ENTERGY

Entergy Operations, Inc.
P.O. Box 31995
Jackson, MS 39286-1995
Tel 601 368 5760
Fax 601 368 5768

Jerrold G. Dewease
Vice President
Operations Support

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U. S. Nuclear Regulatory Commission
Document Control Desk
Mail Station P1-137
Washington, DC 20555

Subject: Arkansas Nuclear One - Unit 1
Docket No. 50-313
License No. DPR-51
Proposed Technical Specification Changes Revising The Battery Requirements

Gentlemen:

Attached for your review and approval are proposed Technical Specification (TS) changes revising the requirements associated with the Arkansas Nuclear One - Unit 1 (ANO-1) batteries. The changes are modeled after the battery requirements specified in NUREG 1430, "Standard Technical Specifications - Babcock and Wilcox Plants," as modified by a proposed generic change to be submitted by the Nuclear Energy Institute sponsored Technical Specifications Task Force implementing guidance contained in IEEE Std 450-1995, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications."

The changes incorporate Limiting Conditions for Operation with respect to battery cell parameters, incorporate a Battery Inspection Program to be maintained under licensee control, incorporate battery charging current as the appropriate measure of battery condition in place of specific gravity, and relocate the requirements applicable to the station switchyard battery to licensee controlled documents.

The changes contained in this submittal are considered to be cost-beneficial in nature as they will result in cost savings to ANO-1 of approximately $39,000 each year of operation due to reduced testing frequencies.

The proposed change has been evaluated in accordance with 10CFR50.91(a)(1) using criteria in 10CFR50.92(c) and it has been determined that this change involves no significant hazards considerations. The bases for these determinations are included in the attached submittal.

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Entergy Operations requests that the effective date for this change be within 30 days of approval. Although this request is neither exigent nor emergency, your prompt review is requested to allow the use of the modified performance discharge test during our next refueling outage which is currently scheduled to commence on September 17, 1996.

Very truly yours,

Jerald G. Dewease

JGD/cws
Attachments

To the best of my knowledge and belief, the statements contained in this submittal are true.

SUBSCRIBED AND SWORN TO before me, a Notary Public in and for Hinds **County and the State of Mississippi, this** 9th **day of** May**, 1996.**

Janie P. Lee

Notary Public
My Commission Expires NOTARY PUBLIC STATE OF MISSISSIPPI AT LARGE
MY COMMISSION EXPIRES: August 10, 1997
BONDED THRU HEIDEN MARCHETTI, INC.

cc: Mr. Leonard J. Callan
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

NRC Senior Resident Inspector
Arkansas Nuclear One
P.O. Box 310
London, AR 72847

Mr. George Kalman
NRR Project Manager Region IV/ANO-1 & 2
U. S. Nuclear Regulatory Commission
NRR Mail Stop 13-H-3
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Mr. Bernard Bevill
Acting Director, Division of Radiation
Control and Emergency Management
Arkansas Department of Health
4815 West Markham Street
Little Rock, AR 72205

ATTACHMENT

TO

1CAN059601

PROPOSED TECHNICAL SPECIFICATION

AND

RESPECTIVE SAFETY ANALYSES

IN THE MATTER OF AMENDING

LICENSE NO. DPR-51

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT ONE

DOCKET NO. 50-313

DESCRIPTION OF PROPOSED CHANGES

The proposed changes to the Arkansas Nuclear One - Unit 1 (ANO-1) Technical Specifications (TSs) are as follows:

- Requirements for the operability of both station batteries and one battery charger formerly specified as Specification 3.7.1.D have been revised and are now contained in Specification 3.7.3.
- Requirements for the control power sources to the switchyard distribution system formerly specified by Specification 3.7.1.E have been relocated under licensee control.
- Actions, formerly specified by Specification 3.7.2.E, associated with inoperable battery chargers have been revised and are now contained in Specification 3.7.3.A.
- Actions, formerly specified by Specification 3.7.2.F, associated with inoperability of the station batteries have been revised and are now contained in Specification 3.7.3.A.
- Actions, formerly specified by Specification 3.7.2.G, associated with inoperable switchyard distribution system control power sources have been relocated under licensee control.
- Specification 3.7.3 has been incorporated to specify the requirements for operability of the DC electrical power subsystem. Specification 3.7.3.A provides the required actions in the event the requirements of Specification 3.7.3 are not met.
- Specification 3.7.4 has been incorporated to specify the requirements for battery parameter limits required for battery operability. Required Actions in the event Specification 3.7.4 is not met, are specified as Specification 3.7.4.A through 3.7.4.D.
- Specification 4.6.2 has been revised. This specification now provides the Surveillance Requirements associated with the DC electrical subsystems and the battery parameters. Switchyard battery Surveillance Requirements have been relocated under licensee control.
- Specification 4.6.2.1 has been revised to specify a check of the battery terminal voltage once each 31 days.
- Specification 4.6.2.2 has been revised to specify the performance of either a battery service test or a modified performance discharge test every 18 months.
- Specification 4.6.2.3 has been revised to require a performance discharge test or a modified performance discharge test every 60 months, and once every 18 months if the battery shows signs of degradation or has reached 85% of its expected life.
- Specification 4.6.2.5 has been added to require verification that the battery parameters are within the limits contained in the battery inspection program. This is a new requirement, not formerly specified.
- Specification 4.6.2.6 has been added to require verification of the average electrolyte temperature of representative cells once every 92 days. This requirement was formerly contained in Specification 4.6.2.2.

