that do not have tank overflows and surrounding area drains connected to the Liquid Radwaste Treatment System is less than the amount that would result in concentrations equal to the limits of 10 CFR 20, Appendix B, Table 2, Column 2, at the nearest potable water supply and the nearest surface water supply in an unrestricted area, in the event of an uncontrolled release of the tanks' contents.

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the Explosive Gas and Storage Tank Radioactivity Monitoring Program surveillance frequencies.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.13 Diesel Fuel Oil Testing Program

A diesel fuel oil testing program to implement required testing of both new fuel oil and stored fuel oil shall be established. The program shall include sampling and testing requirements, and acceptance criteria, all in accordance with applicable ASTM Standards. The purpose of the program is to establish the following:

- a. Acceptability of new fuel oil for use prior to addition to storage tanks by determining that the fuel oil has:
 1. an API gravity or an absolute specific gravity within limits,
 2. a flash point and kinematic viscosity within limits for ASTM 2D fuel oil, and
 3. water and sediment within limits;
- b. Within 31 days following addition of new fuel oil to storage tanks, verify that the properties of the new fuel oil, other than those addressed in a. above, are within limits for ASTM 2D fuel oil;
- c. Total particulate concentration of the fuel oil is ≤ 10 mg/l when tested every 31 days based on ASTM D-2276, Method A-2 or A-3; and
- d. The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the Diesel Fuel Oil Testing Program surveillance Frequencies.

5.5.14 Technical Specifications (TS) Bases Control Program

This program provides a means for processing changes to the Bases of these Technical Specifications.

- a. Changes to the Bases of the TS shall be made under appropriate administrative controls and reviews.
- b. Licensees may make changes to Bases without prior NRC approval provided the changes do not involve either of the following:
 1. A change in the TS incorporated in the license; or
 2. A change to the updated SAR or Bases that requires NRC approval pursuant to 10 CFR 50.59.

Proposed changes that do meet these criteria shall be reviewed and approved by the NRC prior to implementation. Changes to the Bases implemented without prior NRC approval shall be provided to the NRC on a frequency consistent with 10 CFR 50.71(e).

- c. The Bases Control Program shall contain provisions to ensure that the Bases are maintained consistent with the SAR.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.15 Safety Function Determination Program (SFDP)

This program ensures loss of safety function is detected and appropriate actions taken. Upon entry into LCO 3.0.6, an evaluation shall be made to determine if loss of safety function exists. Additionally, other appropriate limitations and remedial or compensatory actions may be identified to be taken as a result of the support system inoperability and corresponding exception to entering supported system Condition and Required Actions. This program implements the requirements of LCO 3.0.6. The SFDP shall contain the following:

- a. Provisions for cross train checks to ensure a loss of the capability to perform the safety function assumed in the accident analysis does not go undetected;
- b. Provisions for ensuring the plant is maintained in a safe condition if a loss of function condition exists;
- c. Provisions to ensure that an inoperable supported system's Completion Time is not inappropriately extended as a result of multiple support system inoperabilities; and
- d. Other appropriate limitations and remedial or compensatory actions.

A loss of safety function exists when, assuming no concurrent single failure, and assuming no concurrent loss of offsite power or loss of onsite diesel generator(s), a safety function assumed in the accident analysis cannot be performed. For the purpose of this program, a loss of safety function may exist when a support system is inoperable, and:

- a. A required system redundant to the system(s) supported by the inoperable support system is also inoperable; or
- b. A required system redundant to the system(s) in turn supported by the inoperable supported system is also inoperable; or
- c. A required system redundant to the support system(s) for the supported systems (a) and (b) above is also inoperable.

The SFDP identifies where a loss of safety function exists. If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.16 Reactor Building Leakage Rate Testing Program

A program shall be established to implement the leakage rate testing of the reactor building as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995, except that the next Type A test performed after the April 16, 1992 Type A test shall be performed no later than April 15, 2007.

In addition, the reactor building purge supply and exhaust isolation valves shall be leakage rate tested once prior to entering MODE 4 from MODE 5 if not performed within the previous 92 days.

The peak calculated reactor building internal pressure for the design basis loss of coolant accident, P_a , is 54 psig.

The maximum allowable reactor building leakage rate, L_a , shall be 0.20% of containment air weight per day at P_a .

Leakage rate acceptance criteria are:

- a. Reactor Building leakage rate acceptance criteria is $\leq 1.0 L_a$. During the first unit startup following each test performed in accordance with this program, the leakage rate acceptance criteria are $< 0.60 L_a$ for the Type B and Type C tests and $< 0.75 L_a$ for Type A tests.
- b. Air lock testing acceptance criteria are:
 1. Overall air lock leakage rate is $\leq 0.05 L_a$ when tested at $\geq P_a$;
 2. For each door, leakage rate is $\leq 0.01 L_a$ when tested at ≥ 10 psig.

The provisions of SR 3.0.2 do not apply to the test frequencies specified in the Reactor Building Leakage Rate Testing Program.

The provisions of SR 3.0.3 are applicable to the Reactor Building Leakage Rate Testing Program.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.17 Metamic Coupon Sampling Program

A coupon surveillance program will be implemented to maintain surveillance of the Metamic absorber material under the radiation, chemical, and thermal environment of the SFP. The purpose of the program is to establish the following:

- Coupons will be examined on a two year basis for the first three intervals with the first coupon retrieved for inspection being on or before February 2009 and thereafter at increasing intervals over the service life of the inserts.
 - Measurements to be performed at each inspection will be as follows:
 - A) Physical observations of the surface appearance to detect pitting, swelling or other degradation,
 - B) Length, width, and thickness measurements to monitor for bulging and swelling
 - C) Weight and density to monitor for material loss, and
 - D) Neutron attenuation to confirm the B-10 concentration or destructive chemical testing to determine the boron content.
 - The provisions of SR 3.0.2 are applicable to the Metamic Coupon Sampling Program.
 - The provisions of SR 3.0.3 are not applicable to the Metamic Coupon Sampling Program.
-

5.0 ADMINISTRATIVE CONTROLS

5.6 Reporting Requirements

5.6.1 DELETED

5.6.2 Annual Radiological Environmental Operating Report

-----NOTE-----

A single submittal may be made for ANO. The submittal should combine sections common to both units.

The Annual Radiological Environmental Operating Report covering the operation of the unit during the previous calendar year shall be submitted by May 15 of each year. The report shall include summaries, interpretations, and analyses of trends of the results of the radiological environmental monitoring program for the reporting period. The material provided shall be consistent with the objectives outlined in the Offsite Dose Calculation Manual (ODCM), and in 10 CFR 50, Appendix I, Sections IV.B.2, IV.B.3, and IV.C.

5.6.2 Annual Radiological Environmental Operating Report (continued)

The Annual Radiological Environmental Operating Report shall include the results of analyses of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in the table and figures in the ODCM, as well as summarized and tabulated results of these analyses and measurements. In the event that some individual results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted in a supplementary report as soon as possible.

5.6.3 Radioactive Effluent Release Report

-----NOTE-----

A single submittal may be made for ANO. The submittal shall combine sections common to both units. The submittal shall specify the releases of radioactive material from each unit.

The Radioactive Effluent Release Report covering the operation of the unit in the previous year shall be submitted prior to May 1 of each year in accordance with 10 CFR 50.36a. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit. The material provided shall be consistent with the objectives outlined in the ODCM and Process Control Program and in conformance with 10 CFR 50.36a and 10 CFR Part 50, Appendix I, Section IV.B.1.

5.6.4 DELETED

5.0 ADMINISTRATIVE CONTROLS

5.6 Reporting Requirements

5.6.5 CORE OPERATING LIMITS REPORT (COLR)

- a. Core operating limits shall be established prior to each reload cycle, or prior to any remaining portion of a reload cycle, and shall be documented in the COLR for the following:

- 2.1.1 Variable Low RCS Pressure – Temperature Protective Limits
- 3.1.1 SHUTDOWN MARGIN (SDM)
- 3.1.8 PHYSICS TESTS Exceptions – MODE 1
- 3.1.9 PHYSICS TEST Exceptions - MODE 2
- 3.2.1 Regulating Rod Insertion Limits
- 3.2.2 AXIAL POWER SHAPING RODS (APSR) Insertion Limits
- 3.2.3 AXIAL POWER IMBALANCE Operating Limits
- 3.2.4 QUADRANT POWER TILT (QPT)
- 3.2.5 Power Peaking
- 3.3.1 Reactor Protection System (RPS) Instrumentation
- 3.4.1 RCS Pressure, Temperature, and Flow DNB limits
- 3.4.4 RCS Loops – MODES 1 and 2
- 3.9.1 Boron Concentration

- b. The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

Babcock & Wilcox Topical Report BAW-10179-A, “Safety Criteria and Methodology for Acceptable Cycle Reload Analyses” (the approved revision at the time the reload analyses are performed). The approved revision number shall be identified in the COLR.

Entergy Topical Report ENEAD-01-P, “Qualification of Reactor Physics Methods for the Pressurized Water Reactors of the Entergy System” (the approved revision at the time the reload analyses are performed). The approved revision number shall be identified in the COLR.

- c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling System (ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.
- d. The COLR, including any midcycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

5.0 ADMINISTRATIVE CONTROLS

5.6 Reporting Requirements

5.6.6 Reactor Building Inspection Report

Any degradation exceeding the acceptance criteria of the containment structure detected during the tests required by the Containment Inspection Program shall undergo an engineering evaluation within 60 days of the completion of the inspection surveillance. The results of the engineering evaluation shall be reported to the NRC within an additional 30 days of the time the evaluation is completed. The report shall include the cause of the condition that does not meet the acceptance criteria, the applicability of the conditions to the other unit, the acceptability of the concrete containment without repair of the item, whether or not repair or replacement is required and, if required, the extent, method, and completion date of necessary repairs, and the extent, nature, and frequency of additional examinations.

