

January 29, 2003

Mr. John L. Skolds, President  
and Chief Nuclear Officer  
Exelon Nuclear  
Exelon Generation Company, LLC  
200 Exelon Way, KSA 3-E  
Kennett Square, PA 19348

SUBJECT: LIMERICK GENERATING STATION, UNITS 1 AND 2 - ISSUANCE OF  
AMENDMENT RE: DC ELECTRICAL POWER SOURCES BASED ON  
TSTF-360 (TAC NOS. MB5257 AND MB5258)

Dear Mr. Skolds:

The Commission has issued the enclosed Amendment No. 164 to Facility Operating License No. NPF-39 and Amendment No. 126 to Facility Operating License No. NPF-85 for the Limerick Generating Station (LGS), Units 1 and 2. These amendments consist of changes to the Technical Specifications (TSs) in response to your application dated May 31, 2002, as supplemented by letter dated October 16, 2002.

These amendments revise TSs 3.8.2.1, "DC Sources-Operating," and 3.8.2.2, "DC Sources-Shutdown"; and add the new Specification 6.8.4.i, "Battery Monitoring and Maintenance Program." The changes also include the relocation of the following TS items to a licensee-controlled program: (1) a number of surveillance requirements that require the performance of preventive maintenance, and (2) certain battery and battery cell parameter values that are periodically verified to monitor early indications of DC subsystem degradation.

A copy of our safety evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

*/RA/*

Scott P. Wall, Project Manager, Section 2  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-352 and 50-353

Enclosures: 1. Amendment No. 164 to  
License No. NPF-39  
2. Amendment No. 126 to  
License No. NPF-85  
3. Safety Evaluation

cc w/encls: See next page

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cc w/encls: See next page

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PUBLIC PDI-2 R/F JClifford SWall MO'Brien BPlatchek, RI NLe  
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Accession Number: ML030290755

OFFICE	PDI-2/PM	PDI-2/LA	RORP/SC	OGC	PD1-2/SC
NAME	SWall	MO'Brien	RDennig	RWeisman	JBoska for JClifford
DATE	01/22/03	01/23/03	SE dated 10/25/02	01/22/03	01/28/03

**Official Record Copy**

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EXELON GENERATION COMPANY, LLC

DOCKET NO. 50-352

LIMERICK GENERATING STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No.164  
License No. NPF-39

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Exelon Generation Company, LLC (the licensee) dated May 31, 2002, as supplemented by letter dated October 16, 2002, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-39 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 164 , are hereby incorporated in the license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days of issuance. Implementation shall include the relocation of Technical Specification requirements to the appropriate licensee-controlled document as identified in the licensee's application dated May 31, 2002, as supplemented by letter dated October 16, 2002, and reviewed in the staff's safety evaluation report enclosed with this amendment. This relocation shall be reflected in the next update of the Updated Final Safety Analysis Report submitted to the Commission pursuant to 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA by JBoska for/*

James W. Clifford, Chief, Section 2  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the  
Technical Specifications

Date of Issuance: January 29, 2003

ATTACHMENT TO LICENSE AMENDMENT NO. 164

FACILITY OPERATING LICENSE NO. NPF-39

DOCKET NO. 50-352

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

<u>Remove</u>	<u>Insert</u>
3/4 8-10	3/4 8-10
-	3/4 8-10a
3/4 8-11	3/4 8-11
3/4 8-12	3/4 8-12
3/4 8-13	3/4 8-13
3/4 8-14	3/4 8-14
-	3/4 8-14a
B 3/4 8-1	B 3/4 8-1
B 3/4 8-1a	B 3/4 8-1a
-	B 3/4 8-1b
-	B 3/4 8-1c
B 3/4 8-2	B 3/4 8-2
B 3/4 8-2a	B 3/4 8-2a
-	B 3/4 8-2b
-	6-14d

EXELON GENERATION COMPANY, LLC

DOCKET NO. 50-353

LIMERICK GENERATING STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 126  
License No. NPF-85

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Exelon Generation Company, LLC (the licensee) dated May 31, 2002, as supplemented by letter dated October 16, 2002, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-85 is hereby amended to read as follows:



(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 126, are hereby incorporated in the license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days of issuance. Implementation shall include the relocation of Technical Specification requirements to the appropriate licensee-controlled document as identified in the licensee's application dated May 31, 2002, as supplemented by letter dated October 16, 2002, and reviewed in the staff's safety evaluation report enclosed with this amendment. This relocation shall be reflected in the next update of the Updated Final Safety Analysis Report submitted to the Commission pursuant to 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA by JBoska for/*