- Specification 4.6.2.7 has been added to require verification of the battery float charging current once every 31 days. This requirement is incorporated in place of the requirement formerly contained in Specification 4.6.2.1 to measure and record the specific gravity of the pilot cell daily, and the requirement formerly contained in Specification 4.6.2.2 to measure the specific gravity of each cell once each quarter.
- Specification 4.6.2.8 has been added to require verification of the electrolyte level of the connected battery cells once every 31 days. This requirement is incorporated in place of the requirement formerly contained in Specification 4.6.2.2 to check and adjust the electrolyte level once each quarter.
- Specification 4.6.2.9 has been added to require verification of the float voltage of the connected battery cells once every 31 days. This requirement is incorporated in place of the requirement formerly contained in Specification 4.6.2.2 to measure the voltage of each cell once each quarter.
- A Battery Inspection Program has been incorporated as Specification 6.8.4 which describes a program to monitor battery condition and performance.
- The ANO-1 TS Bases associated with these revised Specifications have also been added or revised to clarify the requirements.

BACKGROUND

The ANO switchyard consists of a 500 kV yard and a 161 kV yard connected by a 600 MVA autotransformer bank with a 22 kV tertiary winding. The control power for the 500 kV and 161 kV switchyard breakers can be supplied from three sources: 1) the 125 volt DC battery located in the switchyard control building; 2) the battery charger located in the switchyard control building; and 3) the ANO-1 DC bus "D41." The battery and battery charger operate in parallel continuously. The ANO-1 DC bus may be connected to the switchyard DC bus by a manual throwover switch. Three sources of AC power are available for the battery charger: 1) the auxiliary power transformers on the 22 kV bus; 2) the ANO-1 480 volt load center bus "B3"; and 3) the ANO-1 480 volt engineered safeguard bus "B6." The switchyard DC bus is a non-1E power supply and is described in the ANO-1 Safety Analysis Report (SAR) Section 8.2.1.3.

The station DC electrical power system provides the AC emergency power system with control power and is described in the ANO-1 SAR Section 8.3.2. It also provides both motive and control power to selected safety related equipment and preferred 120 VAC vital bus power (via inverters). The DC electrical power system is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure.

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 100% capacity 125 VDC battery, the associated battery charger for each battery, and all the associated control equipment and interconnecting cabling.

Each subsystem is equipped with two battery chargers. During normal operation, one battery charger is inservice and the second battery charger is used as a spare. With either battery charger in service, the requirements of independence and redundancy between subsystems are maintained.

During normal operation, the 125 VDC load is powered from the battery chargers with the batteries floating on the system. In cases where momentary loads are greater than the charger capability, or during a loss of normal power to the battery charger, the DC load is automatically powered from the station batteries. This results in a discharge of the associated battery (and affects both the system and battery 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.

Each 125 VDC 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. Each 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 the redundant subsystem. There is no sharing between redundant Class 1E subsystems, such as batteries, battery chargers, or distribution panels.

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. A voltage of 2.15 V per cell average corresponds to a total minimum voltage output of 124.7 V per battery. The criteria for sizing large lead storage batteries are defined in IEEE-485.

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 also has sufficient capacity to restore the battery from the design minimum charge to its fully charged state within 24 hours while supplying normal steady state loads.

The initial conditions of Design Basis Accident (DBA) and transient analyses in the SAR, Chapter 6 and Chapter 14, 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 in the event of:

1. An assumed loss of all offsite AC power or all onsite AC power; and

2. A worst-case single failure.

Entergy Operations committed to convert the ANO-1 TS using NUREG-1430, "Standard Technical Specifications - Babcock and Wilcox Plants" Revision 1 as the guidance document by letter dated June 21, 1995, 0CAN069502. The purpose of this submittal is to incorporate requirements modeled after the requirements of NUREG 1430 associated with DC electrical subsystems - operating, and battery cell parameters in advance of full implementation of the improved ANO-1 TS as a cost beneficial licensing action. The NUREG-1430 requirements have been modified to the format of the current ANO-1 TSs and to incorporate guidance contained in IEEE Std 450 - 1995, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications," that results in additional cost savings to ANO-1.