5.6.7 Steam Generator Tube Inspection Reports

A report shall be submitted within 180 days after the initial entry into MODE 4 following completion of an inspection performed in accordance with the Specification 5.5.9, Steam Generator (SG) Program. The report shall include:

- a. The scope of inspections performed on each SG,
 - b. Active degradation mechanisms found,
 - c. Nondestructive examination techniques utilized for each degradation mechanism,
 - d. Location, orientation (if linear), and measured sizes (if available) of service induced indications,
 - e. Number of tubes plugged during the inspection outage for each active degradation mechanism,
 - f. Total number and percentage of tubes plugged to date,
 - g. The results of condition monitoring, including the results of tube pulls and in-situ testing.
-

5.0 ADMINISTRATIVE CONTROLS

5.7 High Radiation Area

As provided in paragraph 20.1601(c) of 10 CFR Part 20, the following controls shall be applied to high radiation areas in place of the controls required by paragraph 20.1601(a) and (b) of 10 CFR Part 20:

5.7.1 High Radiation Areas with Dose Rates Not Exceeding 1.0 rem/hour at 30 Centimeters from the Radiation Source or from any Surface Penetrated by the Radiation

- a. Each entryway to such an area shall be barricaded and conspicuously posted as a high radiation area. Such barricades may be opened as necessary to permit entry or exit of personnel or equipment.
- b. Access to, and activities in, each such area shall be controlled by means of Radiation Work Permit (RWP), or equivalent that includes specification of radiation dose rates in the immediate work area(s) and other appropriate radiation protection equipment and measures.
- c. Individuals qualified in radiation protection procedures and personnel continuously escorted by such individuals may be exempted from the requirement for an RWP or equivalent while performing their assigned duties provided that they are otherwise following plant radiation protection procedures for entry to, exit from, and work in such areas.
- d. Each individual or group entering such an area shall possess:
 1. A radiation monitoring device that continuously displays radiation dose rates in the area; or
 2. A radiation monitoring device that continuously integrates the radiation dose rates in the area and alarms when the device's dose alarm setpoint is reached, with an appropriate alarm setpoint, or
 3. A radiation monitoring device that continuously transmits dose rate and cumulative dose information to a remote receiver monitored by radiation protection personnel responsible for controlling personnel radiation exposure within the area, or

5.0 ADMINISTRATIVE CONTROLS

5.7 High Radiation Area

4. A self-reading dosimeter (e.g., pocket ionization chamber or electronic dosimeter) and,
 - (i) Be under the surveillance, as specified in the RWP or equivalent, while in the area, of an individual qualified in radiation protection procedures, equipped with a radiation monitoring device that continuously displays radiation dose rates in the area; who is responsible for controlling personnel exposure within the area, or
 - (ii) Be under the surveillance as specified in the RWP or equivalent, while in the area, by means of closed circuit television, of personnel qualified in radiation protection procedures, responsible for controlling personnel radiation exposure in the area, and with the means to communicate with individuals in the area who are covered by such surveillance.
- e. Except for individuals qualified in radiation protection procedures, or personnel continuously escorted by such individuals, entry into such areas shall be made only after dose rates in the area have been determined and entry personnel are knowledgeable of them. These continuously escorted personnel will receive a pre-job briefing prior to entry into such areas. This dose rate determination, knowledge, and pre-job briefing does not require documentation prior to initial entry.

5.7.2 High Radiation Areas with Dose Rates Greater than 1.0 rem/hour at 30 Centimeters from the Radiation Source or from any Surface Penetrated by the Radiation, but less than 500 rads/hour at 1 Meter from the Radiation Source or from any Surface Penetrated by the Radiation

- a. Each entryway to such an area shall be conspicuously posted as a high radiation area and shall be provided with a locked or continuously guarded door or gate that prevents unauthorized entry, and, in addition:
 1. All such door and gate keys shall be maintained under the administrative control of the shift manager, radiation protection manager, or his or her designee.
 2. Doors and gates shall remain locked except during periods of personnel or equipment entry or exit.
- b. Access to, and activities in, each such area shall be controlled by means of an RWP or equivalent that includes specification of radiation dose rates in the immediate work area(s) and other appropriate radiation protection equipment and measures.

5.0 ADMINISTRATIVE CONTROLS

5.7 High Radiation Area

- c. Individuals qualified in radiation protection procedures may be exempted from the requirement for an RWP or equivalent while performing radiation surveys in such areas provided that they are otherwise following plant radiation protection procedures for entry to, exit from, and work in such areas.
- d. Each individual or group entering such an area shall possess:
 - 1. A radiation monitoring device that continuously integrates the radiation rates in the area and alarms when the device's dose alarm setpoint is reached, with an appropriate alarm setpoint, or
 - 2. A radiation monitoring device that continuously transmits dose rate and cumulative dose information to a remote receiver monitored by radiation protection personnel responsible for controlling personnel radiation exposure within the area with the means to communicate with and control every individual in the area, or
 - 3. A self-reading dosimeter (e.g., pocket ionization chamber or electronic dosimeter) and,
 - (i) Be under the surveillance, as specified in the RWP or equivalent, while in the area, of an individual qualified in radiation protection procedures, equipped with a radiation monitoring device that continuously displays radiation dose rates in the area; who is responsible for controlling personnel exposure within the area, or
 - (ii) Be under the surveillance as specified in the RWP, or equivalent, while in the area by means of closed circuit television, or personnel qualified in radiation protection procedures responsible for controlling personnel radiation exposure in the area and with the means to communicate with individuals in the area who are covered by such surveillance.
 - 4. In those cases where options (2) and (3), above, are impractical or determined to be inconsistent with the "As Low As is Reasonably Achievable" principle, a radiation monitoring device that continuously displays radiation dose rates in the area.

5.0 ADMINISTRATIVE CONTROLS

5.7 High Radiation Area

- e. Except for individuals qualified in radiation protection procedures, or personnel continuously escorted by such individuals, entry into such areas shall be made only after dose rates in the area have been determined and entry personnel are knowledgeable of them. These continuously escorted personnel will receive a pre-job briefing prior to entry into such areas. This dose rate determination, knowledge, and pre-job briefing does not require documentation prior to initial entry.

 - f. Such individual areas that are within a larger area where no enclosure exists for the purpose of locking and where no enclosure can reasonably be constructed around the individual area need not be controlled by a locked door or gate, nor continuously guarded, but shall be barricaded, conspicuously posted, and a clearly visible flashing light shall be activated at the area as a warning device.
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B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.4 DC Sources - Operating

BASES

BACKGROUND

The station DC electrical power system provides the AC emergency power system with control power. It also provides both motive and control power to selected safety related equipment and 120 VAC vital bus power (via inverters). As required by SAR, Section 1.4, GDC 17 (Ref. 1), the DC electrical power system is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure. The DC electrical power system also conforms to the recommendations of Regulatory Guide 1.6 (Ref. 2) and IEEE-308 (Ref. 3).

The 125 VDC electrical power system consists of two independent and redundant safety related Class 1E DC electrical power subsystems (Red Train and Green Train). Each subsystem consists of one 125 VDC battery, the associated battery charger for each battery, and all the associated control equipment and interconnecting cabling.

Additionally, there is one spare battery charger per subsystem, which provides backup service in the event that a battery charger is out of service. If the spare battery charger is substituted, then the requirements of independence and redundancy between subsystems are maintained.

During normal operation, each 125 VDC subsystem is powered from the inservice battery charger with the battery floating on the system. In case of a loss of normal power to the battery charger, the DC load is automatically powered from the station battery. This results in a discharge of the associated battery (and may affect both the system and cell parameters).

The Red Train and Green Train DC electrical power subsystems provide the control power for its associated Class 1E AC power load group, 4.16 kV switchgear, and 480 V load centers. The DC electrical power subsystems also provide DC electrical power to the inverters, which in turn power the 120 VAC vital buses.

The DC power distribution system is described in more detail in Bases for LCO 3.8.9, "Distributions System – Operating."

~~Each battery has adequate storage capacity to carry the required load continuously for at least 2 hours in addition to supplying power for the operation of momentary loads during the 2 hour period as discussed in the SAR, Chapter 8 (Ref. 4).~~ Each 125 VDC battery is separately housed in a ventilated room apart from its charger and distribution centers. Each subsystem is located in an area separated physically and electrically from the other subsystem to ensure that a single failure in one subsystem does not cause a failure in a redundant subsystem. There is no sharing between redundant Class 1E subsystems, such as batteries, battery chargers, or distribution panels.

Each battery has adequate storage capacity to meet the duty cycle(s) discussed in the SAR, 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.

BACKGROUND (continued)

The batteries for Red Train and Green Train 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 V. The Red Train and Green Train batteries are C&D type LCR-21 (58 cell). This size of battery was required before the black battery was added because of the large non-1E lift oil and seal oil pump motors fed from the 1E batteries. The LCR-21 batteries have 10 positive plates and with the present loads the calculated positive plate requirement for the Red Train and Green Train batteries and for the Green Train battery is less than 10 positive plates (this includes temperature correction for 60 °F and 80% aging factor 1.25 for end-of-life). This provides an approximate 65% design margin for Red Train battery and an approximate 100% design margin for the Green Train battery.—IEEE 485 (Ref. 5) recommends a 10-15% design margin. IEEE 485 is used as a reference in the battery sizing calculation which is the document, along with the battery test procedure, used to determine that the batteries are adequately sized.