James W. Clifford, Chief, Section 2  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the  
Technical Specifications

Date of Issuance: January 29, 2003

ATTACHMENT TO LICENSE AMENDMENT NO. 126

FACILITY OPERATING LICENSE NO. NPF-85

DOCKET NO. 50-353

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

<u>Remove</u>	<u>Insert</u>
3/4 8-10	3/4 8-10
-	3/4 8-10a
3/4 8-11	3/4 8-11
3/4 8-12	3/4 8-12
3/4 8-13	3/4 8-13
3/4 8-14	3/4 8-14
-	3/4 8-14a
B 3/4 8-1	B 3/4 8-1
B 3/4 8-1a	B 3/4 8-1a
-	B 3/4 8-1b
-	B 3/4 8-1c
B 3/4 8-2	B 3/4 8-2
B 3/4 8-2a	B 3/4 8-2a
-	B 3/4 8-2b
-	6-14d

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 164 AND 126 TO FACILITY OPERATING

LICENSE NOS. NPF-39 AND NPF-85

EXELON GENERATION COMPANY, LLC

LIMERICK GENERATING STATION, UNITS 1 AND 2

DOCKET NOS. 50-352 AND 50-353

1.0 INTRODUCTION

By letter dated May 31, 2002, as supplemented by letter dated October 16, 2002, the Exelon Generation Company, LLC (Exelon, the licensee), submitted a request for proposed license amendments to change the Technical Specifications (TSs) for the Limerick Generating Station (LGS), Units 1 and 2, using Technical Specifications Task Force (TSTF) Standard Technical Specification (TS) Change Traveler TSTF-360, Revision 1, as described in NUREG-1433, "Standard Technical Specifications, General Electric Plants, [Boiling Water Reactor] BWR/4," Revision 2. These amendments would revise TSs 3.8.2.1, "DC Sources-Operating," and 3.8.2.2, "DC Sources-Shutdown"; and add the new Specification 6.8.4.i, "Battery Monitoring and Maintenance Program." The proposed changes also included the relocation of the following TS items to a licensee-controlled program: (1) a number of surveillance requirements that require the performance of preventive maintenance, and (2) certain battery and battery cell parameter values that are periodically verified to monitor early indications of DC subsystem degradation.

The supplement dated October 16, 2002, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* (FR) on September 17, 2002 (67 FR 58643).

The changes associated with TSTF-360, Revision 1, would revise TSs 3.8.2.1 and 3.8.2.2, and are related to the TS Actions and Surveillance Requirements (SRs) of the battery chargers, the batteries, and the DC electrical power subsystem. Less restrictive Actions are proposed for inoperable battery charger(s) as well as for out-of-limits conditions for battery cell voltage, battery float current, electrolyte level, and electrolyte temperature. Additionally, a new administrative TS program is being proposed as TS 6.8.4.i for the maintenance and monitoring of station batteries based on the recommendations of the Institute of Electrical and Electronics Engineers (IEEE) Standard 450-1995, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications."

The licensee stated that the proposed changes are to be consistent, except for format, with NUREG-1433, Revision 2, and with the Nuclear Regulatory Commission (NRC)-approved TSTF-360, Revision 1. Since LGS is not an Improved Standard Technical Specification (ISTS) plant, differences in format from NUREG-1433 and TSTF-360 are required. The TS Bases for LGS TSs 3.8.2.1 and 3.8.2.2 would also be revised to present content consistent with NUREG-1433.

The letter dated May 31, 2002, and the supplement dated October 16, 2002, make reference to new Specification 6.8.4.h. However, Amendment No. 162 to LGS Unit 1 and Amendment No. 124 to LGS Unit 2, both dated October 2, 2002, have recently authorized TS 6.8.4.h as "Technical Specification (TS) Bases Control Program." The NRC staff, therefore, recognizes TS 6.8.4.i, "Battery Monitoring and Maintenance Program," as the properly-referenced section for this current license amendment.

