

June 2, 2006

Mr. Christopher M. Crane, President  
and Chief Nuclear Officer  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

SUBJECT: LASALLE COUNTY STATION, UNITS 1 AND 2 - REQUEST FOR ADDITIONAL  
INFORMATION RELATED TO REQUEST FOR AMENDMENT TO TECHNICAL  
SPECIFICATIONS ASSOCIATED WITH DIRECT CURRENT ELECTRICAL  
POWER (TAC NOS. MC5771 AND MC5772)

Dear Mr. Crane:

By letter to the Nuclear Regulatory Commission dated December 9, 2004, Exelon Generation Company, LLC, submitted a request for a license amendment to modify Technical Specification (TS) 3.8.4, "DC Sources - Operating"; TS 3.8.5, "DC Sources - Shutdown"; TS 3.8.6, "Battery Cell Parameters"; and TS 5.5, "Programs and Manuals," for LaSalle County Station, Units 1 and 2. The proposed changes request new actions for an inoperable battery charger and alternate battery charger testing criteria for Limiting Conditions for Operation 3.8.4 and 3.8.5. The requested changes also include the relocation of a number of surveillance requirements in TS 3.8.4 which perform preventative maintenance on the safety-related batteries to a licensee-controlled program.

The NRC staff is reviewing your submittal and has determined that additional information is required to complete the review. The specific information requested is addressed in the enclosure to this letter, and was forward to Ms. Alison MacKellar of your staff via e-mail on June 21, 2005. It is requested that you provide a response 30 days from the date of this letter.

The NRC staff considers that timely responses to requests for additional information help ensure sufficient time is available for staff review and contribute toward the NRC's goal of efficient and effective use of staff resources.

C. Crane

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If you have any questions, please do not hesitate to contact me 301-415-3154 or via e-mail at [sps1@nrc.gov](mailto:sps1@nrc.gov).

Sincerely,

*/RA/*

Stephen P. Sands, Project Manager  
Plant Licensing Branch III-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-373 and 50-374

Enclosure:  
Request for Additional Information

cc w/encls: See next page

C. Crane

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Enclosure:  
Request for Additional Information

cc w/encls: See next page

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**ADAMS Accession Number: ML051650293**      **Nrr-088** \*with comments

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DATE	6/2/06	6/2/06	6/2/06

**OFFICIAL RECORD COPY**

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Robert Cushing, Chief, Public Utilities Division

## REQUEST FOR ADDITIONAL INFORMATION

### RELATED TO DIRECT CURRENT ELECTRICAL POWER

#### LA SALLE COUNTY STATION

In reviewing the Exelon Generation Company's (Exelon's) submittal dated December 9, 2004, related to direct current electrical power for LaSalle County Station, Units 1 and 2 (LaSalle), the NRC staff has determined that the following information is needed in order to complete its review:

1. Proposed Limiting Condition for Operation (LCO) 3.8.4 indicates one inoperable required battery charger in any Division or the opposite unit Division 2 would require entry into the action statement. The LaSalle Updated Final Safety Analysis Report (UFSAR) indicates the 125 VDC design indicating that the Unit 1, Divisions 1 and 2, DC systems have a single 100-percent capacity battery charger with Division 2 having an auxiliary battery charger rated at 75 A (37.5 percent). The LaSalle UFSAR indicates the Unit 2, Divisions 1 and 2, DC systems have two redundant 100-percent capacity battery chargers. The proposed wording would indicate there is no incentive to correct a problem on the first Unit 2 battery charger to fail as long as the second battery charger remained operable. (Category 2.a)
  - (a) Describe the purpose of the 75 A battery charger and confirm that this smaller battery charger would not be considered a 100-percent substitute for an inoperable Unit 1, Division 2, battery charger.
  - (b) Describe what actions and completion time (CT) are proposed to return the first Unit 2, Division 1 or 2, inoperable battery charger to service.
  - (c) Describe the independence of each unit to the opposite Division 2, 125 VDC system.
2. Proposed Technical Specification (TS) 3.8.4 CT for Action A.1, restore battery terminal voltage to minimum established float voltage, is 2 hours. (Category 2.a)
  - (a) Describe any onsite equipment planned to be used to restore the battery terminal voltage within 2 hours. Confirm that the AC power source for this replacement battery charger will come from a bus capable of being powered from the opposite power supply.
  - (b) Define the "minimum established float voltage," and if it is less than 130 V (2.25 volts per cell), justify why a lower voltage is acceptable.
  - (c) Describe what controls will be in place to terminate any discharge of a battery with a degraded or inoperable battery charger and specify how many ampere-hours (worst case) will be removed from the battery during the first 2 hours before the battery terminal voltage is returned to the minimum established float voltage.