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 2.063 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 2.063 Vpc, the battery cell will maintain its capacity for 180 days without further charging per manufacturer's instructions. Optimal long term performance however, is obtained by maintaining a float voltage 2.20 to 2.25 Vpc. This provides adequate over-potential, which limits the formation of lead sulfate and self discharge. The nominal float voltage of 2.22 Vpc corresponds to a total float voltage output of 128.8 V for a 58 cell battery.

Each 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 is also designed with 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.

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.

The initial conditions of Design Basis Accident (DBA) and transient analyses in the SAR, Chapter 14 (Ref. 6), assume that Engineered Safeguards (ES) 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 sources is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining the DC sources OPERABLE during accident conditions that consider:

- a. An assumed loss of all offsite AC power or all onsite AC power; and
- b. A worst-case single failure.

In MODES 1 and 2, the DC sources satisfy Criterion 3 of 10 CFR 50.36 (Ref. 7). In MODES 3 and 4, the DC sources satisfy Criterion 4 of 10 CFR 50.36.

LCO

The DC electrical power subsystems, each subsystem consisting of one battery, one of two battery chargers and the corresponding control equipment and interconnecting cabling supplying power to the associated bus within the [train-subsystem](#) are required to be OPERABLE to ensure the availability of the required power to shut down the reactor and maintain it in a safe condition after an abnormality or a postulated DBA. Loss of any train DC electrical power subsystem does not prevent the minimum safety function from being performed (Ref. 4).

An OPERABLE DC electrical power subsystem requires the associated battery to be OPERABLE and connected to the associated DC bus and one of its respective chargers to be operating and connected to the associated DC bus.

APPLICABILITY

The DC electrical power sources are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure safe unit operation and to ensure that:

- a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of abnormalities; and
- b. Adequate core cooling is provided, and reactor building OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

The DC electrical power requirements for MODES 5 and 6 are addressed by the definition of OPERABILITY for each required supported load.

ACTIONS

A.1

Condition A represents one ~~train-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 DC power to the affected ~~subsystem~~~~train~~. The 8 hour limit is consistent with the allowed time for an inoperable DC distribution ~~subsystem~~~~train~~.

If one of the required DC electrical power subsystems is inoperable (e.g., inoperable battery, inoperable battery chargers, or inoperable battery chargers and associated inoperable battery), the remaining DC electrical power subsystem has 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 ~~complete~~ loss of the ~~minimum necessary remaining 125 VDC~~ electrical ~~power~~-subsystems ~~to mitigate a worse case accident with attendant loss of ES functions~~, continued ~~steady-state~~ power operation should not exceed 8 hours. The 8 hour Completion Time 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.

B.1 and B.2

If the inoperable 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 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1

Verifying battery terminal voltage while on float charge helps to ensure the effectiveness of the ~~battery chargersing, which support 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 ~~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 ~~(2.15 V per cell average)~~ and are consistent with ~~the minimum float voltage established by the battery manufacturer (2.20 Vpc times the number of connected cells or 127.6 V for a 58 cell battery at the battery terminals). This voltage maintains the battery plates in a condition that supports maintaining the grid life~~ ~~IEEE-450 (Ref. 8).~~ The 7-day Frequency is consistent with manufacturer recommendations ~~and IEEE-450 (Ref. 8).~~

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.2

This SR verifies the design capacity of the chargers. According to Regulatory Guide (RG) 1.32 (Ref. 9), the battery charger supply is recommended to be based on the largest combined demands of the various steady state loads and the charging capacity to restore the battery from the design minimum charge state to the fully charged state, irrespective of the status of the unit during these demand occurrences. The minimum required amperes and duration ensure that these requirements can be satisfied.

This SR provides two options. One option requires that each battery charger be capable of supplying ≥ 300 amps at the minimum established float voltage for 8 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 that each battery charger be capable of recharging the battery after a service test coincident with supplying the largest coincident demands of the various continuous steady state loads (irrespective of the status of the plant during which these demands occur). This level of loading 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 ≤ 2 amps.

The Surveillance Frequency is acceptable, given the unit conditions required to perform the test and the other administrative controls existing to ensure adequate charger performance during these 18 month intervals. In addition, this Frequency is intended to be consistent with expected fuel cycle lengths.

SR 3.8.4.32

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

The Surveillance Frequency of 18 months is consistent with ~~considerations that the recommendations of battery service test should be performed during refueling outages, or at some other outage~~ RG 1.32 (Ref. 9) and RG 1.129 (Ref. 10), which state that the battery service test should be performed during refueling operations, or at some other outage, with intervals between tests not to exceed 18 months.

A modified performance discharge test may be performed in lieu of a service test. The modified performance discharge test (Ref. 8) is a simulated duty cycle consisting of just two rates; the one minute rate published for the battery or the largest current load of the duty cycle, followed by the test rate employed for the performance test, both of which envelope the duty cycle of the service test. Since the ampere-hours removed by a rated one-minute discharge represents a very small portion of the battery capacity, the test rate can be changed to that for the

performance test without compromising the results of the performance discharge test. The battery terminal voltage for the modified performance discharge test should remain above the minimum battery terminal voltage specified in the battery service test for the duration of time equal to that of the service test.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.3 (continued)

A modified performance discharge test is a test of the battery capacity, as found, 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 and the test discharge rate must envelope the duty cycle of the service test if the modified performance discharge test is performed in lieu of a service test.

SR 3.8.4.3

~~A battery performance discharge test is a test of constant current capacity of a battery 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 (Ref. 8).~~

~~A battery modified performance discharge test is described in the Bases for SR 3.8.4.2. Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.4.3; however, only the modified performance discharge test may be used to satisfy SR 3.8.4.3 while satisfying the requirements of SR 3.8.4.2 at the same time.~~

~~The acceptance criteria for this Surveillance are consistent with IEEE 450 (Ref. 8), which recommends that the battery be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements.~~

~~The Surveillance Frequency for this test is normally 60 months. If the battery shows degradation, or if the battery has reached 85% of its expected life and capacity is < 100% of the manufacturer's rating, the Surveillance Frequency is reduced to 12 months. However, if the battery shows no degradation but has reached 85% of its expected life, the Surveillance Frequency is only reduced to 24 months for batteries that retain capacity \geq 100% of the manufacturer's ratings. Degradation is indicated, according to 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 > 10% below the manufacturer's rating. These Frequencies are consistent with the recommendations in IEEE 450 (Ref. 8).~~

REFERENCES

1. SAR, Section 1.4, GDC 17.
2. Regulatory Guide 1.6, "Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems," March, 1971.

3. IEEE-308-1971, "Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."
 4. SAR, Chapter 8.
 5. IEEE-485-1993, June 1983.
 6. SAR, Chapter 14.
 7. 10 CFR 50.36.
 8. IEEE-450-1995, "Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications."
 9. [Regulatory Guide 1.32, "Criteria for Power Systems for Nuclear Power Plants," March 2004.](#)
 10. [Regulatory Guide 1.129, "Maintenance, Testing, and Replacement of Vented Lead-Acid Storage Batteries for Nuclear Power Plants," February 2007.](#)
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B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.5 DC Sources - Shutdown

BASES

BACKGROUND

A description of the DC sources is provided in the Bases for LCO 3.8.4, "DC Sources - Operating."

APPLICABLE SAFETY ANALYSES

The DC electrical power system provides normal and emergency DC electrical power for the DGs, emergency auxiliaries, and control and switching.

The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the fuel handling accident and the requirements for the supported systems' OPERABILITY.

In general, when the unit is shutdown, the [Technical Specifications](#) requirements ensure that the unit has the capability to mitigate the consequences of postulated accidents. However, assuming a single failure and concurrent loss of all offsite or all onsite power is not required. The rationale for this is based on the fact that many Design Basis Accidents (DBAs) that are analyzed in MODES 1 and 2 have no specific analyses in MODES 3, 4, 5 and 6. Worst case bounding events are deemed not credible in MODES 5 and 6 because the energy contained within the reactor pressure boundary, reactor coolant temperature and pressure, and the corresponding stresses result in the probabilities of occurrence being significantly reduced or eliminated, and in minimal consequences. These deviations from DBA analysis assumptions and design requirements during shutdown conditions are allowed by the LCO for required systems.

The shutdown [Technical Specification](#) requirements are designed to ensure that the unit has the capability to mitigate the consequences of certain postulated accidents. Worst case DBAs which are analyzed for operating MODES are generally viewed not to be a significant concern during shutdown MODES due to the lower energies involved. The [Technical Specifications](#) therefore require a lesser complement of electrical equipment to be available during shutdown than is required during operating MODES. More recent work completed on potential risks associated with shutdown, however, [has](#) found significant risk associated with certain shutdown evolutions. As a result, in addition to the requirements established in the [Technical Specification](#)s, ANO, through industry commitment, has adopted NUMARC 91-06, "Guidelines for Industry Actions to Assess Shutdown Management," as an industry initiative to manage shutdown tasks and associated electrical support to maintain risk at an acceptable low level. This may require the availability of additional equipment beyond that required by the shutdown [Technical Specifications](#).

In MODES 5 and 6, the DC sources satisfy Criterion 4 of 10 CFR 50.36 (Ref. 1). During handling of irradiated fuel, the DC sources satisfy Criterion 3 of 10 CFR 50.36.