## 2.0 BACKGROUND

### 2.1 TSTF-360

TSTF-360, Revision 1, DC Electrical Rewrite was approved for incorporation into the Standard Technical Specifications (STSs) in NUREG-1433 by the NRC staff on December 18, 2000, by letter from W. D. Beckner, NRC, to A. R. Pietrangelo, Nuclear Energy Institute (NEI). This TSTF provides guidance for the rewrite of current TS requirements for Class 1E DC power supply systems as referenced in the STSs NUREGs, Revision 1, (i.e., NUREG-1430 Babcock & Wilcox, NUREG-1431 Westinghouse, NUREG-1432 Combustion Engineering, NUREG-1433 General Electric (BWR/4), and NUREG-1434 General Electric (BWR/6)). The acceptability of a licensee-proposed rewrite of its DC electrical systems TS requirements will be based on the NRC evaluation of the licensee justifications for each of the changes. This includes justifications for revising, relocating, and removing of current plant specific requirements in order to convert the current TSs 3.8.2.1, 3.8.2.2, and 3.8.2.3 into a format similar to ISTS Limiting Conditions of Operation (LCOs) 3.8.4, 3.8.5, and 3.8.6. A new specification, 6.8.4.i, is also added which is similar to TS 5.5.14 outlined in the TSTF. In general, licensees address the following areas to be consistent with TSTF-360 during conversion of plant TSs to ISTS format:

1. Relocation of preventive maintenance SRs to licensee-controlled programs;
2. Proposing alternate testing criteria for battery charger testing;
3. Replacing battery specific gravity monitoring with float current monitoring;
4. Relocation of maintenance surveillance for cell voltage and electrolyte level based on the industry recommendations in IEEE Standard 450, 1995 Revision, to a licensee-controlled program, and creation of a new TS 5.5[xx] program. This new program 5.5[xx] will be a TS-controlled activity with its detailed requirements relocated to a plant procedure;
5. Addition of specific Actions and increased Completion Times for out-of-limits conditions for battery cell voltage, electrolyte level, and electrolyte temperature;

6. Eliminating the once-per-60-month restriction on replacing the battery service test with the battery modified performance discharge test; and
7. Providing an enhanced TS Bases for each of the revised or newly proposed specifications similar to those of STSs 3.8.4, 3.8.5, and 3.8.6 of the applicable NUREG cited above.

In particular, the NRC staff reviews licensee plant justifications for adopting the various elements of TSTF-360 for consistency with the revised Bases of the TSTF. These Bases were reviewed and accepted by the staff during the review of the TSTF-360, Revision 0, and TSTF-360, Revision 1, which were submitted by the NEI on behalf of the industry on February 4, 2000, and November 6, 2000, respectively.

## 2.2 10 CFR 50.36(c)(2)(ii) Requirements

Section 182a of the Atomic Energy Act requires applicants for nuclear power plant operating licenses to state the TSs to be included as part of the license. The Commission's regulatory requirements related to the content of the TSs are set forth in Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.36. That regulation requires the TSs to include items in five specific categories, including: (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting conditions for operation; (3) surveillance requirements; (4) design features; and (5) administrative controls. However, the regulation does not specify the particular requirements to be included in a plant's TSs.

Under 10 CFR 50.36(c)(2)(ii), a limiting condition for operation must be included in the TSs for any item meeting one or more of the following four criteria:

1. Installed instrumentation that is used to detect, and indicate in the control room a significant abnormal degradation of the reactor coolant pressure boundary;
2. 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 presents a challenge to the integrity of a fission product barrier;
3. 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 the failure of or presents a challenge to the integrity of a fission product barrier; and
4. A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.

As a result, existing TS requirements that fall within or satisfy any of the criteria in 10 CFR 50.36 must be retained in the TSs, while those TS requirements that do not fall within or satisfy these criteria may be relocated to other licensee controlled documents.

### 3.0 EVALUATION OF LICENSEE PROPOSED CHANGES

The staff reviewed the licensee's submittal for conformance to the guidance of TSTF-360, Revision 1, NUREG-1433, Revision 2, and 10 CFR 50.36(c)(2)(ii) regulatory requirements.