A proposed generic change to be submitted by the Nuclear Energy Institute (NEI) TS Task Force incorporates guidance for maintenance and testing of batteries contained in IEEE 450-1995. This generic change removes those requirements from the TS that are purely maintenance related, and incorporates requirements that more effectively determine battery operability. The items associated with battery maintenance are relocated to a Battery Inspection Program (BIP), described in the Administrative Controls section of the TS.

The BIP is required to include, at a minimum, controls over the following parameters: 1) condition of battery terminals and connectors; 2) condition of battery cells, cell plates, and racks; 3) battery connection resistance; 4) battery cell electrolyte levels; and 5) battery cell float voltage. Specific acceptance criteria that require evaluation of battery operability and additional maintenance and testing details are discussed in the BIP. Test frequencies are also included in the BIP and are in accordance with IEEE 450-1995, Section 4.3. The proposed generic change retains the following parameters as measures of battery operability: 1) average electrolyte temperature of representative cells; 2) battery float current; 3) battery cell electrolyte level; 4) float voltage of connected cells; and 5) BIP parameters that are evaluated as affecting battery operability.

Battery float charging current is used as a measure of battery operability instead of the previously accepted battery cell specific gravity. IEEE 450-1995 Section 4.5 states that the most accurate indicator of return to full charge is a stabilized charging or float current. Specific gravity readings may not be accurate when the battery is on charge following a discharge or following the addition of water. IEEE 450-1995 Annex A and B provide further information on the limitations of specific gravity as a measure of battery operability and the use of charging current in its place.

DISCUSSION OF CHANGE

Changes to Limiting Conditions For Operation, Required Actions, and Allowable Outage Times

The existing requirements of TS 3.7.1.D have been revised and retained as TS 3.7.3. The revised wording of the requirement now requires both DC electrical subsystems to be operable whenever the unit is above the cold shutdown condition. This change is considered to be administrative in nature in that the previous requirement specified by 3.7.1.D is maintained. The Bases associated with the revised 3.7.3 describe the DC electrical subsystem as consisting of one 100% 125 VDC battery, the associated battery charger for each battery, and all the associated control equipment and interconnecting cabling.

The existing requirements of TS 3.7.1.E have been relocated from the ANO-1 TSs to a document under licensee control. Entergy Operations has utilized the selection criteria provided in 10 CFR 50.36 (effective August 18, 1995) to evaluate this requirement for relocation from the ANO-1 TSs. The selection criteria have been evaluated as follows:

Criterion 1 - The 125 V DC switchyard distribution system is not used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.

Criterion 2 - The 125 V DC switchyard distribution system is not a process variable, design feature, or operating restriction that is an initial condition of a Design Basis Accident or Transient analysis that either assumes the failure of or challenge to the integrity of a fission product barrier.

Criterion 3 - The 125 V DC switchyard distribution system is not a structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a Design Basis Accident or Transient that either assumes failure of or presents a challenge to the integrity of a fission product barrier.

Criterion 4 - The 125 V DC switchyard distribution system is not specifically addressed in the ANO-1 Probabilistic Safety Assessment (PSA). However, the probability of failure of this system contributes to, and is enveloped by, the probability of a loss of offsite power (LOOP) event which is addressed. Since the impact of this system is enveloped by the LOOP event, it is considered to have a non-significant impact on the probability or severity of the LOOP event. The 125 V DC switchyard distribution system is not credited in any accident analysis. The 125 V DC switchyard distribution system is considered to be non-risk significant with respect to core damage frequency and offsite releases.

The controls associated with the 125 V DC switchyard distribution system will be relocated to an ANO-1 license basis document that will be controlled under the ANO-1 10 CFR 50.59 process. The Required Actions and Surveillance Requirements associated with the 125 V DC

switchyard distribution system, formerly specified by TS 3.7.2.G and TS 4.6.2 will also be relocated to a license basis document.

The Required Actions and Allowable Outage Times of existing TSs 3.7.2.E and 3.7.2.D have been revised and are retained as TS 3.7.3.A. The Bases associated with the revised TS 3.7.3 describe the DC electrical subsystem as consisting of one 100% 125 VDC battery, the associated battery charger for each battery, and all the associated control equipment and interconnecting cabling. Should any of these components be inoperable, the DC electrical subsystem is considered to be inoperable and the inoperable component must be restored to operable status within 8 hours. This retains the current requirements of TSs 3.7.2.E and 3.7.2.F. The NUREG-1430 LCO 3.8.4 Actions require restoration of an inoperable DC electrical subsystem within 2 hours. The current TS allowable outage time of 8 hours has been previously determined to be acceptable for ANO-1, as long as no loss of safety function is identified, and the plant specific risk assessment has not identified the 8 hour allowable outage time for the DC subsystems as representing an unacceptable risk. Should a loss of safety function be identified, the appropriate actions will continue to be taken in accordance with Specification 3.0.3.