LCO

The DC electrical power subsystems consisting of one battery, one battery charger, and the corresponding control equipment and interconnecting cabling within the [subsystemtrain](#), are required to be OPERABLE to support the required [subsystemtrain](#)(s) of the distribution systems required OPERABLE by LCO 3.8.10, "Distribution Systems - Shutdown." This ensures the availability of sufficient DC electrical power sources to operate the unit in a safe manner and to mitigate the consequences of a fuel handling accident.

An OPERABLE DC electrical power subsystem requires the associated battery to be OPERABLE and connected to the associated DC bus and one of its respective chargers to be OPERABLE and capable of being connected to the associated DC bus.

APPLICABILITY

The DC electrical power sources required to be OPERABLE in MODES 5 and 6 and during movement of irradiated fuel assemblies in either the reactor building or fuel handling area, provide assurance that:

- a. Required features to provide adequate decay heat removal are available for the irradiated fuel assemblies in the core;
- b. Required features needed to mitigate a fuel handling accident in either the reactor building or fuel handling area are available;
- c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and
- d. Instrumentation and control capability is available for monitoring and maintaining the unit in MODE 5 or 6.

The DC electrical power requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.4.

ACTIONS

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO would not specify an action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Entering LCO 3.0.3, while in MODE 1, 2, 3, or 4 would require the unit to be shutdown unnecessarily.

ACTIONS (continued)

A.1

Condition A represents one subsystem with the required battery charger inoperable (e.g., the voltage limit of SR 3.8.4.1 is not maintained). The ACTION provides a 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 aligning a fully qualified swing charger to the associated DC subsystem. Restoring the battery terminal voltage to greater than or equal to the minimum established float voltage provides confidence that, within 12 hours, 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 (the second part) of its recharge cycle. The time to return a battery to its fully charged state under this condition is simply a function of the amount of the previous discharge and the recharge characteristic of the battery. Thus there is good assurance of fully recharging the battery within 12 hours

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. 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.

BA.1.1, BA.1.2, BA.1.3, BA.1.4, and BA.1.5

With the required DC electrical subsystem inoperable (e.g., inoperable battery, no OPERABLE battery charger, or both) there may be insufficient capability to mitigate the consequences of a fuel handling accident. Therefore, conservative actions must be taken (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies in both the reactor building and the fuel handling area, and operations involving positive reactivity additions that could result in loss of required SDM (MODE 5) or boron concentration (MODE 6)). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than that which would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

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

ACTIONS (continued)

B.1.1, B.1.2, B.1.3, B.1.4, and B.1.5 (continued)

Notwithstanding performance of the above conservative Required Actions, a required low temperature overpressure protection (LTOP) System feature may be inoperable. In this case, Required Actions A.1.1 through A.1.4 do not adequately address the concerns relating to LTOP. Pursuant to LCO 3.0.6, the LTOP ACTIONS would not be entered. Therefore, Required Action A.1.5 is provided to direct entry into the appropriate LTOP Conditions and Required Actions, which results in taking the appropriate LTOP actions.

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

SURVEILLANCE REQUIREMENTS

SR 3.8.5.1

SR 3.8.5.1 requires the DC Sources to be capable of meeting the requirements of SR 3.8.4.1 through SR 3.8.4.3.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DC source from being discharged below its capability to provide the required power supply or otherwise rendered inoperable during the performance of SRs. It is the intent that these SRs must still be capable of being met, but actual performance is not required during periods when the DC Source is required to be OPERABLE. Refer to the corresponding Bases for LCO 3.8.4 for discussion of each SR.

When the Note is considered, SR 3.8.5.1 requires the following for an OPERABLE DC Source:

- SR 3.8.4.1 must be performed and met,
- SR 3.8.4.2 must be met, but does not have to be performed, and
- SR 3.8.4.3 must be met, but does not have to be performed.

As an example, typical operation during a refueling shutdown (in MODES 5 and 6) requires only one OPERABLE battery. However, the SRs with an 18-month Frequency which are not required to be performed on the OPERABLE battery should be conducted on each battery during that portion of the refueling shutdown that it is not required to be OPERABLE so that the SRs are current when it is time to enter MODES 1, 2, 3, and 4. This is to allow continued OPERABILITY of the battery during MODES 5 and 6 even if the Frequency for SR 3.8.4.2 or SR 3.8.4.3 is not met.

REFERENCES

1. 10 CFR 50.36

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.6 Battery ~~Cell~~ Parameters

BASES

BACKGROUND

This LCO delineates the limits on [battery float current as well as](#) electrolyte temperature, level, [and float voltage](#) ~~and specific gravity~~ for the DC power ~~subsystem~~ [source](#) 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." [In addition to the limitations of this Specification, the licensee controlled program also implements a program specified in Specification 5.5.6 for monitoring various battery parameters.](#)

[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 2.063 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 2.063\$ Vpc, the battery cell will maintain its capacity for 180 days without further charging per manufacturer's instructions. Optimal long term performance however, is obtained by maintaining a float voltage 2.20 to 2.25 Vpc. This provides adequate over-potential which limits the formation of lead sulfate and self discharge. The nominal float voltage of 2.22 Vpc corresponds to a total float voltage output of 128.8 V for a 58 cell battery.](#)

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the SAR, Chapter 14 (Ref. 1), assume Engineered Safeguards 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 at least one [subsystem](#) ~~train~~ of DC sources OPERABLE during accident conditions that consider:

- a. An assumed loss of all offsite AC power or all onsite AC power; and
- b. A worst-case single failure.

Battery ~~cell~~ parameters satisfy Criterion 3 of 10 CFR 50.36 (Ref. 2).

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 abnormality or a postulated DBA. The limits are conservatively established, allowing continued DC electrical system function even with ~~Category A and B~~ limits not met. Additional preventative maintenance, testing, and monitoring performed in accordance with the licensee controlled program is conducted as specified in Specification 5.5.6.

APPLICABILITY

The battery ~~cell~~ parameters are required solely for the support of the associated DC electrical power subsystems. Therefore, battery ~~cell~~ parameters are only required to be within limits when the DC power source is required to be OPERABLE. See the Applicability discussion in Bases for LCO 3.8.4 and LCO 3.8.5.

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 subsystem. Complying with the Required Actions for one inoperable DC subsystem may allow for continued operation, and subsequent inoperable DC subsystem(s) are governed by separate Condition entry and application of associated Required Actions.

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

With one or more cells in one or more batteries in one subsystem < 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 cells in one or more batteries < 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. With one or more cells in one or more batteries not within 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 in the accompanying LCO, the battery is degraded but there still is 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 electrolyte level and float voltage are required to be verified to meet the Category C limits within 1 hour (Required Action A.1). These checks will provide a quick representative 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. 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 within the Category A and B limits, the battery will still be capable of performing its intended function. A period of 24 hours is allowed to complete the initial verification because parameter 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 considered reasonable. The verification is repeated at 7 day intervals until the parameters are restored to within Category A and B limits. This periodic verification is consistent with the increased potential to exceed these battery cell parameter limits during these conditions.~~

ACTIONS (continued)

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

~~Continued operation is only permitted for 31 days before battery cell parameters must be restored to within Category A and B limits. With the 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 prior to declaring the battery inoperable.~~

B.1 and B.2

One or more batteries in one subsystem 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. Condition A addresses 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, the associated "OR" statement in Condition F 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 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. With one or more batteries with one or more battery cell parameters outside the Category C limit for any connected cell, sufficient capacity to supply the maximum expected load requirement may not be available. Therefore, the battery must be immediately declared inoperable and the corresponding DC electrical power subsystem must be declared inoperable. Additionally, other potentially extreme conditions, such as the Required Actions and associated Completion Time of Condition A not met or average electrolyte temperature of representative cell falling below 60°F, are also cause for immediately declaring the associated DC electrical power subsystem inoperable.

A discharged battery with float voltage (the charger setpoint) across its terminals indicates that the battery is on the exponential charging current portion (the second part) of its recharge cycle. The time to return a battery to its fully charged state under this condition is simply a function of the amount of the previous discharge and the recharge characteristic of the battery. Thus there is good assurance of fully recharging the battery within 12 hours, 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 still greater than 2.07 V and float voltage is found to be satisfactory, this is not indication of a substantially discharged battery and 12 hours is a reasonable time prior to declaring the battery inoperable.

Since Required Action B.1 only specifies "perform," a failure of SR 3.8.4.1 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, C.2, and C.3

With one or more batteries in one subsystem 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.

ACTIONS (continued)

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

With electrolyte level below the top of the plates there is a potential for dryout and plate degradation. Required Actions C.1 and C.2 address this potential (as well as provisions in Specification 5.5.6, 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 and within 12 hours a visual inspection to verify no leakage is performed. Specification 5.5.6.b.3 initiates action to equalize and test in accordance with manufacturer's recommendation following restoration of the electrolyte level to above the top of the plates. Based on the results of the manufacturer's recommended testing, the battery may have to be declared inoperable and the affected cell[s] replaced.

D.1

With one or more batteries in one subsystem 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.

E.1

With one or more batteries in redundant subsystems 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 subsystem within 2 hours.

F.1

With one or more batteries with any battery parameter outside the allowances of the Required Actions for Condition A, B, C, D, or E, sufficient capacity to supply the maximum expected load requirement is not assured and the corresponding battery must be declared inoperable. Additionally, discovering one or more batteries in one subsystem 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.

SURVEILLANCE REQUIREMENTS

SR 3.8.6.1

This SR verifies that 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 and temperature of pilot cells. 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 equipment used to monitor float current must have the necessary accuracy and capability to measure electrical currents in the expected range. The float current requirements are based on the float current indicative of a charged battery. The 7-day Frequency is consistent with IEEE-450 (Ref. 3).