The licensee provided the following description of the current 125 Volts (V) electrical power systems for LGS Units 1 and 2: There are four independent divisions of Class 1 E DC systems for each unit; two 125/250 V systems for Divisions 1 and 2 and two 125 V systems for Divisions 3 and 4. Each 125/250 V system is comprised of two 125 V batteries, each with its own charger. Each 125 V system is comprised of one 125 V battery with its own charger. Each Class 1 E battery bank is sized to have sufficient capacity without its charger to independently supply the large break loss-of-offsite-power (LOOP)/loss-of-coolant accident (LOCA) load profile shown in LGS Updated Final Safety Analysis Report (UFSAR) Tables 8.3-18 through 8.3-26 and Figure 8.3-4 for 4 hours. The battery is estimated to be 98% charged when stable charging current measurements are  $\leq 2$  amps for Divisions 1 and 2 batteries, and  $\leq 1$  amp for Divisions 3 and 4 batteries. Each battery is sized to perform its duty cycle at the 98% charged level. When measured at float voltage, the charging current of a fully charged battery is an accurate measure of the capability of the battery.

Each charger is supplied from separate 440 V motor control centers. Each of these motor control centers is connected to an independent Class 1E AC bus. The battery chargers are sized using the formula (1) in IEEE 946-1992, "IEEE Recommended Practice for the Design of DC Auxiliary Power Systems for Generating Stations," Section 6.2. Each Class 1E battery charger has sufficient capacity to supply the largest combined demand of the various steady-state loads and the charging current required to restore the battery from the design minimum charge state to the fully charged state, regardless of the plant status during the time in which these demands occur. The approximate recharge time is 16 hours.

During normal operation, the DC loads are powered from the battery chargers with the batteries floating on the system. In case of the loss of the supply from the charger, the DC loads are automatically supplied from the battery. Loads are diversified among different battery systems so that each system serves loads that are identical and redundant, or are different but redundant to plant safety, or are backup equipment to the AC driven equipment. Where two-channel or four-channel redundancy and separation are required, such as control power for the four diesel generators and the four emergency switchgear assemblies, the loads are divided among the four divisions.

Power required for the larger loads, such as DC motor-driven pumps and valves, is supplied at 250 V from the two 125 V sources of each system, connected in series and distributed through 250 V DC motor control centers. Power required for most DC control functions, such as that required for the control of the 4 kV circuit breakers and control relays, is supplied at 125 V from the several 125 V sources.

### 3.1 Proposed Changes

The proposed changes would revise TSs 3.8.2.1, "DC Sources-Operating," and 3.8.2.2, "DC Sources-Shutdown," and add Specification 6.8.4.i, "Battery Monitoring and Maintenance Program." Section 5.0 of Attachment 1 to the May 31, 2002, letter, presented a numbered summary of these changes. In particular, the proposed changes would:

- (1) provide specific actions and increased restoration time for an inoperable battery charger;
- (2) relocate preventive maintenance surveillance requirements;
- (3) replace battery specific gravity monitoring with battery float current monitoring;
- (4) relocate limiting values for battery float voltage and battery cell voltage, electrolyte level, and temperature, and revise associated surveillance requirements;
- (5) create a new battery monitoring and maintenance program;
- (6) provide specific actions with increased restoration time for certain battery and battery cell parameter out-of-limits conditions;
- (7) eliminate the once-per-60-month restriction on crediting performance discharge test for service test - restrict to "modified" performance discharge test;
- (8) delete excessive surveillance requirements detail of 4.8.2.1.d.2;
- (9) revise battery charger service test 8-hour duration to 4-hours; and
- (10) revise battery performance discharge test 18-month frequency to 12/24 months.

The NRC staff focused its review to determine if the licensee-proposed changes supported the criteria and provisions found in TSTF-360, Revision 1. In Attachment 5 to the May 31, 2002, letter, the licensee provided their revised Bases, for information only, to assist the staff's review of the proposed changes. The staff's review and evaluation of the above proposed changes are as follows:

#### **(1) Provide Specific Actions and Increased Restoration Time for an Inoperable Battery Charger**

- The proposed change would revise the current TS 3.8.2.1 as follows: (i) renumber the existing Action as Action c., ii) add new Action a. to address inoperable battery charger(s), and (iii) move a portion of the existing 3.8.2.1 Action to the end of the Actions as the common default action.

- The proposed change would revise the current TS 3.8.2.2 as follows: (i) renumber the existing Action a. and Action b. as Actions c. and Action d., and (ii) add new Action a., which consists of the following:
  - (a) Ensuring that a battery charging source is applied to the battery within 2 hours (Action a.1: Restore battery terminal voltage to greater than or equal to the minimum established float voltage);
  - (b) Ensuring that the battery is fully recharged within 18 hours (Action a.2: Verify battery float current is within limits); and
  - (c) Restoring the battery charger to operable status within 7 days (Action a.3).