If the battery charger, battery or associated distribution system can not be restored within 8 hours, current TSs 3.7.2.E and 3.7.2.F direct that the requirements of Specification 3.7.2.A shall apply. This specification directs the operator that if the conditions of 3.7.2.E and 3.7.2.F are not met, a hot shutdown shall be initiated within 12 hours. If the condition is not cleared within 24 hours, the reactor shall be brought to cold shutdown within an additional 24 hours. The NUREG-1430 LCO 3.8.4 Actions require a shutdown to Mode 3 in 6 hours and Mode 5 within 36 hours, if the inoperable subsystems is not restored to operable status. ANO-1 will implement the more restrictive measures of the NUREG-1430 LCO 3.8.4 Actions. These actions require the reactor to be placed in a subcritical condition 6 hours sooner than allowed by the current specification and omit the allowed delay of 24 hours in hot shutdown. The total time, from the end of the 8 hour allowable outage time to the cold shutdown condition, will now be 36 hours instead of the previously allowed 48 hours. The combination of the 8 hour allowable outage time and the subsequent requirement to place the reactor in cold shutdown within 36 hours results in a more restrictive requirement than previously specified.

The requirement to verify the operability of the diesel generator immediately upon discovering station battery or DC electrical subsystem inoperability has not been retained. The NUREG-1430 requirements clearly separate diesel generator operability from DC electrical subsystem operability. System and component inoperabilities are evaluated for their effect on other systems and components as required by ANO administrative procedures. Should the evaluation show that a condition discovered in the DC electrical subsystem could result in a failure of a diesel generator to perform its safety function, the appropriate actions would be taken based on the TS 1.3 definition of Operable - Operability.

TS 3.7.4 is incorporated to require battery parameters to be within limits when the DC electrical subsystem is required to be operable. This specification allows time for restoration of parameters that do not result in immediate inability of the DC electrical subsystem to

perform its function. These parameters contain substantial margin, in addition to the limits, which would be absolutely necessary for operability. Therefore, certain levels of degradation in these parameters are justified to extend the allowances for restoration. During the proposed extended periods for restoration of these parameters, the DC electrical subsystem is still capable of performing its intended function. This specification incorporates the Battery Inspection Program as described in the Administrative Controls section.

TS 3.7.4.A provides the Required Actions and Allowable Outage Times in the event either station battery is determined to be inoperable as a result of battery parameters not being within the limits of the BIP, while still satisfying the associated Surveillance Requirements of TS 4.6.2. These actions require the verification that the electrolyte level and float voltage of the pilot cell are within limits within 1 hour; verification that average electrolyte temperature is within limits for representative cells and that the electrolyte level and float voltage of all connected cells are within limits within 24 hours and once per 7 days thereafter; and restoration of the battery parameters to within limits within 31 days.

With one or more required parameters in one or more batteries not within limits of the BIP, but within the limits of the associated Surveillance Requirements of TS 4.6.2, the battery is degraded but there will still be sufficient capacity to perform the intended function. Therefore, the affected battery is not required to be considered inoperable solely as a result of not meeting BIP parameter limits, and continued operation is permitted for a limited period.

The pilot cell electrolyte level and float voltage are required to be verified to within limits within 1 hour. This check 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 cells. One hour is considered a reasonable amount of time to perform the required verification.

Verification that the average electrolyte temperature is within limits for representative cells and that the electrolyte level and float voltage of all connected cells are within limits within 24 hours and once per 7 days thereafter, provides assurance that during the time needed to restore the parameters to within 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 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 parameters are not severely degraded, this time is considered reasonable. The verification is repeated at 7 day intervals until the parameters are restored to BIP parameter limits. This periodic verification is consistent with the increased potential to exceed these battery parameter limits during these conditions.

Continued operation is only permitted for 31 days before battery parameters must be restored to within BIP parameter 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.

TS 3.7.4.B provides the Required Actions and Allowable Outage Times in the event either station battery is determined to be inoperable as a result of battery float current being out of the limit. A float current ≥2 amps is indicative of a battery which has been at least partially discharged. However, if the float current remains <10 amps, this is indicative of a battery performing as expected when returning to a full state of charge. The requirement to restore float current to <2 amps within 24 hours is based on the period necessary for a normally recharging battery to reach a state of full charge from the point at which it is capable of performing at ≥ 80% of the manufacturers rating.