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 3.8.6.54

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 127.6 V at the battery terminals, or 2.20 Vpc. This provides adequate over-potential, which limits the formation of lead sulfate and self discharge, which could eventually render the battery inoperable. Float voltages in this range or less, but greater than 2.07 Vpc, are addressed in Specification 5.5.17. 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 of 2.07 V. 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. 3).~~This Surveillance verification that the average temperature of representative cells is $\geq 60^{\circ}\text{F}$ is consistent with a recommendation of IEEE-450 (Ref. 3), which states that the temperature of electrolytes in the pilot cell should be determined at least once per month and that the temperature in representative cells (~10% of all connected cells) should be determined on a quarterly basis.~~

~~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 recommendations.~~

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 minimum design electrolyte level is the minimum level indication mark on the battery cell jar. The Frequency is consistent with IEEE-450 (Ref. 3).

~~The quarterly inspection of specific gravity and voltage is consistent with IEEE-450 (Ref. 3). In addition, within 24 hours of a battery discharge $< 110\text{ V}$ or a battery overcharge $> 145\text{ V}$, the battery must be demonstrated to meet Category B limits. Transients, such as motor starting transients, which may momentarily cause battery voltage to drop to $\leq 110\text{ V}$, do not constitute a battery discharge provided 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.~~

SR 3.8.6.4

This Surveillance verifies that the pilot cell temperature is greater than or equal to the minimum established design limit (i.e., 60°F). Pilot cell electrolyte temperature is maintained above this temperature to assure the battery can provide the required current and voltage to meet the design requirements. Temperatures lower than assumed in battery sizing calculations act to inhibit or reduce battery capacity. The Frequency is consistent with IEEE-450 (Ref. 3).

SR 3.8.6.6

A battery performance discharge test is a test of constant current capacity of a battery 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.
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 designated pilot cell in each battery. The cells selected as pilot cells are those whose temperature, voltage and electrolyte specific gravity approximate the state of charge of the entire battery.

The Category A limits specified for electrolyte level are based on manufacturer recommendations and are consistent with the guidance in IEEE 450 (Ref. 3), with the extra 1/4 inch allowance above the high water level indication for operating margin to account for temperatures and charge effects. In addition to this allowance, footnote (a) to Table 3.8.6-1 permits the electrolyte level to be above the specified maximum level during equalizing charge, 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 ≥ 2.13 V per cell. This value is based on a recommendation of IEEE 450 (Ref. 3), which states that prolonged operation of cells < 2.13 V can reduce the life expectancy of cells.

The Category A limit specified for specific gravity for each pilot cell is ≥ 1.195 (0.020 below the manufacturer fully charged nominal specific gravity). 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. 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.

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 ≥ 1.190 (0.025 below the manufacturer fully charged, nominal specific gravity) with the average of all connected cells > 1.195 (0.020 below the manufacturer fully charged, nominal specific gravity). These values are based on manufacturer's recommendations. The minimum specific gravity value required for each cell ensures that the effects of a highly charged or newly installed cell will not mask overall degradation of the battery.

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 limits specified for electrolyte level (above the top of the plates and not overflowing) ensure that the plates suffer no physical damage and maintain adequate electron

~~transfer capability. The Category C limits for float 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 limits of average specific gravity ≥ 1.190 is based on manufacturer recommendations (0.025 below the manufacturer 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 less than 0.020 below the average of all connected cells. This limit ensures that the effect of a highly charged or new cell does not mask overall degradation of the battery.~~

~~Footnotes (b) and (c) to Table 3.8.6-1 are applicable to Category A, B, and C specific gravity. Footnote (b) to Table 3.8.6-1 requires the above mentioned correction for electrolyte 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 charger current is an acceptable alternative to specific gravity measurement for determining the state of charge. This phenomenon is discussed in IEEE 450 (Ref. 3). Footnote (c) to Table 3.8.6-1 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.~~

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.6.6 (continued)

A battery modified performance discharge test is described in the Bases for SR 3.8.4.3. 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 3.8.4.3.

The acceptance criteria for this Surveillance are consistent with IEEE-450 (Ref. 3), which recommends that the battery be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements. Furthermore, the battery is sized to meet the assumed duty cycle loads when the battery design capacity reaches this 80% limit.

The Surveillance Frequency for this test is normally 60 months. If the battery shows degradation, or if the battery has reached 85% of its expected life and capacity is $< 100\%$ of the manufacturer's rating, the Surveillance Frequency is reduced to 12 months. However, if the battery shows no degradation but has reached 85% of its expected life, the Surveillance Frequency is only reduced to 24 months for batteries that retain capacity $\geq 100\%$ of the manufacturer's ratings. Degradation is indicated, according to IEEE-450 (Ref. 3), 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. These Frequencies are consistent with the recommendations in IEEE-450 (Ref. 3).

REFERENCES

1. SAR, Chapters [8 and 14](#).
 2. 10 CFR 50.36.
 3. IEEE-450-1995, "Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications."
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Attachment 5 to

1CAN011304

Revised (clean) Technical Specification Pages

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources - Operating

LCO 3.8.4 Both DC electrical power subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One DC electrical power subsystem inoperable.	A.1 Restore DC electrical power subsystem to OPERABLE status.	8 hours
B. Required Action and Associated Completion Time not met.	B.1 Be in MODE 3.	12 hours
	<u>AND</u> B.2 Be in MODE 5.	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.	7 days
SR 3.8.4.2 Verify each battery charger supplies ≥ 300 amps at greater than or equal to the minimum established float voltage for ≥ 8 hours. <u>OR</u> Verify each battery charger can recharge the battery to the fully charged state within 24 hours while supplying the largest combined demands of the various continuous steady state loads, after a battery discharge to the bounding design basis event discharge state.	18 months

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.3	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 or a modified performance discharge test.	18 months

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources - Shutdown

LCO 3.8.5 The DC electrical power subsystem shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems – Shutdown."

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

-----NOTE-----
LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>A. Required battery charger on one subsystem inoperable.</p> <p><u>AND</u></p> <p>The redundant subsystem battery and charger are OPERABLE.</p>	<p>A.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage.</p>	<p>2 hours</p>
<p>B. One or more required DC electrical power subsystems inoperable for reasons other than Condition A.</p> <p><u>OR</u></p> <p>Required Action and associated Completion Time of Condition A not met.</p>	<p>B.1.1 Suspend CORE ALTERATIONS.</p> <p><u>AND</u></p> <p>B.1.2 Suspend movement of irradiated fuel assemblies.</p> <p><u>AND</u></p> <p>B.1.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.</p> <p><u>AND</u></p>	<p>Immediately</p> <p>Immediately</p> <p>Immediately</p>

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.1.4 Initiate action to restore required DC electrical power subsystems to OPERABLE status.	Immediately
	<p><u>AND</u></p> <p>B.1.5 Enter applicable Conditions and Required Actions of LCO 3.4.11, "Low Temperature Overpressure Protection (LTOP) System," for LTOP features made inoperable by Condition B.</p>	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.5.1 -----NOTE-----</p> <p>The following SRs are not required to be performed: SR 3.8.4.2 and SR 3.8.4.3.</p> <p>-----</p> <p>For DC sources required to be OPERABLE, the following SRs are applicable:</p> <p>SR 3.8.4.1, SR 3.8.4.2, and SR 3.8.4.3.</p>	<p>In accordance with applicable SRs</p>

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Parameters

LCO 3.8.6 Battery parameters for the Train A and Train B electrical power subsystem 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 battery with one or more battery cells float voltage < 2.07 V.	A.1 Perform SR 3.8.4.1.	2 hours
	<u>AND</u>	
	A.2 Perform SR 3.8.6.1.	2 hours
	<u>AND</u>	
	A.3 Restore affected cell voltage ≥ 2.07 V.	24 hours
B. One battery with float current > 2 amps.	B.1 Perform SR 3.8.4.1	2 hours
	<u>AND</u>	
	B.2 Restore battery float current to ≤ 2 amps.	12 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>-----NOTE----- Required Action C.2 shall be completed if electrolyte level was below the top of the plates. -----</p> <p>C. One battery with one or more cells electrolyte level less than minimum established design limits.</p>	<p>-----NOTE----- Required Actions C.1 and C.2 are only applicable if electrolyte level was below the top of the plates. -----</p> <p>C.1 Restore electrolyte level to above top of plates.</p> <p><u>AND</u></p> <p>C.2 Verify no evidence of leakage.</p> <p><u>AND</u></p> <p>C.3 Restore electrolyte level to greater than or equal to minimum established design limits.</p>	<p>8 hours</p> <p>12 hours</p> <p>31 days</p>
<p>D. One battery with pilot cell electrolyte temperature less than minimum established design limits.</p>	<p>D.1 Restore battery pilot cell temperature to greater than or equal to minimum established design limits.</p>	<p>12 hours</p>
<p>E. Two batteries with battery parameters not within limits.</p>	<p>E.1 Restore at least one battery to within limits.</p>	<p>2 hours</p>
<p>F. Required Actions and associated Completion Times of Condition A, B, C, D, or E not met.</p> <p><u>OR</u></p> <p>One battery with one or more battery cells float voltage < 2.07 V and float current > 2 amps.</p>	<p>F.1 Declare associated battery inoperable.</p>	<p>Immediately</p>

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>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.</p>	7 days
SR 3.8.6.2 Verify each battery pilot cell float 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 float voltage is ≥ 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.	<p>60 months</p> <p><u>AND</u></p> <p>12 months when battery shows degradation, or has reached 85% of the expected life with capacity < 100% of manufacturer's rating</p> <p><u>AND</u></p> <p>24 months when battery has reached 85% of the expected life with capacity $\geq 100\%$ of manufacturer's rating</p>