The requirements for the current TS Actions 3.8.2.1 and 3.8.2.2 for an inoperable battery charger are the same as for an inoperable battery or a completely de-energized DC distribution subsystem, which require restoration of battery charger operability within 8 hours.

The proposed new Actions a.1, a.2, and a.3, with their associated restoration times, are to be added to the current specifications for both TSs 3.8.2.1 and 3.8.2.2 to address battery charger inoperability. Each of these Actions addresses the condition where one or both battery charger(s) for any one division becomes inoperable. For TS 3.8.2.1, multiple divisions with inoperable battery charger(s) will result in no longer applying the existing 8-hour restoration time, but will require applying the newly proposed "Otherwise,..." default action.

The proposed new Action a.3 for TSs 3.8.2.1 and 3.8.2.2 also provides a 7-day restoration time for inoperable battery charger(s) on one division. This time is contingent on a focused and tiered approach to assuring adequate battery capability is maintained. The first priority is to minimize the battery discharge, and new Action a.1 assures that the discharge is terminated by requiring that the battery terminal voltage be restored to greater than or equal to the minimum established float voltage within 2 hours. The licensee stated that there is no comparable limitation in the current LGS TSs; therefore, including this proposed new action is more conservative, and it provides for continued safe plant operation.

The proposed new Action a.2 requires that within 18 hours (and continuing at 12-hour intervals), verification is made that the battery has sufficient capacity to perform its assumed duty cycle. The 18-hour time is proposed since there may be involved some recharging of lost capacity that occurred during the initial 2 hours. This action provides a reasonable time to fully recharge the battery. In approving TSTF-360, Revision 1, the NRC staff provided criteria for establishing a plant-specific time for this recharging allowance. These criteria also apply for the LGS proposed Action b.2 restoration time, which is based on TSTF-360, Revision 1, and NUREG-1433, Specification 3.8.6, Required Action B.2. The criteria state that plants that cannot meet the 12-hour Completion Time due to an inherent battery charging characteristic can propose an alternate time equal to 2 hours plus the time experienced to accomplish the exponential charging current portion of the battery charge profile following the service test.

The licensee stated that LGS UFSAR, Section 8.3.2.1.1.3, presents the LGS-specific recharge time as "approximately 16 hours." Given this, the appropriate LGS restoration time applicable to the new proposed Action a.2 is proposed as 2 hours plus 16 hours – or 18 hours. Given that the DC bus remains energized (as required by Specification 3.8.3.1 or 3.8.3.2), the battery



discharge, if it was occurring, is terminated by Action a.1, and the battery is fully recharged by Action a.2; and therefore, it is reasonable to extending the restoration time for an inoperable charger beyond the existing 8-hour limit to 7 days [as proposed in new Action a.3.]

Based on the above review, the NRC staff finds the proposed change to revise current TS Actions 3.8.2.1 and 3.8.2.2 to be consistent with TSTF-360, Revision 1, NUREG-1433, Revision 2, STS Actions 3.8.4.A.1, A.2, and A.3. The proposed change also focuses efforts on retaining battery capabilities, retaining the requirement for charger operability, and applying a reasonable restoration time for an inoperable battery charger to avoid an unnecessary plant shutdown transient. Therefore, the proposed change is acceptable.

## **(2) Relocate Preventive Maintenance Surveillance Requirements**

- The proposed change relocates existing SRs 4.8.2.1.b.2, c.1, c.2, and c.3, and the conditional performance requirements (battery discharge or overcharge) specified in current specification 4.8.2.1.b, to the plant Technical Requirement Manual (TRM).

The licensee stated that the basic premise of TS Surveillances, based on 10 CFR 50.36, is that SRs represent the minimum acceptable requirements for operability of the required equipment. However, for existing SRs 4.8.2.1.b.2, c.1, c.2, and c.3 and the conditional performance requirements specified in SR 4.8.2.1.b, failure to meet the requirements does not necessarily mean that the equipment is not capable of performing its safety function, and the corrective action is generally a routine or preventive maintenance type activity.

- The proposed change relocates the following SRs:
  - (a) SR 4.8.2.1.b (conditional performance requirements after a battery discharge or overcharge);
  - (b) SR 4.8.2.1.b.2 (verification of visible corrosion or battery connection resistance);
  - (c) SR 4.8.2.1.c.1 (verification of physical damage or deterioration of battery cells, cell plates, and racks),
  - (d) SR 4.8.2.1.c.2 (removal of visible corrosion, tightening terminal connections, and coating the terminals); and
  - (e) SR 4.8.2.1.c.3 (verification of battery connection resistance).