TS 3.7.4.C provides the actions required to be taken in the event the Required Actions and allowable outage times of TSs 3.7.4.A.1, 3.7.4.A.2, or 3.7.4.A.3 are not met. In the event that these requirements are not met, sufficient capacity to supply the maximum expected load requirement is not assured and the corresponding DC electrical power subsystem must be immediately declared inoperable and the requirements of TS 3.7.3.A must be performed.

TS 3.7.4.D provides the actions required with one or more batteries with one or more battery parameters outside the limits, excluding the battery parameter limits addressed by TS 3.7.4.A, TS 3.7.4.B and TS 3.7.4.C. Upon failure to meet the Surveillance Requirements of TS 4.6.2, for those conditions not addressed in TS 3.7.4.A and TS 3.7.4.B, sufficient capacity to supply the maximum expected load requirement is not assured and the corresponding DC electrical power subsystem must be immediately declared inoperable and the requirements of TS 3.7.3.A must be performed.

Changes to Surveillance Requirements

TS 4.6.2.1 now requires the verification of battery terminal voltage ≥124.7 V when on float charge once each 31 days. This requirement was previously specified by TS 4.6.2.1 as a requirement to be "measured and recorded daily" and contained no acceptance criteria. Verifying battery terminal voltage while on float charge helps to ensure the effectiveness of the charging system and the ability of the batteries to perform their intended function. Float charge is the condition in which the charger is supplying the connected loads and the continuous charge required to overcome the internal losses of the battery and maintain the battery in a fully charged state. The voltage requirements are based on the nominal design voltage of the battery and are consistent with IEEE-450, 1995, and the initial state of charge conditions assumed in the battery sizing calculations. The 31 day frequency is consistent with battery manufacturer recommendations and with IEEE-450, 1995, Section 4.3 recommendations.

TS 4.6.2.2 now requires the verification that battery capacity is adequate to supply, and maintain in operable status, the required emergency loads for the design duty cycle when subjected to either a battery service test or a modified performance discharge test once every 18 months. This is a new requirement, not previously specified in the ANO-1 TS. 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 the recommendations of Regulatory Guide 1.32, "Criteria for Safety Related Electric Power Systems for Nuclear Power Plants," February 1977, and Regulatory Guide 1.129, "Maintenance, Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants," December 1974, 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.

This requirement may be satisfied by the performance of a modified performance discharge test in lieu of the service test. The modified performance discharge test is a simulated duty cycle consisting of just two rates; the one minute rate published for the battery or the largest current load of the duty cycle, followed by the test rate employed for the performance test, both of which envelope the duty cycle of the service test. Since the ampere-hours removed by a rated one minute discharge represents a very small portion of the battery capacity, the test rate can be changed to that for the performance discharge test without compromising the results of the performance discharge test. The battery terminal voltage for the modified performance discharge test should remain above the minimum battery terminal voltage specified in the battery service test for the duration of time equal to that of the service test.

A modified performance discharge test is a test of the battery capacity and its ability to provide a high rate, short duration load (usually the highest rate of the duty cycle). This will often confirm the battery's ability to meet the critical period of the load duty cycle, in addition 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.

TS 4.6.2.3 now requires a verification that battery capacity is ≥80% of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test once every 60 months, and once every 18 months when the battery shows degradation or has reached 85% of the expected life. TS 4.6.2.3 previously required a performance discharge test to be conducted once every 18 months. A battery performance discharge test is a test of constant current capacity of a battery, normally done in the as found condition, after having been in service, to detect any change in the capacity determined by the acceptance test. The test is intended to determine overall battery degradation due to age and usage.

The battery modified performance discharge test was described in the discussion of TS 4.6.2.2. Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying TS 4.6.2.3; however, only the modified performance discharge test may be used to satisfy TS 4.6.2.3 while satisfying the requirements of TS 4.6.2.2 at the same time.

The acceptance criteria for this Surveillance are consistent with IEEE-450 and IEEE-485. These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements.

The Surveillance Frequency for this test is normally 60 months, as recommended by IEEE-450. If the battery shows degradation, or if the battery has reached 85% of its expected life, the Surveillance Frequency is reduced to 18 months. Degradation is indicated, according to IEEE-450, 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. The 60 month frequency is consistent with the recommendations in IEEE-450, while the 18 month frequency has been reduced from the IEEE-450 recommendation of 24 months for consistency with the current ANO-1 fuel cycle length.

TS 4.6.2.5 will require verification that battery parameters are within the BIP limits as required by the BIP. The required parameters include the condition of the battery terminals and connectors, the condition of the battery cells, cell plates, and racks, the battery connection resistance, the electrolyte level, and float voltage. The term "connected battery cell" excludes any battery cell that may be jumpered out. Specific acceptance criteria and additional details are discussed in the Battery Inspection Program. Test frequencies are also included in the Battery Inspection Program and are in accordance with IEEE-450.