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.6 Battery Monitoring and Maintenance Program

This Program provides controls for battery restoration and maintenance. The program shall be in accordance with IEEE Standard (Std) 450-2002, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications," as endorsed by Regulatory Guide 1.129, Revision 2 (RG), with RG exceptions and program provisions as identified below:

- a. The program allows the following RG 1.129, Revision 2 exceptions:
 1. Battery temperature correction may be performed before or after conducting discharge tests.
 2. RG 1.129, Regulatory Position 1, Subsection 2, "References," is not applicable to this program.
 3. In lieu of RG 1.129, Regulatory Position 2, Subsection 5.2, "Inspections," the following shall be used: "Where reference is made to the pilot cell, pilot cell selection shall be based on the lowest voltage cell in the battery."
 4. In Regulatory Guide 1.129, Regulatory Position 3, Subsection 5.4.1, "State of Charge Indicator," the following statements in paragraph (d) may be omitted: "When it has been recorded that the charging current has stabilized at the charging voltage for three consecutive hourly measurements, the battery is near full charge. These measurements shall be made after the initially high charging current decreases sharply and the battery voltage rises to approach the charger output voltage."
 5. In lieu of RG 1.129, Regulatory Position 7, Subsection 7.6, "Restoration", the following may be used: "Following the test, record the float voltage of each cell of the string."
- b. The program shall include the following provisions:
 1. Actions to restore battery cells with float voltage < 2.13 V;
 2. Actions to determine whether the float voltage of the remaining battery cells is ≥ 2.13 V when the float voltage of a battery cell has been found to be < 2.13 V;
 3. Actions to equalize and test battery cells that had been discovered with electrolyte level below the top of the plates;
 4. Limits on average electrolyte temperature, battery connection resistance, and battery terminal voltage; and
 5. A requirement to obtain specific gravity readings of all cells at each discharge test, consistent with manufacturer recommendations.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.7 Reactor Coolant Pump Flywheel Inspection Program

This program shall provide for the inspection of each reactor coolant pump flywheel. Surface and volumetric examination of the reactor coolant pump flywheels will be conducted coincident with refueling or maintenance shutdowns such that during 10 year intervals all four reactor coolant pump flywheels will be examined. Such examinations will be performed to the extent possible through the access ports, i.e., those areas of the flywheel accessible without motor disassembly. The surface and volumetric examination may be accomplished by Acoustic Emission Examination as an initial examination method. Should the results of the Acoustic Emission Examination indicate that additional examination is necessary to ensure the structural integrity of the flywheel, then other appropriate NDE methods will be performed on the area of concern.

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the Reactor Coolant Pump Flywheel Inspection Program inspection frequencies.

5.5.8 Inservice Testing Program

This program provides controls for inservice testing of ASME Code Class 1, 2, and 3 components. The program shall include the following:

- a. Testing frequencies applicable to the ASME Code For Operation and Maintenance (OM) of Nuclear Power Plants and applicable Addenda as follows:

<u>ASME OM Code terminology for inservice testing activities</u>	<u>Required Frequencies for performing inservice testing activities</u>
Monthly	At least once per 31 days
Every 6 weeks	At least once per 42 days
Quarterly or every 3 months	At least once per 92 days
Semiannually or every 6 months	At least once per 184 days
Every 9 months	At least once per 276 days
Yearly or annually	At least once per 366 days
Biennially or every 2 years	At least once per 731 days

- b. The provisions of SR 3.0.2 are applicable to the above required Frequencies and to other normal and accelerated Frequencies specified as 2 years or less in the Inservice Testing Program for performing inservice testing activities;
- c. The provisions of SR 3.0.3 are applicable to inservice testing activities; and
- d. Nothing in the ASME OM Code shall be construed to supersede the requirements of any TS.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Program

A Steam Generator Program shall be established and implemented to ensure that SG tube integrity is maintained. In addition, the Steam Generator Program shall include the following provisions:

- a. Provisions for condition monitoring assessments. Condition monitoring assessment means an evaluation of the “as found” condition of the tubing with respect to the performance criteria for structural integrity and accident induced leakage. The “as found” condition refers to the condition of the tubing during an SG inspection outage, as determined from the inservice inspection results or by other means, prior to the plugging of tubes. Condition monitoring assessments shall be conducted during each outage during which the SG tubes are inspected or plugged to confirm that the performance criteria are being met.
- b. Performance criteria for SG tube integrity. SG tube integrity shall be maintained by meeting the performance criteria for tube structural integrity, accident induced leakage, and operational LEAKAGE.
 1. Structural integrity performance criterion: All in-service steam generator tubes shall retain structural integrity over the full range of normal operating conditions (including startup, operation in the power range, hot standby, and cool down and all anticipated transients included in the design specification) and design basis accidents. This includes retaining a safety factor of 3.0 against burst under normal steady state full power operation primary to secondary pressure differential and a safety factor of 1.4 against burst applied to the design basis accident primary to secondary pressure differentials. Apart from the above requirements, additional loading conditions associated with the design basis accidents, or combination of accidents in accordance with the design and licensing basis, shall also be evaluated to determine if the associated loads contribute significantly to burst or collapse. In the assessment of tube integrity, those loads that do significantly affect burst or collapse shall be determined and assessed in combination with the loads due to pressure with a safety factor of 1.2 on the combined primary loads and 1.0 on axial secondary loads.
 2. Accident induced leakage performance criterion: The primary to secondary accident induced leakage rate for any design basis accident, other than a SG tube rupture, shall not exceed the leakage rate assumed in the accident analysis in terms of total leakage rate for all SGs and leakage rate for an individual SG. Leakage is not to exceed 1 gpm.
 3. The operational LEAKAGE performance criterion is specified in LCO 3.4.13, “RCS Operational LEAKAGE.”

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- c. Provisions for SG tube repair criteria. Tubes found by inservice inspection to contain flaws with a depth equal to or exceeding 40% of the nominal tube wall thickness shall be plugged.
- d. Provisions for SG tube inspections. Periodic SG tube inspections shall be performed. The number and portions of the tubes inspected and methods of inspection shall be performed with the objective of detecting flaws of any type (e.g., volumetric flaws, axial and circumferential cracks) that may be present along the length of the tube, from the tube-to-tubesheet weld at the tube inlet to the tube-to-tubesheet weld at the tube outlet, and that may satisfy the applicable tube repair criteria. The tube-to-tubesheet weld is not part of the tube. In addition to meeting the requirements of d.1, d.2, and d.3 below, the inspection scope, inspection methods, and inspection intervals shall be such as to ensure that SG tube integrity is maintained until the next SG inspection. An assessment of degradation shall be performed to determine the type and location of flaws to which the tubes may be susceptible and, based on this assessment, to determine which inspection methods need to be employed and at what locations.
 - 1. Inspect 100% of the tubes in each SG during the first refueling outage following SG replacement.
 - 2. Inspect 100% of the tubes at sequential periods of 144, 108, 72, and, thereafter, 60 effective full power months. The first sequential period shall be considered to begin after the first inservice inspection of the SGs. In addition, inspect 50% of the tubes by the refueling outage nearest the midpoint of the period and the remaining 50% by the refueling outage nearest the end of the period. No SG shall operate for more than 72 effective full power months or three refueling outages (whichever is less) without being inspected.
 - 3. If crack indications are found in any SG tube, then the next inspection for each SG for the degradation mechanism that caused the crack indication shall not exceed 24 effective full power months or one refueling outage (whichever is less). If definitive information, such as from examination of a pulled tube, diagnostic non-destructive testing, or engineering evaluation indicates that a crack-like indication is not associated with a crack(s), then the indication need not be treated as a crack.
- e. Provisions for monitoring operational primary to secondary LEAKAGE.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.10 Secondary Water Chemistry

This program provides controls for monitoring secondary water chemistry to inhibit SG tube degradation. The program shall include:

- a. Identification of a sampling schedule for the critical variables and control points for these variables;
- b. Identification of the procedures used to measure the values of the critical variables;
- c. Identification of process sampling points;
- d. Procedures for the recording and management of data;
- e. Procedures defining corrective actions for all off control point chemistry conditions; and
- f. A procedure identifying the authority responsible for the interpretation of the data and the sequence and timing of administrative events required to initiate corrective action.

5.5.11 Ventilation Filter Testing Program (VFTP)

A program shall be established to implement the following required testing of Engineered Safeguards (ES) ventilation systems filters at the frequencies specified in Regulatory Guide 1.52, Revision 2. The VFTP is applicable to the Penetration Room Ventilation System (PRVS) and the Control Room Emergency Ventilation System (CREVS).