The licensee stated that the above SR activities will be included in the TRM and controlled under the plant maintenance program, which will be based on the recommendations of IEEE Standard 450-1995. All future changes related to these above activities are, therefore, subject to review under 10 CFR 50.59, "Changes, tests, and experiments," to determine if the proposed changes will require prior NRC review and approval, and will require reporting of all changes to the NRC in accordance with 10 CFR 50.71(e), "Maintenance of records, making of reports."

As stated in the current Bases, sub-tier portions of SR 4.8.2.1.b, related to the battery terminal voltage conditional performance requirements after a battery discharge or overcharge, refer to maintenance activities. SR 4.8.2.1.b.2 identifies the removal of visible corrosion and tightening of terminal connections as a preventive maintenance SR. Additionally, SR 4.8.2.1.c.1, which refers to visible inspections for physical damage or deterioration that could potentially degrade battery performance, reflects ongoing preventive maintenance activities rather than requirements for the battery to perform its safety function. These activities are inappropriate for operability SRs and are better controlled under the maintenance programs for batteries.

SR 4.8.2.1.c.2 and c.3 verify conditions of terminal connections, and vendor-recommended values of resistance at which some action should be taken and not necessarily when the operability of the battery is in question. The safety analyses do not assume a specific battery resistance value, but assume the batteries will supply adequate power. Therefore, a key parameter is the overall battery resistance. Between SRs, the resistance of each connection varies independently from all the others. The NRC staff concurs that some of the connection resistances may be higher or lower than others, and the battery may still be able to perform its function and thus should not be considered inoperable solely because one connector's resistance is high. Overall resistance has a direct impact on operability; however, it is adequately determined as acceptable through completion of the battery service and discharge tests. Based on this review, the NRC staff finds the proposed relocation of these SRs to be consistent with IEEE-450 and the Bases in TSTF-360. Further, upon their relocation to the licensee-controlled document, TRM, they will be under the control of 10 CFR 50.59; and therefore, the relocation is acceptable.

### **(3) Replace Battery Specific Gravity Monitoring with Battery Float Current Monitoring**

- The proposed change would remove the specific gravity limits of Table 4.8.2.1-1, associated Footnotes (5) and (6), and associated portions of existing SRs 4.8.2.1.a.1 and 4.8.2.1.b.1 from plant specifications.
- The proposed change would add new SR 4.8.2.1.a.1 and require that Divisions 1 and 2 battery float current is  $\leq 2$  amps, and Divisions 3 and 4 battery float current is  $\leq 1$  amp, when battery terminal voltage is greater than or equal to the minimum established float voltage of SR 4.8.2.1.a.2.
- The proposed change would add new Action b.2 for both TSs 3.8.2.1 and 3.8.2.2 and impose the requirement to restore battery float current to within these limits within 18 hours. This would replace the existing Table 4.8.2.1-1 Footnotes (1), (2), and (3) action times as they apply to specific gravity measurements that are out of limits.

The licensee stated that existing LGS SRs 4.8.2.1.a.1 and 4.8.2.1.b.1, in conjunction with Table 4.8.2.1-1, require monitoring of the specific gravity for individual cells and the average of connected cells. However, the provision of Table 4.8.2.1-1, Footnote (6), allows battery charging current to be verified at  $\leq 1$  amp when on float charge to be substituted for all specific gravity measurements except the quarterly verification against current TS Table 4.8.2.1-1 Category B Limits. The NRC staff finds that the new SRs 4.8.2.1.b.1 and 4.8.2.2.b.1, for TSs 3.8.2.1 and 3.8.2.2 respectively, will impose the requirement to restore battery float current for

the Divisions 1 and 2 batteries to  $\leq 2$  amps, and for Divisions 3 and 4 batteries to  $\leq 1$  amp, within 18 hours. This will replace the existing TS Table 4.8.2.1-1 Footnotes (1), (2), and (3) action times as they apply to specific gravity measurements that are out of limits.

