

A. SUBJECT

1. NL-90/08 Surveillance Test of Specific Gravity for ESF Batteries, Table 4.8.2.1-1.
2. Affected Technical Specification:
 - a) Table 4.8.2.1-1, Battery Surveillance Requirements -Page 3/4 8-13
 - b) Bases 3/4.8.1, 3/4.8.2 and 3/4.8.3 - Page B 3/4 8-2

B. DISCUSSION

1. GGNS is requesting a clarification to Technical Specification (TS) Table 4.8.2.1-1 which adds a note to allow the battery charging current to be used in lieu of specific gravity to verify OPERABILITY of the Engineered Safety Feature (ESF) batteries following the service and performance discharge test.
2. A statement is added to the Bases to TS 3/4.8.2 to clarify that the battery charging current may be used in lieu of the specific gravity measurement following the service or performance discharge test.

C. JUSTIFICATION

1. The ESF batteries are presently subjected to a service discharge test once every 18 months and a performance discharge test once every 60 months to comply with TS Surveillance Requirement (SR) 4.8.2.1.d & e. SR 4.8.2.1.b specifies that the quarterly test to demonstrate the OPERABILITY of the batteries be performed within 7 days of completion of the service and performance discharge tests. This SR requires that parameters in Table 4.8.2.1-1 meet the Category B limits. SR 4.8.2.1.a also requires that the Category A limits be verified at least once per 7 days.
2. Although the batteries are fully recharged after a discharge test and capable of performing the intended function, a rigorous interpretation of the current TS would delay declaring the batteries OPERABLE until the specific gravity limits of Table 4.8.2.1-1 are satisfied. However, because of specific gravity gradients which are produced during the recharging process, delays of 3 to 7 days may occur while waiting for the specific gravity to stabilize. The Bases for TS 3.8.2.1 recognizes that a stabilized charger current is an acceptable alternative to specific gravity measurement for determining the state of charge of the designated pilot cell. As a clarification, this allowance is being added as a footnote to TS Table 4.8.2.1-1 to allow the float charge to be used as alternate means of verifying operability following a discharge test. The footnote will be made applicable to the Category A limits and the Category B Allowable Values.

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3. The specific gravity of the tested battery drops during a discharge to a value approaching 1.00. On the subsequent recharge, it is normal for the measured specific gravity of the cells to lag behind the true specific gravity. This is caused by the generation of high specific gravity sulfuric acid by the plates during the recharge. This acid sinks toward the bottom of the cell resulting in a specific gravity gradient and produces an incorrect low reading at the top of the cell. The high specific gravity acid gradually diffuses through the solution. Depending on the depth of discharge and the recharge voltage, diffusion of the acid through out the electrolyte may take several weeks. Due to the time required for the diffusion process, the specific gravity parameter measurement does not accurately reflect the battery's state of charge after recharging. Therefore, the specific gravity parameter measurement is not an accurate indication of the state of charge of the battery during this time.
4. The battery charging current is a more accurate indicator of the battery's state of charge following a service or performance discharge test. As the cells approach full charge, the battery voltage rises to approach the charger output voltage, and the charging current decreases to a stabilized value. When the charging current has stabilized at the charging voltage, the battery is charged, even though specific gravities have not stabilized. For the Division I, II, and III batteries, a float current of 2 amps is indicative of full charge. Using the battery charging current indicator resolves the problems associated with delaying battery return to service after scheduled discharge tests. This alternate method of verifying OPERABILITY is discussed in the Bases for TS 3.8.2.1 for the Category A Limits.
5. A discussion of this phenomenon can be found in IEEE 450-1980, "IEEE Recommended Practices for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations". IEEE 450-1980, along with Regulatory Guide 1.129, is referenced in the GGNS TS Bases (page B 3/4 8-2) as the basis for demonstrating OPERABILITY of the unit batteries. The need to use an alternate means of verifying the state of the battery's charge is recognized in the BWR-6 Standard TS and other BWR-6 plant's TS.

D. NO SIGNIFICANT HAZARDS CONSIDERATIONS

GGNS is proposing with this amendment request a revision to TS Table 4.8.2.1-1 which would allow the battery charger current to be used in lieu of the specific gravity of the electrolyte for determining if the battery is OPERABLE following the service and performance discharge test.

The Commission has provided standards for determining whether a no significant hazards consideration exists as stated in 10CFR50.92(c). A proposed amendment to an operating license involves no significant hazards if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety.

GGNS has evaluated the no significant hazards considerations in its request for a license amendment. In accordance with 10CFR50.91(a), GGNS is providing the following analysis of the proposed amendment against the three standards in 10CFR50.92:

1. No significant increase in the probability or consequences of an accident previously evaluated results from this change.

The D.C. power systems provide normal and emergency D.C. power for emergency auxiliaries and for control and switching during all modes of operation. As such, the unit batteries provide a support function to other systems and components required to shutdown the reactor and maintain it in a safe shutdown condition after an anticipated operational occurrence or a postulated design basis accident. The proposed change affects only the method of verifying OPERABILITY of the batteries. The batteries will continue to be OPERABLE and capable of supplying the loads required to mitigate the consequences of any previously evaluated accident.

Therefore, no significant increase in the probability or consequences of an accident previously evaluated results from this change.