Visual inspection to detect corrosion of the battery terminals and connections, or measurement of the resistance of the connections, provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance. The acceptance criteria established must be no more than 20% above the resistance as measured during installation or not above the ceiling value established by the manufacturer. The frequency for these inspections, which can detect conditions that can cause power losses due to resistance heating, is 92 days. This frequency is considered acceptable based on operating experience related to detecting corrosion trends. This requirement was not previously specified in the ANO-1 TS.

Visible corrosion is removed as a preventive maintenance activity. The presence of visible corrosion does not necessarily represent a failure of this program provided visible corrosion is removed during performance of the inspection. The visual inspection for corrosion is not intended to require removal of and inspection under each terminal connection. Anticorrosion material is used to help ensure good electrical connections and to reduce terminal deterioration. IEEE-450 recommends cell to cell and terminal connection resistance measurement on an annual basis. This requirement was not previously specified in the ANO-1 TS.

Visual inspection of the battery cells, cell plates, and battery racks provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance. The presence of physical damage or deterioration does not necessarily represent a failure of the Battery Inspection Program provided an evaluation determines that the

physical damage or deterioration does not affect the operability of the battery (its ability to perform its design function). IEEE-450 recommends detailed visual inspection of cell condition and rack integrity on an annual basis. This requirement was not previously specified in the ANO-1 TS.

The Battery Inspection Program also defines the normal maintenance parameter limits for each designated pilot cell in each battery and for each connected battery cell. The cells selected as pilot cells are those whose temperature and voltage approximate the state of charge of the entire battery. These maintenance parameter limits are typically more conservative than the operability limits provided in the other Surveillance Requirements of TS 4.6.2, and are indicative of battery cell degradation which, if left unattended, will ultimately affect battery operability. The requirements for verification of pilot cells voltage and temperature were previously contained in TS 4.6.2.1. These verifications will still be performed, as required by the BIP, but are considered to be advance indicators of the need for maintenance rather than a measure of battery operability status. The proposed changes to the ANO-1 TS will require verification of the temperature of representative cells, and verification of the float voltage of all connected cells as measures of battery operability status.

The Battery Inspection Program limits specified for electrolyte level are based on manufacturer recommendations and are consistent with the guidance in IEEE-450, with an extra 1/4 inch allowance above the high water level indication for operating margin to account for temperature and charge effects. In addition to this allowance, the electrolyte level is permitted 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 recommends that electrolyte level readings should be made only after the battery has been at float charge for at least 72 hours. The requirement to check and adjust the electrolyte level was previously contained in TS 4.6.2.2. The proposed changes to the ANO-1 TS will specify an electrolyte level as a measure of battery operability.

The Battery Inspection Program limit specified for float voltage is ≥ 2.13 V for each individual cell. This value is based on a recommendation of IEEE-450, which states that prolonged operation of cells < 2.13 V can reduce the life expectancy of the cell. The proposed changes to the ANO-1 TS will specify a requirement to verify float voltage of connected battery cells as a measure of battery operability.

TS 4.6.2.6 will require verification that the electrolyte temperature of representative cells is $\geq$60°F once every 92 days. IEEE-450 recommends that the temperature of the electrolyte in 10% of the connected battery cells should be checked at least once per quarter. Large cell-temperature deviations are usually caused by shorting conditions, which are also evident by the cell voltage. This is cause for immediate cell replacement. All other temperature deviations are usually caused by outside conditions that are part of the installation. Lower than normal temperatures act to inhibit or reduce battery capacity. While operation at elevated temperatures will reduce life expectancy, it will not adversely affect capacity. Currently, TS 4.6.2 contains a requirement to measure the temperature of every fifth cell in

each bank on a quarterly basis. This proposed change retains the requirement to verify the electrolyte temperature on a quarterly basis, revising the "every fifth cell" to read "representative cells," and incorporates an acceptance criteria not formerly specified. The proposed acceptance criteria is consistent with the guidance provided in NUREG-1430.

TS 4.6.2.7 will require verification that float current is <2 amps, when on float charge, once every 31 days. Verifying battery charging (float) current while on float charge helps to ensure the effectiveness of the charging system and the ability of the batteries to perform their intended function. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery and maintain the battery in a fully charged state. The float current requirements are based on the float (charging) current indicative of a fully charged battery. Use of float current to determine the state of charge of the battery is consistent with IEEE-450. The 31 day Frequency is consistent with manufacturer recommendations and IEEE-450. IEEE-450 states that the most accurate indicator of return to full charge is a stabilized charging or float current and this surveillance requirement is proposed in lieu of the current requirements of TS 4.6.2.1 to measure and record the specific gravity of each pilot cell daily, and TS 4.6.2.2 to measure the specific gravity of each cell on a quarterly basis.