- a. Demonstrate that an in-place cold DOP test of the high efficiency particulate (HEPA) filters shows:
 1. $\geq 99\%$ DOP removal for the PRVS when tested at the system design flowrate of $1800 \text{ scfm} \pm 10\%$; and
 2. $\geq 99.95\%$ DOP removal for the CREVS when tested in accordance with Regulatory Guide 1.52, Revision 2, at the system design flowrate of $2000 \text{ cfm} \pm 10\%$.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

- b. Demonstrate that an in-place halogenated hydrocarbon test of the charcoal adsorbers shows:
 - 1. $\geq 99\%$ halogenated hydrocarbon removal for the PRVS when tested at the system design flowrate of $1800 \text{ cfm} \pm 10\%$; and
 - 2. $\geq 99.95\%$ halogenated hydrocarbon removal for the CREVS when tested in accordance with Regulatory Guide 1.52, Revision 2, at the system design flowrate of $2000 \text{ cfm} \pm 10\%$.
- c. Demonstrate that a laboratory test of a sample of the charcoal adsorber meets the laboratory testing criteria of ASTM D3803-1989 when tested at 30°C and 95% relative humidity for a methyl iodide penetration of:
 - 1. $< 5\%$ for the PRVS;
 - 2. when obtained as described in Regulatory Guide 1.52, Revision 2, for CREVS
 - i. $\leq 2.5\%$ for 2 inch charcoal adsorber beds; and
 - ii. $\leq 0.5\%$ for 4 inch charcoal adsorber beds.
- d. Demonstrate for the PRVS and CREVS, that the pressure drop across the combined HEPA filters, other filters in the system, and the charcoal adsorbers is < 6 inches of water when tested at the following system design flowrates $\pm 10\%$:

PRVS	1800 cfm
CREVS	2000 cfm

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the VFTP test frequencies.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.12 Explosive Gas and Storage Tank Radioactivity Monitoring Program

This program provides controls for potentially explosive gas mixtures contained in the Waste Gas System, the quantity of radioactivity contained in gas storage tanks, and the quantity of radioactivity contained in unprotected temporary outdoor liquid storage tanks. The gaseous radioactivity quantities shall be determined following the methodology in Branch Technical Position (BTP) ETSB 11-5, "Postulated Radioactive Release due to Waste Gas System Leak or Failure." The liquid radwaste quantities shall be determined in accordance with the ODCM.

The program shall include:

- a. The limits for concentrations of hydrogen and oxygen in the Waste Gas System and a surveillance program to ensure the limits are maintained. Such limits shall be appropriate to the system's design criteria (i.e., whether or not the system is designed to withstand a hydrogen explosion);
- b. A surveillance program to ensure that the quantity of radioactivity contained in each gas storage tank is less than the amount that would result in a whole body exposure of ≥ 0.5 rem to any individual in an unrestricted area, in the event of an uncontrolled release of the tanks' contents;
- c. A surveillance program to ensure that the quantity of radioactivity contained in all temporary outdoor liquid radwaste tanks: 1) that are not surrounded by liners, dikes, or walls, capable of holding the tanks' contents; and 2) that do not have tank overflows and surrounding area drains connected to the Liquid Radwaste Treatment System is less than the amount that would result in concentrations equal to the limits of 10 CFR 20, Appendix B, Table 2, Column 2, at the nearest potable water supply and the nearest surface water supply in an unrestricted area, in the event of an uncontrolled release of the tanks' contents.

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the Explosive Gas and Storage Tank Radioactivity Monitoring Program surveillance frequencies.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.13 Diesel Fuel Oil Testing Program

A diesel fuel oil testing program to implement required testing of both new fuel oil and stored fuel oil shall be established. The program shall include sampling and testing requirements, and acceptance criteria, all in accordance with applicable ASTM Standards. The purpose of the program is to establish the following:

- a. Acceptability of new fuel oil for use prior to addition to storage tanks by determining that the fuel oil has:
 1. an API gravity or an absolute specific gravity within limits,
 2. a flash point and kinematic viscosity within limits for ASTM 2D fuel oil, and
 3. water and sediment within limits;
- b. Within 31 days following addition of new fuel oil to storage tanks, verify that the properties of the new fuel oil, other than those addressed in a. above, are within limits for ASTM 2D fuel oil;
- c. Total particulate concentration of the fuel oil is ≤ 10 mg/l when tested every 31 days based on ASTM D-2276, Method A-2 or A-3; and
- d. The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the Diesel Fuel Oil Testing Program surveillance Frequencies.

5.5.14 Technical Specifications (TS) Bases Control Program

This program provides a means for processing changes to the Bases of these Technical Specifications.

- a. Changes to the Bases of the TS shall be made under appropriate administrative controls and reviews.
- b. Licensees may make changes to Bases without prior NRC approval provided the changes do not involve either of the following:
 1. A change in the TS incorporated in the license; or
 2. A change to the updated SAR or Bases that requires NRC approval pursuant to 10 CFR 50.59.

Proposed changes that do meet these criteria shall be reviewed and approved by the NRC prior to implementation. Changes to the Bases implemented without prior NRC approval shall be provided to the NRC on a frequency consistent with 10 CFR 50.71(e).

- c. The Bases Control Program shall contain provisions to ensure that the Bases are maintained consistent with the SAR.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.15 Safety Function Determination Program (SFDP)

This program ensures loss of safety function is detected and appropriate actions taken. Upon entry into LCO 3.0.6, an evaluation shall be made to determine if loss of safety function exists. Additionally, other appropriate limitations and remedial or compensatory actions may be identified to be taken as a result of the support system inoperability and corresponding exception to entering supported system Condition and Required Actions. This program implements the requirements of LCO 3.0.6. The SFDP shall contain the following:

- a. Provisions for cross train checks to ensure a loss of the capability to perform the safety function assumed in the accident analysis does not go undetected;
- b. Provisions for ensuring the plant is maintained in a safe condition if a loss of function condition exists;
- c. Provisions to ensure that an inoperable supported system's Completion Time is not inappropriately extended as a result of multiple support system inoperabilities; and
- d. Other appropriate limitations and remedial or compensatory actions.

A loss of safety function exists when, assuming no concurrent single failure, and assuming no concurrent loss of offsite power or loss of onsite diesel generator(s), a safety function assumed in the accident analysis cannot be performed. For the purpose of this program, a loss of safety function may exist when a support system is inoperable, and:

- a. A required system redundant to the system(s) supported by the inoperable support system is also inoperable; or
- b. A required system redundant to the system(s) in turn supported by the inoperable supported system is also inoperable; or
- c. A required system redundant to the support system(s) for the supported systems (a) and (b) above is also inoperable.

The SFDP identifies where a loss of safety function exists. If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.16 Reactor Building Leakage Rate Testing Program

A program shall be established to implement the leakage rate testing of the reactor building as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995, except that the next Type A test performed after the April 16, 1992 Type A test shall be performed no later than April 15, 2007.

In addition, the reactor building purge supply and exhaust isolation valves shall be leakage rate tested once prior to entering MODE 4 from MODE 5 if not performed within the previous 92 days.

The peak calculated reactor building internal pressure for the design basis loss of coolant accident, P_a , is 54 psig.

The maximum allowable reactor building leakage rate, L_a , shall be 0.20% of containment air weight per day at P_a .

Leakage rate acceptance criteria are:

- a. Reactor Building leakage rate acceptance criteria is $\leq 1.0 L_a$. During the first unit startup following each test performed in accordance with this program, the leakage rate acceptance criteria are $< 0.60 L_a$ for the Type B and Type C tests and $< 0.75 L_a$ for Type A tests.
- b. Air lock testing acceptance criteria are:
 1. Overall air lock leakage rate is $\leq 0.05 L_a$ when tested at $\geq P_a$;
 2. For each door, leakage rate is $\leq 0.01 L_a$ when tested at ≥ 10 psig.

The provisions of SR 3.0.2 do not apply to the test frequencies specified in the Reactor Building Leakage Rate Testing Program.

The provisions of SR 3.0.3 are applicable to the Reactor Building Leakage Rate Testing Program.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

5.5.17 Metamic Coupon Sampling Program

A coupon surveillance program will be implemented to maintain surveillance of the Metamic absorber material under the radiation, chemical, and thermal environment of the SFP. The purpose of the program is to establish the following:

- Coupons will be examined on a two year basis for the first three intervals with the first coupon retrieved for inspection being on or before February 2009 and thereafter at increasing intervals over the service life of the inserts.
 - Measurements to be performed at each inspection will be as follows:
 - A) Physical observations of the surface appearance to detect pitting, swelling or other degradation,
 - B) Length, width, and thickness measurements to monitor for bulging and swelling
 - C) Weight and density to monitor for material loss, and
 - D) Neutron attenuation to confirm the B-10 concentration or destructive chemical testing to determine the boron content.
 - The provisions of SR 3.0.2 are applicable to the Metamic Coupon Sampling Program.
 - The provisions of SR 3.0.3 are not applicable to the Metamic Coupon Sampling Program.
-

5.0 ADMINISTRATIVE CONTROLS

5.6 Reporting Requirements

5.6.1 DELETED

5.6.2 Annual Radiological Environmental Operating Report

-----NOTE-----

A single submittal may be made for ANO. The submittal should combine sections common to both units.

The Annual Radiological Environmental Operating Report covering the operation of the unit during the previous calendar year shall be submitted by May 15 of each year. The report shall include summaries, interpretations, and analyses of trends of the results of the radiological environmental monitoring program for the reporting period. The material provided shall be consistent with the objectives outlined in the Offsite Dose Calculation Manual (ODCM), and in 10 CFR 50, Appendix I, Sections IV.B.2, IV.B.3, and IV.C.

5.6.2 Annual Radiological Environmental Operating Report (continued)

The Annual Radiological Environmental Operating Report shall include the results of analyses of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in the table and figures in the ODCM, as well as summarized and tabulated results of these analyses and measurements. In the event that some individual results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted in a supplementary report as soon as possible.

5.6.3 Radioactive Effluent Release Report

-----NOTE-----

A single submittal may be made for ANO. The submittal shall combine sections common to both units. The submittal shall specify the releases of radioactive material from each unit.

The Radioactive Effluent Release Report covering the operation of the unit in the previous year shall be submitted prior to May 1 of each year in accordance with 10 CFR 50.36a. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit. The material provided shall be consistent with the objectives outlined in the ODCM and Process Control Program and in conformance with 10 CFR 50.36a and 10 CFR Part 50, Appendix I, Section IV.B.1.