3. The LaSalle UFSAR identifies different battery sizes for Division 1 and 2, 125 V batteries, Division 1, 250 V battery, and the Division 3 battery. Proposed TS 3.8.4 required action (RA) for Action A.2, and surveillance requirement (SR) required action A.2, verify battery float current  $\leq 2$  amperes. (Category 2.a)
  - (a) Explain why the same proposed recharging current acceptance criteria is acceptable for the three size batteries at LaSalle.
  
4. The technical analysis cited to support this change, contained in this LaSalle request, stated that verifying the charging current at 12-hour intervals provides assurance that the battery has sufficient capacity to perform its assumed safety function. If, at the expiration of the 12-hour period, the battery float current is not less than or equal to 2 amperes, industry experience indicates there may be additional battery problems. (Category 2.a)
  - (a) Explain why it would take 12 hours to return a battery to a fully-charged state (i.e., less than 2 amperes charging current) that had experienced a limited 2-hour discharge.
  - (b) Quantify the additional battery capacity that could be lost during this 12-hour period if the charging current does not return to less than 2 amperes, and explain why this additional loss of battery capacity meets safety requirements.
  
5. The proposed wording in SRs 3.8.4.2 and 3.8.5 is not consistent with Section 8.3.2 of the LaSalle UFSAR, which indicates the following:

The battery chargers are sized to recharge the batteries in a time commensurate with the recommendations of the battery manufacturer and the battery chargers will supply rated current for at least 8 hours.

The NRC staff has interpreted these statements to indicate that the battery chargers would recharge the batteries within 8 hours. (Category 2.a)
  - (a) Explain why SR 3.8.4.2 and SR 3.8.5, which require either (1) only a four-hour surveillance at rated current, or (2) the capability of recharging the batteries within 24 hours, meet LaSalle's battery chargers UFSAR commitment.
  
6. LaSalle's current practice is to perform a modified performance discharge test in lieu of a service discharge test but has proposed striking the words, "provided the modified performance test completely envelops the performance test" (SR 3.8.4.3, Note 1). According to industry standards, using the results of a modified performance discharge test in lieu of service discharge test data does not provide assurance that the battery will be capable of meeting the LaSalle duty-cycle requirements if the test does not completely envelop the service test required discharge profile. (Category 2.a)
  - (a) Ensure that the modified performance test will completely envelope the service test discharge profile or provide justification why this modification is not required.

7. Part 2 of the proposed SR 3.8.6.6 states that the battery performance test is not required to be performed when the opposite unit is in Mode 4 or 5, or during movement of irradiated fuel in the secondary containment. (Category 2.a)
  - (a) Clarify why activities in the opposite unit would justify not performing the battery performance test in the subject unit.
  - (b) Clarify how the unit will return to service without performing the required battery performance test if the opposite unit is in Mode 4 or 5.
  
8. SR 3.8.6.6 does not include a requirement to increase the frequency to 12 months when the battery was identified as degraded in the previous performance test. Degraded is defined in the Institute of Electrical and Electronics Engineers (IEEE) Standard IEEE-450-1995, "Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications," as either less than 90-percent rated capacity or a loss of capacity of  $\geq 10$  percent from the previous performance test. (Category 2.a)
  - (a) Explain why the frequency of performing the performance discharge test is not increased for a degraded battery.
  
