August 1, 2006

Mr. Thomas Gurdziel
9 Twin Orchard Drive
Oswego, NY 13126

Dear Mr. Gurdziel:

We received your letters dated June 23, June 25, June 27, July 2, and July 6, 2006, in reference to stationary batteries at nuclear power plants in general, and specifically, in reference to a request for a change to the plant Technical Specifications at the James A. FitzPatrick Nuclear Power Plant (JAF). As licensing actions for JAF are processed in my branch at the Nuclear Regulatory Commission (NRC) Headquarters, I am enclosing a response to your questions and comments.

We appreciate you taking the time to engage the NRC on these matters. If you have any further questions regarding these issues, please call the NRC project manager for JAF, Mr. John Boska, at (301) 415-2901.

Sincerely,

/RA/ by Timothy G. Colburn for

Richard J. Laufer, Chief
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-333

Enclosure:
As stated

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RESPONSE TO QUESTIONS FROM MR. GURDZIEL

REGARDING STATIONARY BATTERIES AT NUCLEAR POWER PLANTS

The questions and comments are from letters dated June 23, June 25, June 27, July 2, and July 6, 2006, in reference to stationary batteries at nuclear power plants in general, and specifically in reference to a request for a change to the plant Technical Specifications (TSs) at the James A. FitzPatrick Nuclear Power Plant (JAF). The Nuclear Regulatory Commission (NRC) staff is providing the following response:

1. A request was made to have a review done of the completeness of stationary battery requirements in Standard Technical Specifications (STSs), NUREG-1433, "Standard Technical Specifications, General Electric Plants, [Boiling Water Reactor] BWR/4," Revision 3, and of the change to NUREG-1433 in Technical Specification Task Force (TSTF) document TSTF-360, Revision 1.

   Answer: All changes to the STSs are reviewed by NRC engineers, and additional reviews are done before any changes are issued to specific nuclear power plant TSs. NUREG-1433, Revision 3, has incorporated the wording of TSTF-360, Revision 1. NUREG-1433, Section 3.8, "Electrical Power Systems," requires that stationary batteries important to nuclear plant safety be operable in various modes of plant operation. Also specified are surveillance requirements (SRs), which are performed on the batteries to verify operability. Note that SR 3.8.6.6 requires a battery performance discharge test every 5 years (and more often when the battery has reached 85% of the expected life). Also, SR 3.8.4.3 requires a battery service test every 18 months, to verify the battery capacity is adequate to supply the required emergency loads for the design duty cycle. The licensees have analyses that show the required emergency loads, which determine what capacity a battery must have. Due to these tests, the NRC can be confident that a battery of sufficient capacity is installed.

   The safety-related batteries are operated with a battery charger in service, which supplies the normal electrical loads and also keeps a small float current to the battery. As the battery is not in an open-circuit configuration, NRC documents typically refer to float voltage rather than open-circuit voltage. As stated in the note with Limiting Condition for Operation (LCO) 3.8.6 in NUREG-1433, licensees must implement a program to monitor battery parameters based on the recommendations of the Institute of Electrical and Electronics Engineers (IEEE) Standard 450-1995, "IEEE Recommended Practice for Maintenance, Testing, an Replacement of Vented Lead-Acid Batteries for Stationary Applications." Also, the SRs in Section 3.8.6, "Battery Parameters," require the following:

   a. Check battery float current every 7 days.
   b. Check pilot cell voltage every 31 days.
   c. Check cell electrolyte levels every 31 days.
   d. Check pilot cell temperature every 31 days.
   e. Check individual cell voltages every 92 days.

Enclosure

These surveillances provide assurance that the batteries remain ready to respond if needed during a loss of normal plant power.

In your letter dated June 27, 2006, you asked about LCO 3.8.6A, which gives required actions if one or more battery cells have an individual cell float voltage less than 2.07 volts. The actions require the cell voltage be restored greater than 2.07 volts within 24 hours, or the battery must be declared inoperable, which then requires the plant to be shut down within 14 hours. Note that the battery charger is still supplying all the electrical loads during this time, it is just that the capacity of the backup battery has been affected. You suggested that it may be necessary to perform an equalization charge on the battery, which may take longer to perform than the 24 hours allotted to restore the cell voltage. We agree that an equalization charge may take longer than 24 hours to restore the battery to the fully charged condition, depending on the initial condition of the battery.

However, TS 5.5.14, "Battery Monitoring and Maintenance Program," requires the cell to be recharged above 2.13 volts, not to completely raise the individual cell to 2.2 volts (which is an average cell voltage during an equalization charge). Many of our licensees also have alternate plans for the possibility of a degraded cell. For example, some licensees maintain spare battery cells, fully charged, which can be used in place of a deficient cell. Other licensees have analyses which show the capability of the battery to supply the required emergency loads with one or two cells removed from the battery. In that case, a deficient cell can be jumpered out to restore the battery to an operable status. In any case, if the licensee cannot meet the requirements of the TSs, the plant will be shut down.

In your letter dated July 6, 2006, you suggested that LCO 3.8.6A, which requires action if a cell float voltage is less than 2.07 volts, is not conservative enough. You cited IEEE Standard 450-1987 as saying that if cell float voltage is less than 2.13 volts, corrective action should be initiated immediately. In SR 3.8.4.1, it is required that the battery terminal voltage be greater than or equal to the minimum established float voltage. In the NUREG-1433 Bases for SR 3.8.4.1, the minimum established float voltage will be at or above 127.6 volts. For the standard 60 cell battery, this equates to 2.127 volts per cell (very close to your 2.13 volts). Therefore, the overall battery, with 60 cells, is in relatively good condition if it can meet this requirement, but an individual cell has declining performance if its individual cell float voltage has dropped as low as 2.07 volts. Specifying a voltage limit for the entire battery applies enough conservatism that the limit for a single cell can be set somewhat lower. Also note TS 5.5.14, "Battery Monitoring and Maintenance Program," of NUREG-1433. TS 5.5.14.a requires the program to have actions to restore cells with float voltage less than 2.13 volts. You also asked if the design of the dc electrical system allows for the higher voltages necessary for a battery equalization charge. Typically the system design does allow for the higher voltages. As you pointed out, if the system design does not allow for it, the battery would have to be disconnected from the electrical system during the equalization charge. A disconnected battery is inoperable per TSs, and the licensee would have to comply with the actions for an inoperable battery.

2. In your letters dated June 23 and June 25, 2006, you asked questions specific to JAF. You commented on the fact that they label their 60 cell lead-acid batteries as 125-volt batteries, which corresponds roughly with the open-circuit voltage of 2.065 volts per cell.

You also asked why they did not label their low pressure coolant injection (LPCI) batteries, which have 186 lead-acid cells, as 384-volt batteries. This would correspond with the open-circuit voltage, rather than the current label of a 419-volt battery (which corresponds to 2.25 volts per cell, which is the float voltage).

Answer: We agree that JAF used different methods to label these batteries. However, they have analyses to show that each battery is capable of supplying the required emergency loads. The analyses are done using the capacity of the connected cells, not by reference to the overall battery voltage.