TS 4.6.2.8 will require verification of cell electrolyte level once every 31 days. This requirement verifies that each connected battery cell electrolyte level is consistent with IEEE-450 recommendations for levels that may affect the battery capacity. These limits (above the top of the plates, and not overflowing) ensure that the plates suffer no physical damage and that adequate electron transfer capability is maintained in the event of transient conditions. The term "connected battery cell" excludes any battery cell that may be jumpered out. The frequency is consistent with the need to verify a parameter that is also included in a required periodic inspection program. A requirement to check and adjust the electrolyte level as required was previously specified by TS 4.6.2.2. However, this requirement contained no frequency requirement and no acceptance criteria for this check.

TS 4.6.2.9 will require verification that the float voltage of the connected battery cells is >2.07 V once every 92 days. This requirement verifies that each connected battery cell float voltage (when corrected for electrolyte temperature) is consistent with IEEE-450 recommendations for float voltage that is indicative of internal cell problems that may require cell replacement. The term "connected battery cell" excludes any battery cell that may be jumpered out. The frequency is consistent with the need to verify a parameter that is also included in a required periodic inspection program. IEEE-450 recommends a monthly check of pilot cell float voltage, as was previously required by TS 4.6.2.1, and a quarterly frequency (once each 92 days) for all connected cells, as was previously required by TS 4.6.2.2. The monthly check of pilot cell float voltage is included in the BIP as a periodic inspection. The requirement to measure the voltage "to the nearest 0.01 volt" is a level of detail that is not appropriate for the TS. The BIP will contain the level of testing detail required to satisfy the TS Surveillance Requirements.

TS 6.8.4 has been incorporated to describe the minimum inspection and testing, acceptance criteria, and frequencies associated with maintenance of the station batteries required to be incorporated in the BIP. The BIP would include both battery and battery cell parameter, inspection, and testing requirements as identified in the description of the BIP included in the TS, with frequencies as identified in Section 4.3 of IEEE-450-1995. However, the BIP may include additional actions or evaluations that may be implemented prior to determining that the affected battery does not meet the acceptance criteria. Examples of these actions and evaluations could include: immediate removal of visible corrosion and tightening of terminal connections, both of which are generally quicker than verifying battery connection resistance; determining that physical damage or deterioration "could potentially degrade battery performance"; and coating with anti-corrosion material (which is not required for the battery to perform its safety function). Further, the BIP may include limits at which the battery would be declared inoperable. This is similar to pump vibration limits which are not included in TS but which may affect the component's capability to perform its safety function.

The commitment to the IEEE-450 frequencies is included in the BIP description in the Administrative Controls section of the TS and is not under licensee control. The BIP would include acceptance criteria that would be more restrictive than the point at which the parameter would require that the battery be declared inoperable. Failure of this intermediate acceptance criteria (which is to be based on IEEE-450, but under licensee control) for the required battery parameters would result in entry into TS 3.7.4.A, and performance of several Surveillance Requirements in TS 4.6.2 to verify continued acceptable battery performance.

The incorporation of the Battery Inspection Program, and the associated proposed TS changes, is expected to result in a high degree of battery readiness, as battery testing and maintenance are more formally specified by the associated Surveillance Requirements and the requirements maintained in the BIP. These changes incorporate the latest industry guidance on maintenance and testing of the batteries contained in IEEE-450, 1995, and are consistent with proposed generic changes submitted to the NRC by the NEI TS Task Force.

The Bases associated with TS 3.7.3, 3.7.4, and 4.6.2 have been revised to clarify the intent of the specifications. The changes incorporate some of the discussion presented above for the respective requirements.

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

An evaluation of the proposed change has been performed in accordance with 10CFR50.91(a)(1) regarding no significant hazards considerations using the standards in 10CFR50.92(c). A discussion of these standards as they relate to this amendment request follows:

Criterion 1 - Does Not Involve a Significant Increase in the Probability or Consequences of an Accident Previously Evaluated.

The switchyard 125V DC control power source requirements do not meet the criteria for inclusion in Technical Specifications (TSs) as evaluated with respect to the selection criteria of 10 CFR 50.36. These control power sources are not assumed to mitigate accident or transient events. The effects of a loss of these control power sources are enveloped by the Loss of Offsite Power (LOOP) event and relocation is considered to have a non-significant impact on the probability or severity of a LOOP event. These requirements will be relocated from the TSs to an appropriate administratively controlled document and maintained pursuant to 10 CFR 50.59.