9. Proposed SR 3.8.6 contains two inserts. Insert SR 3.8.6, ACTIONS and insert SR 3.8.6, Surveillance Requirements, contain the following limits: (Category 2.a)

Cell Float Voltage	< 2.07 V
Float Current	> 2 A
Electrolyte Level	< minimum established design limits
Electrolyte Temperature	< minimum established design limits

  - (a) Explain why a cell float voltage below the manufacture's recommended minimum float voltage is acceptable.
  - (b) What ensures that the minimum established electrolyte level design limits are no less than the minimum level line on the cell jar?
  - (c) What ensures that the minimum established electrolyte temperature design limits are no less than those minimum temperatures used in the sizing of the Division 1, 2, and 3 batteries?
  - (d) Explain why it is acceptable to take 8 hours to restore electrolyte level to above the top of the plates and 31 days to restore the level to the minimum established design limits.
  
10. Proposed TS 5.5.14, "Battery Monitoring and Maintenance Program," has eliminated the recommendations of the battery manufacturer. (Category 2.a)
  - (a) Explain why the battery manufacturer's recommendations will not be followed.

11. Proposed TS 5.5.14 has eliminated the recommendations of the battery manufacturer. TS 5.5.14 also requires actions to restore battery cells with float voltage < 2.13 V. The LaSalle UFSAR states that the average voltage per cell is 2.25 V. (Category 2.a)
  - (a) Explain why the acceptance criteria for cell voltage is less than 2.25 V.
  - (b) If the design average cell voltage is 2.25 V, justify why the battery terminal voltage of 130 V for the 58 cell batteries and 260 V for the 116 cell batteries is not part of the battery monitoring program.
12. The existing SR 3.8.6, Condition B addresses average electrolyte temperature. The proposed SR 3.8.6, Condition D addresses only pilot cell electrolyte temperature limit criteria. Proposed TS 5.5.14 does not address electrolyte temperature. (Category 2.a)
  - (a) Describe what controls will be placed on electrolyte temperature for the non-pilot cells.
13. The existing SRs 3.8.4.2 through 3.8.4.5 address physical damage to battery cells and racks, corrosion and terminal resistance. Proposed TS 5.5.14 does not address these physical characteristics. (Category 2.a)
  - (a) Describe what controls will be placed on the physical characteristics of damage to battery cells and racks, corrosion, and terminal resistance.
14. The existing SR 3.8.6, Table 3.8.6-1, addresses cell-specific gravity following 7 days after a battery recharge. Proposed TS 5.5.14 does not address cell-specific gravity. Industry standards indicate that specific gravity is a better measure of battery charge in the steady state (away from the period immediately following recharge). (Category 2.a)
  - (a) Explain why specific gravity is not used as the measure of battery capacity in the steady state.
  - (b) Describe what actions will be taken to determine the electrolyte temperature of the remaining battery cells if the pilot cell temperature is found below the minimum established design limits.
15. No mention is made of the 250 V battery charger ratings in the UFSAR text. UFSAR Figure 8.3-9, indicates a tie between the 250 V DC systems of Unit 1 and Unit 2. (Category 2.a)
  - (a) Describe the 250 V battery charger ratings and confirm that each unit's 250 V DC system battery and battery charger have been sized to carry the combined loads of both units.
16. If the loss of the battery charger is the result of loss of the AC supply to the battery charger(s) (e.g., loss of AC motor control center or low voltage switchgear), identify what additional loads beyond the steady state DC loads will be placed on the battery during the 2-hour discharge, such as the addition of inverters, or uninterruptible power supplies under worst case conditions. Specify the anticipated loss in battery capacity and the

expected time to recharge the battery upon recovery of AC power to the battery charger(s). (Category 2.a)