2. This change would not create the possibility of a new or different kind of accident from any previously analyzed.

The proposed change to the surveillance requirement employs an effective method of demonstrating battery OPERABILITY following a discharge test. No changes to the batteries, the supported systems or components are proposed. The proposed change will not result in changes to the way the supported components and systems are operated.

Therefore, the possibility of a new or different accident from any previously analyzed is not created.

3. This change would not involve a significant reduction in the margin of safety.

The proposed change will allow the ESF batteries to be declared OPERABLE following a discharge test as soon as they have been completely recharged rather than waiting for the specific gravity to stabilize. Taking specific gravity measurements during this period of time may yield readings which do not accurately relate to the battery state of charge due to gradients within the battery electrolyte. Although the specific gravity method is normally the preferred means of verifying OPERABILITY, the current IEEE standard recognizes the pattern of charging current delivered by a conventional voltage-regulated charger after a discharge provides another method for determining the state of charge. A stabilized charging or float current is a more accurate indicator of return to full charge following a discharge than specific gravity readings.

Using the alternate means of verifying OPERABILITY may result in a slight reduction in the margin of safety. However, the reduction is not considered to be significant because:

- a. even though the battery's specific gravity has not stabilized, the battery is still capable of supplying the required loads,
- b. the TS will require that the specific gravity be measured within 7 days following the discharge test,
- c. the alternate means of verifying full charge is consistent with industry practice and fully sufficient to demonstrate the battery's OPERABILITY, and
- d. the proposed change will allow the battery to be returned to service at an earlier time reducing the unavailability of the D.C. power division.

Therefore, the proposed change will not involve a significant reduction in the margin of safety.

Based on the above evaluation, GGNS has concluded that operation in accordance with the proposed amendment involves no significant hazards considerations.

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TABLE 4.8.2.1-1
BATTERY SURVEILLANCE REQUIREMENTS

Parameter	CATEGORY A ⁽¹⁾	CATEGORY B ⁽²⁾	
	Limits for each designated pilot cell	Limits for each connected cell	Allowable ⁽³⁾ value for each connected cell
Electrolyte Level	>Minimum level indication mark, and < 1/4" above maximum level indication mark	>Minimum level indication mark, and < 1/4" above maximum level indication mark	Above top of plates, and not overflowing
Float Voltage	≥ 2.13 volts	≥ 2.13 volts ^(b)	> 2.07 volts
Specific Gravity ^(a)	≥ 1.195 ^(c)	≥ 1.190	Not more than .020 below the average of all connected cells
		Average of all connected cells > 1.200	Average of all connected cells ≥ 1.190 ^(c)

- (a) Corrected for electrolyte temperature and level.
 (b) May be corrected for average electrolyte temperature.
 (1) For any Category A parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that within 24 hours all the Category B measurements are taken and found to be within their allowable values, and provided all Category A and B parameter(s) are restored to within limits within the next 6 days.
 (2) For any Category B parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that the Category B parameters are within their allowable values and provided the Category B parameter(s) are restored to within limits within 7 days.
 (3) Any Category B parameter not within its allowable value indicates an inoperable battery.

(c) Or battery charging current, following a battery service or performance discharge test, is less than 2 amps when on float charge.

ELECTRICAL POWER SYSTEMSBASESA.C. SOURCES, D.C. SOURCES and ONSITE POWER DISTRIBUTION SYSTEMS (Continued)

The surveillance requirements for demonstrating the OPERABILITY of the unit batteries are in accordance with the recommendations of Regulatory Guide 1.129 "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants," February 1978, and IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations."

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

Table 4.8.2.1-1 specifies the normal limits for each designated pilot cell and each connected cell for electrolyte level, float voltage and specific gravity. The limits for the designated pilot cells float voltage and specific gravity, greater than 2.13 volts and 0.015 below the manufacturer's full charge specific gravity or a battery charger current that had stabilized at a low value, is characteristic of a charged cell with adequate capacity. The normal limits for each connected cell for float voltage and specific gravity, greater than 2.13 volts and not more than 0.020 below the manufacturer's full charge specific gravity with an average specific gravity of all the connected cells not more than 0.010 below the manufacturer's full charge specific gravity, ensures the OPERABILITY and capability of the battery. ↑

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Operation with a battery cell's parameter outside the normal limit but within the allowable value specified in Table 4.8.2.1-1 is permitted for up to 7 days. During this 7 day period: (1) the allowable values for electrolyte level ensures no physical damage to the plates with an adequate electron transfer capability; (2) the allowable value for the average specific gravity of all the cells, not more than 0.020 below the manufacturer's recommended full charge specific gravity, ensures that the decrease in rating will be less than the safety margin provided in sizing; (3) the allowable value for an individual cell's specific gravity ensures that an individual cell's specific gravity will not be more than 0.040 below the manufacturer's full charge specific gravity and that the overall capability of the battery will be maintained within an acceptable limit; and (4) the allowable value for an individual cell's float voltage, greater than 2.07 volts, ensures the battery's capability to perform its design function.

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Exceptions to the specific gravity requirements are taken to allow for the normal deviations experienced after a battery discharge and subsequent recharge associated with a service or performance discharge test. The specific gravity deviations are recognized by and discussed in IEEE 450-1980.