Proposed changes incorporating the requirements of TS 3.7.1.D, 3.7.2.E, 3.7.2.F, and 3.7.2.A, as related to the DC electrical power subsystems, in the new TS 3.7.3 results in a more stringent requirement for the ANO-1 TSs in that reductions to lower conditions of operation in shorter periods of time are now required. These more stringent requirements are not assumed to be initiators of any analyzed events and will not alter assumptions relative to mitigation of accident or transient events.

Proposed changes incorporating TS 3.7.4 requirements for the station batteries allowing the battery parameters to be outside the limits of the Battery Inspection Program for 31 days do not result in an increase in the frequency or consequences of any analyzed accident, as the actions require more frequent checks of other parameters to ensure battery capability during this 31 day period. The Battery Inspection Program also requires evaluations to determine battery operability in the event these limits are exceeded. If an evaluation shows the battery is incapable of performing its design basis function, that DC electrical subsystem will be declared inoperable, and the appropriate actions taken.

Proposed changes to allow the use of float current in lieu of specific gravity incorporate current industry guidance on operability measures for station batteries, as stated in IEEE-450, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications." This Surveillance Requirement is not considered to initiate or mitigate any analyzed accident.

The proposed incorporation of a Battery Inspection Program relocates maintenance requirements from the TSs to a program under 10 CFR 50.59 control and allows the TSs to concentrate on those items required to ensure battery operability. These relocated requirements are not considered to be initiators of any analyzed accident. Battery operability

is assured by the combination of TS Surveillance Requirements and Battery Inspection Program maintenance requirements based on IEEE-450 guidance.

Proposed changes in Surveillance Requirements and Frequencies reflect current industry guidance on maintenance and testing of the station batteries. These requirements, in themselves, are not considered to be initiators of any analyzed accident condition. Although some frequencies have been extended, continued performance of maintenance activities in accordance with IEEE-450, in addition to the required Surveillance Requirements, ensures that corrective maintenance can be performed prior to a condition challenging an operability limit.

Therefore, this change does not involve a significant increase in the probability or consequences of any accident previously evaluated.

Criterion 2 - Does Not Create the Possibility of a New or Different Kind of Accident from any Previously Evaluated.

The proposed changes do not change the design, configuration, or method of operation of the plant.

Therefore, this change does not create the possibility of a new or different kind of accident from any previously evaluated.

Criterion 3 - Does Not Involve a Significant Reduction in the Margin of Safety.

Relocation of the switchyard 125V DC control power source requirements has no impact on any safety analysis assumptions. In addition, the requirements associated with these control power sources are relocated to an owner controlled document for which future changes will be evaluated pursuant to the requirements of 10 CFR 50.59.

Proposed changes incorporating the requirements of TS 3.7.1.D, 3.7.2.E, 3.7.2.F, and 3.7.2.A, as related to the DC electrical power subsystems, in the new TS 3.7.3 impose more stringent requirements than previously specified for ANO-1.

Proposed changes incorporating TS 3.7.4 requirements for the station batteries allowing the battery parameters to be outside the limits of the Battery Inspection Program for 31 days may involve an incremental reduction in the margin of safety since the battery may be in a slightly degraded state. However, this reduction is not considered significant in that the associated actions require more frequent checks of other parameters to ensure battery capability during this 31 day period. The Battery Inspection Program also requires evaluations to determine battery operability in the event these limits are exceeded. If an evaluation shows the battery is incapable of performing its design basis function, that DC electrical subsystem will be declared inoperable, and the appropriate actions taken.

The proposed change to allow the use of float current in lieu of specific gravity as a measure of battery operability is expected to result in a more representative measure of operability. IEEE-450 states that specific gravity may not be an appropriate measure of battery capability following addition of electrolyte or when the battery is on recharge following a discharge.

Proposed incorporation of a Battery Inspection Program relocates maintenance requirements from the TSs to a program under 10 CFR 50.59 controls and allows the TSs to concentrate on those items required to ensure battery operability. The relocation of these requirements is not considered to be a reduction in the margin of safety. Battery operability is assured by the combination of TS Surveillance Requirements and Battery Inspection Program maintenance requirements based on IEEE-450 guidance.

Proposed changes in Surveillance Requirements and Frequencies reflect current industry guidance on maintenance and testing of the station batteries. Although some frequencies have been extended, continued performance of maintenance activities in accordance with IEEE-450, in addition to the required Surveillance Requirements, ensures that corrective maintenance can be performed prior to a condition challenging an operability limit.

Therefore, this change does <u>not</u> involve a significant reduction in the margin of safety.

Therefore, based upon the reasoning presented above and the previous discussion of the amendment request, Entergy Operations has determined that the requested change does <u>not</u> involve a significant hazards consideration.

PROPOSED TECHNICAL SPECIFICATION CHANGES