



BATTERIES DIVISION

Industrial Batteries and Chargers
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June 27, 1980

Salem Nuclear Generating Station
P.O. Box 168
Hancock's Bridge, NJ 08038
Attn: Mr. Joe Hagen

SUBJECT: Recharge of Class I Safety
Related Batteries After a
Service Discharge Test.
LCU-33 Nominal 1.210 Specific
Gravity.

Dear Mr. Hagen:

From the information received the following conclusions about the batteries state of charge following recovery from a discharge can be drawn.

Individual cell voltage is not, by itself, an indication of the state of charge of the battery. Specific gravity is normally an indication of state of charge but may not be a true value. Inaccurate values may occur immediately after a recharge following a discharge or after the addition of water to a cell. When cell design permits, more accurate specific gravity readings to determine cell state of charge can be obtained by taking the average specific gravity within the cell. A cell's average specific gravity value 1.200, corrected for temperature and electrolyte level, should be considered as a minimum acceptable value for a fully charged cell having a nominal specific gravity value of 1.210.

A cell float voltage of 2.13 is considered a minimum acceptable operating value by C&D. When an individual cell float voltage corrected for temperature is below 2.13 volts, corrective action should be initiated. Typically, corrective action would be in the form of an equalizing charge to the cell or battery.

Sincerely yours,

David A. Emery
Technical Services
Manager
Stationary Batteries

cc: Bill Pavincich

DAE/mj

PROPOSED CHANGE
D.C. SOURCES
SALEM UNIT NO. 2
TECHNICAL SPECIFICATIONS

Description of Change

Changing the individual cell voltage minimum value for surveillance requirements of the 125 Volt and 28 Volt vital batteries.

Reason for Change

The objective of this change is to align the battery surveillance requirements with realistic operating conditions of a lead-calcium acid storage battery. The existing higher value of the individual cell voltage places an unnecessary restriction on the operability status of the 125 Volt and 28 Volt D.C. systems. After performing any of the surveillance tests that require a discharge of the batteries, one or two cells in each battery group may not get back to the 2.17 volt level as quickly as the rest of the cells, reaching 2.16 Volts in the same time but requiring extraordinary means to reach 2.17 Volts.

This change to an individual cell voltage of 2.13 Volts minimum will insure a batteries' operability while reducing the man-hours presently required to accomplish the same objective at the higher individual cell voltage.

Safety Evaluation

The present individual cell voltage of 2.17 Volts minimum is conservative and is in excess of IEEE-450 as well as manufacturer's recommendations. The individual cell voltage of 2.13 Volts minimum does not reduce the performance of the 125 Volt D.C. or 28 Volt D.C. vital buses. Even if each of the 60 cells on a 125 Volt battery were to reach this minimum value of 2.13 V/cell, the battery would still be at 127.8 Volts. Similarly, if each of the 13 cells in a 28 Volt battery were to reach this minimum of 2.13 V/cell, the battery would still be at 27.69 Volts which is in excess of Technical Specifications.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

2. The pilot cell specific gravity, corrected to 77°F and full electrolyte level, is greater than or equal to 1.200.
 3. The pilot cell voltage is greater than or equal to 2.08 volts
 4. The overall battery voltage is greater than or equal to 125 volts.
- b. At least once per 92 days by verifying that:
1. The voltage of each connected cell is greater than or equal to ^{2.13}~~2.17~~ volts under float charge and has not decreased more than ^{0.27}~~0.23~~ volts from the value observed during the original acceptance test.
 2. The specific gravity, corrected to 77°F and full electrolyte level, of each connected cell is greater than or equal to 1.200 and has not decreased more than 0.02 from the value observed during the previous test.
 3. The electrolyte level of each connected cell is between the minimum and maximum level indication marks.
- c. At least once per 18 months by verifying that:
1. The cells, cell plates and battery racks show no visual indication of physical damage or abnormal deterioration.
 2. The cell-to-cell and terminal connections are clean, tight, and coated with anti-corrosion material.
 3. The resistance of each cell-to-cell and terminal connection is less than or equal to 0.01 ohms.
 4. The battery charger will supply at least 200 amperes at 125 volts for at least 4 hours.
- d. At least once per 18 months, during shutdown, by verifying that the battery capacity is adequate to supply and maintain in OPERABLE status all of the actual emergency loads for 8 hours when the battery is subjected to a battery service test.
- e. At least once per 60 months, during shutdown, by verifying that the battery capacity is at least 80% of the manufacturer's rating when subjected to a performance discharge test. This performance discharge test shall be performed subsequent to the satisfactory completion of the required battery service test.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

2. The pilot cell specific gravity, corrected to 77°F, and full electrolyte level, is greater than or equal to 1.200.
 3. The pilot cell voltage is greater than or equal to 2.08 volts.
 4. The overall battery voltage is greater than or equal to 27 volts.
- b. At least once per 92 days by verifying that:
1. The voltage of each connected cell is greater than or equal to ~~2.13~~ ~~2.17~~ volts under float charge and has not decreased more than ~~0.21~~ ~~0.23~~ volts from the value observed during the original acceptance test.
 2. The specific gravity, corrected to 77°F and full electrolyte level, of each connected cell is greater than or equal to 1.200 and has not decreased more than 0.02 from the value observed during the previous test.
 3. The electrolyte level of each connected cell is between the minimum and maximum level indication marks.
- c. At least once per 18 months by verifying that:
1. The cells, cell plates and battery racks show no visual indication of physical damage or abnormal deterioration.
 2. The cell-to-cell and terminal connections are clean, tight, and coated with anti-corrosion material,
 3. The battery charger will supply at least 150 amperes at 28 volts for at least 4 hours.
- d. At least once per 18 months, during shutdown, by verifying that the battery capacity is adequate to supply and maintain in OPERABLE status all of the actual emergency loads for 8 hours when the battery is subjected to a battery service test.
- e. At least once per 60 months, during shutdown, by verifying that the battery capacity is at least 80% of the manufacturer's rating when subjected to a performance discharge test. This performance discharge test shall be performed subsequent to the satisfactory completion of the required battery service test.