17. In order to demonstrate the design margin of the LaSalle batteries, provide the results of the battery sizing calculations that demonstrate the amount of total margin above IEEE-485 sizing requirements (minimum temperature, aging, and margin for maintenance) that may be utilized during the 2 hours allotted to restore battery terminal voltage. (Category 2.a)
18. In order to demonstrate prompt detection of battery charger problems that would require removal of the battery charger from service, identify the alarm and monitoring, including setpoints or acceptance criteria, available to the control room operator to identify a degrading battery charger, but not limited to: (Category 2.a)
  - (a) low DC voltage alarms on the battery charger,
  - (b) low DC voltage alarms on the DC bus, and
  - (c) operator shift rounds of the DC battery charger and DC bus.
19. Specific gravity monitoring is used to measure the strength of a battery cell's electrolyte, which is an important component of the battery's chemical reaction, and provides an indication of the battery's state-of-charge. Float current monitoring may or may not provide an accurate indication of the battery's state-of-charge. Float current monitoring is based on a calculation that is dependent on several variables. The NRC staff has a concern with two variables of this calculation: the applied charging voltage and the cell resistance. A change in either of these variables may provide a false indication of the battery's state-of-charge. Provide assurance that float current monitoring will provide an accurate indication of the battery's state-of-charge. (Category 2.a)
20. The battery pilot cell is representative of the average battery cell in the battery. Provide assurance that a battery which has a battery pilot cell with a voltage of 2.07 volts or slightly greater will remain capable of performing its minimum designed function. (Category 2.a)
21. As mentioned in Question 19, the battery pilot cell is representative of the average battery cell in the battery. Provide assurance that a battery with a battery pilot cell with an electrolyte temperature slightly greater than or equal to the minimum established design limit will remain capable of performing its minimum designed function. (Category 2.a)
22. Consistency with IEEE 450-1995 was used throughout the submittal as the justification for approval. The most recent version of IEEE 450 that has been endorsed by the NRC through Regulatory Guides (RGs) is IEEE 450-1975. The RGs of mention are: RG 1.128, "Installation, Design, and Installation of Large Lead Storage Batteries for Nuclear Power Plants," and RG 1.129, "Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Nuclear Power Plants." (Category 2.a)
  - (a) Provide a plant-specific technical justification for each proposed change in lieu of referencing consistency with the IEEE 450-1995.

- (b) Provide a copy of the proposed battery monitoring and the maintenance program identified in TS 5.5.

## RAI CATEGORIES

(Select only one, most dominant category for each RAI question)

1. More information is needed because of:
  - a. complexity of request
  - b. first-of-a-kind nature of request
  - c. NRC change in regulatory significance or focus
  - d. NRC questions on previously used methodology or guidance
  - e. licensee change to previously used methodology
  - f. licensee reduction in current safety margin
  
2. The review can not be completed without additional explanation or clarification of:
  - a. input variables or analytical assumptions
  - b. methodology used or results obtained
  - c. applicability or bounding nature of third party analyses or data correlations
  - d. differences from NRC guidance documents (SRP, RG, etc.)
  - e. no significant hazards consideration discussion
  - f. environmental considerations discussion
  - g. applicable regulatory requirements discussion
  - h. information that appears to be incorrect and needs to be corrected
  - i. response to previous RAI appears inadequate
  
3. Reviewer requesting information even though the question is, or the question asks for:
  - a. not directly related to the request
  - b. inconsistent with applicable codes, standards, RGs, or SRP sections
  - c. information accessible from readily available sources and was explicitly referenced
  - d. information does not appear needed given the precedent cases discussed in the request
  - e. information that is not safety significant or pertinent to the regulatory finding
  - f. information that is known to engineers who work in the general technical area
  - g. going beyond the current licensing basis and doesn't need to be asked
  - h. a formal commitment
  
4. Other (please specify)