5.6.4 DELETED

5.0 ADMINISTRATIVE CONTROLS

5.6 Reporting Requirements

5.6.5 CORE OPERATING LIMITS REPORT (COLR)

- a. Core operating limits shall be established prior to each reload cycle, or prior to any remaining portion of a reload cycle, and shall be documented in the COLR for the following:

- 2.1.1 Variable Low RCS Pressure – Temperature Protective Limits
- 3.1.1 SHUTDOWN MARGIN (SDM)
- 3.1.8 PHYSICS TESTS Exceptions – MODE 1
- 3.1.9 PHYSICS TEST Exceptions - MODE 2
- 3.2.1 Regulating Rod Insertion Limits
- 3.2.2 AXIAL POWER SHAPING RODS (APSR) Insertion Limits
- 3.2.3 AXIAL POWER IMBALANCE Operating Limits
- 3.2.4 QUADRANT POWER TILT (QPT)
- 3.2.5 Power Peaking
- 3.3.1 Reactor Protection System (RPS) Instrumentation
- 3.4.1 RCS Pressure, Temperature, and Flow DNB limits
- 3.4.4 RCS Loops – MODES 1 and 2
- 3.9.1 Boron Concentration

- b. The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

Babcock & Wilcox Topical Report BAW-10179-A, “Safety Criteria and Methodology for Acceptable Cycle Reload Analyses” (the approved revision at the time the reload analyses are performed). The approved revision number shall be identified in the COLR.

Entergy Topical Report ENEAD-01-P, “Qualification of Reactor Physics Methods for the Pressurized Water Reactors of the Entergy System” (the approved revision at the time the reload analyses are performed). The approved revision number shall be identified in the COLR.

- c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling System (ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.
- d. The COLR, including any midcycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

5.0 ADMINISTRATIVE CONTROLS

5.6 Reporting Requirements

5.6.6 Reactor Building Inspection Report

Any degradation exceeding the acceptance criteria of the containment structure detected during the tests required by the Containment Inspection Program shall undergo an engineering evaluation within 60 days of the completion of the inspection surveillance. The results of the engineering evaluation shall be reported to the NRC within an additional 30 days of the time the evaluation is completed. The report shall include the cause of the condition that does not meet the acceptance criteria, the applicability of the conditions to the other unit, the acceptability of the concrete containment without repair of the item, whether or not repair or replacement is required and, if required, the extent, method, and completion date of necessary repairs, and the extent, nature, and frequency of additional examinations.

5.6.7 Steam Generator Tube Inspection Reports

A report shall be submitted within 180 days after the initial entry into MODE 4 following completion of an inspection performed in accordance with the Specification 5.5.9, Steam Generator (SG) Program. The report shall include:

- a. The scope of inspections performed on each SG,
 - b. Active degradation mechanisms found,
 - c. Nondestructive examination techniques utilized for each degradation mechanism,
 - d. Location, orientation (if linear), and measured sizes (if available) of service induced indications,
 - e. Number of tubes plugged during the inspection outage for each active degradation mechanism,
 - f. Total number and percentage of tubes plugged to date,
 - g. The results of condition monitoring, including the results of tube pulls and in-situ testing.
-

5.0 ADMINISTRATIVE CONTROLS

5.7 High Radiation Area

As provided in paragraph 20.1601(c) of 10 CFR Part 20, the following controls shall be applied to high radiation areas in place of the controls required by paragraph 20.1601(a) and (b) of 10 CFR Part 20:

5.7.1 High Radiation Areas with Dose Rates Not Exceeding 1.0 rem/hour at 30 Centimeters from the Radiation Source or from any Surface Penetrated by the Radiation

- a. Each entryway to such an area shall be barricaded and conspicuously posted as a high radiation area. Such barricades may be opened as necessary to permit entry or exit of personnel or equipment.
- b. Access to, and activities in, each such area shall be controlled by means of Radiation Work Permit (RWP), or equivalent that includes specification of radiation dose rates in the immediate work area(s) and other appropriate radiation protection equipment and measures.
- c. Individuals qualified in radiation protection procedures and personnel continuously escorted by such individuals may be exempted from the requirement for an RWP or equivalent while performing their assigned duties provided that they are otherwise following plant radiation protection procedures for entry to, exit from, and work in such areas.
- d. Each individual or group entering such an area shall possess:
 1. A radiation monitoring device that continuously displays radiation dose rates in the area; or
 2. A radiation monitoring device that continuously integrates the radiation dose rates in the area and alarms when the device's dose alarm setpoint is reached, with an appropriate alarm setpoint, or
 3. A radiation monitoring device that continuously transmits dose rate and cumulative dose information to a remote receiver monitored by radiation protection personnel responsible for controlling personnel radiation exposure within the area, or

5.0 ADMINISTRATIVE CONTROLS

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4. A self-reading dosimeter (e.g., pocket ionization chamber or electronic dosimeter) and,
 - (i) Be under the surveillance, as specified in the RWP or equivalent, while in the area, of an individual qualified in radiation protection procedures, equipped with a radiation monitoring device that continuously displays radiation dose rates in the area; who is responsible for controlling personnel exposure within the area, or
 - (ii) Be under the surveillance as specified in the RWP or equivalent, while in the area, by means of closed circuit television, of personnel qualified in radiation protection procedures, responsible for controlling personnel radiation exposure in the area, and with the means to communicate with individuals in the area who are covered by such surveillance.
- e. Except for individuals qualified in radiation protection procedures, or personnel continuously escorted by such individuals, entry into such areas shall be made only after dose rates in the area have been determined and entry personnel are knowledgeable of them. These continuously escorted personnel will receive a pre-job briefing prior to entry into such areas. This dose rate determination, knowledge, and pre-job briefing does not require documentation prior to initial entry.

5.7.2 High Radiation Areas with Dose Rates Greater than 1.0 rem/hour at 30 Centimeters from the Radiation Source or from any Surface Penetrated by the Radiation, but less than 500 rads/hour at 1 Meter from the Radiation Source or from any Surface Penetrated by the Radiation

- a. Each entryway to such an area shall be conspicuously posted as a high radiation area and shall be provided with a locked or continuously guarded door or gate that prevents unauthorized entry, and, in addition:
 1. All such door and gate keys shall be maintained under the administrative control of the shift manager, radiation protection manager, or his or her designee.
 2. Doors and gates shall remain locked except during periods of personnel or equipment entry or exit.
- b. Access to, and activities in, each such area shall be controlled by means of an RWP or equivalent that includes specification of radiation dose rates in the immediate work area(s) and other appropriate radiation protection equipment and measures.

5.0 ADMINISTRATIVE CONTROLS

5.7 High Radiation Area

- c. Individuals qualified in radiation protection procedures may be exempted from the requirement for an RWP or equivalent while performing radiation surveys in such areas provided that they are otherwise following plant radiation protection procedures for entry to, exit from, and work in such areas.
- d. Each individual or group entering such an area shall possess:
 - 1. A radiation monitoring device that continuously integrates the radiation rates in the area and alarms when the device's dose alarm setpoint is reached, with an appropriate alarm setpoint, or
 - 2. A radiation monitoring device that continuously transmits dose rate and cumulative dose information to a remote receiver monitored by radiation protection personnel responsible for controlling personnel radiation exposure within the area with the means to communicate with and control every individual in the area, or
 - 3. A self-reading dosimeter (e.g., pocket ionization chamber or electronic dosimeter) and,
 - (i) Be under the surveillance, as specified in the RWP or equivalent, while in the area, of an individual qualified in radiation protection procedures, equipped with a radiation monitoring device that continuously displays radiation dose rates in the area; who is responsible for controlling personnel exposure within the area, or
 - (ii) Be under the surveillance as specified in the RWP, or equivalent, while in the area by means of closed circuit television, or personnel qualified in radiation protection procedures responsible for controlling personnel radiation exposure in the area and with the means to communicate with individuals in the area who are covered by such surveillance.
 - 4. In those cases where options (2) and (3), above, are impractical or determined to be inconsistent with the "As Low As is Reasonably Achievable" principle, a radiation monitoring device that continuously displays radiation dose rates in the area.

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5.7 High Radiation Area

- e. Except for individuals qualified in radiation protection procedures, or personnel continuously escorted by such individuals, entry into such areas shall be made only after dose rates in the area have been determined and entry personnel are knowledgeable of them. These continuously escorted personnel will receive a pre-job briefing prior to entry into such areas. This dose rate determination, knowledge, and pre-job briefing does not require documentation prior to initial entry.
 - f. Such individual areas that are within a larger area where no enclosure exists for the purpose of locking and where no enclosure can reasonably be constructed around the individual area need not be controlled by a locked door or gate, nor continuously guarded, but shall be barricaded, conspicuously posted, and a clearly visible flashing light shall be activated at the area as a warning device.
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Attachment 6 to

1CAN011304

List of Regulatory Commitments

LIST OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
Entergy Operations, Inc. (Entergy) commits to include in a licensee-controlled program that is controlled under 10 CFR 50.59 a requirement to maintain a 2 percent design margin for the batteries which corresponds to a 2 amp float current value that is an indication that the battery is 98 percent charged.		✓	Upon implementation of the approved TS amendment
Entergy will ensure that the minimum required procedural time to measure battery float current will be 30 seconds.		✓	Upon implementation of the approved TS amendment
Entergy will revise the ANO-1 SAR to include those items described in Attachment 3 of this submittal.	✓		Upon implementation of the approved TS amendment
Entergy commits to implement Technical Bases changes consistent with the Bases in TSTF-500 in accordance with the Technical Specifications Bases Control Program.	✓		Upon implementation of the approved TS amendment