The NRC staff finds that the new Action b.2 for both TSs 3.8.2.1 and 3.8.2.2 will impose the requirement to restore battery float current to within these limits within 18 hours. This will replace the existing Table 4.8.2.1-1 Footnotes (1), (2), and (3) action times as they apply to specific gravity measurements that are out of limits. Use of float current to determine the state of charge of the battery is consistent with Section 4.5 of IEEE Standard 450-1995. The licensee proposed that the battery float current limit applicable to Divisions 1 and 2 batteries (1500 amp-hour batteries) be 2 amps, and the restoration time be within 18 hours. These requirements are supported by LGS UFSAR Section 8.3.2.1.1.3(2). The licensee also stated that the battery is estimated to be 98% charged when stable charging current measurements are  $\leq 2$  amps for the Divisions 1 and 2 batteries, and  $\leq 1$  amp for the Divisions 3 and 4 batteries (which are 250 amp-hour batteries). Each battery is sized to perform its duty cycle at the 98% charged level. Given the existing TS allowance and UFSAR support for utilizing float current to determine the state of charge of the battery, the staff finds that the proposed float currents are consistent with IEEE Standard 450, and thus deleting the requirement for specific gravity measurements will not have a significant impact on safety or the ability to accurately determine the operability of the batteries; and therefore, the proposed TS is acceptable. The NRC staff also finds the above proposed change to be consistent with LGS UFSAR Section 8.3.2.1.1.3(2), criteria given in TSTF-360, Revision 1, and NUREG-1433, Revision 2.

**(4) Relocate Limiting Values for Battery Float Voltage and Battery Cell Voltage, Electrolyte Level, and Temperature and Revise Associated Surveillance Requirements**

- The proposed change would relocate the following specifications from the current TSs to the Bases or to the Technical Requirement Manual (TRM):
  - (a) The specific value for battery float voltage in SR 4.8.2.1.a.2 and in existing SR 4.8.2.1.c.4 (renumbered SR 4.8.2.1.d.1);
  - (b) The specific value for cell electrolyte temperature in SR 4.8.2.1.b.3; and
  - (c) The Table 4.8.2.1-1 Category A and B Limits for cell float voltage and all Table 4.8.2.1-1 limits for electrolyte level.
- The proposed change would revise the following specifications:
  - (a) The frequency of monitoring battery cell voltage and electrolyte level (proposed 4.8.2.1.b.1 and b.2) would be revised from the existing 7 days for pilot cell and 92 days for each connected cell, to 31 days for each pilot cell voltage and each connected cell level;

- (b) Electrolyte temperature monitoring of pilot cells (proposed SR 4.8.2.1.b.3) would replace monitoring of every sixth-cell; and
- (c) Table 4.8.2.1-1 Footnote (4) would be deleted.

The licensee stated that the basic premise of TS Surveillances based on 10 CFR 50.36 is that SRs represent the minimum acceptable requirements for operability of the required equipment. However, failure to meet the requirements for the following current specification requirements does not necessarily mean that the equipment is not capable of performing its safety function, and the corrective action is generally a routine or preventive maintenance type activity:

- (a) the specific value for battery float voltage in SR 4.8.2.1.a.2;
- (b) the specific value for cell electrolyte temperature;
- (c) all Table 4.8.2.1-1 limits for electrolyte level and Category A and B Limits for cell float voltage (including Footnote 4);
- (d) the frequency of monitoring battery cell voltage and electrolyte level (proposed SRs 4.8.2.1.b.1 and b.2); and
- (e) the change to pilot cell temperature monitoring from averaging every sixth cell.

The proposed change would relocate the above requirements from the current TSs (the specific value of the minimum float voltage requirement would be revised to state "greater than or equal to the minimum established float voltage"), and would include current limits and actions in the TRM or TS Bases or controlled under the plant maintenance program which will be based on the recommendations of IEEE Standard 450-1995. The licensee stated that all changes made to these relocated items will be subject to review under 10 CFR 50.59 to determine if the proposed changes will require prior NRC review and approval, and will require reporting of all changes to the NRC in accordance with 10 CFR 50.71(e).

Based on the above, the NRC staff finds the above proposed change to be consistent with 10 CFR 50.36(c)(2)(ii), and provides adequate assurance of system operability commensurate with the safety significance; and therefore, the proposed change is acceptable. In addition, the proposed change is consistent with the criteria in TSTF 360, Revision 1, and NUREG-1433, Revision 2.

#### **(5) Create New Battery Monitoring and Maintenance Program**

- The proposed change would add Specification 6.8.4.i, "Battery Monitoring and Maintenance Program," to provide time for restoration and maintenance, based on the recommendations of IEEE Standard 450-1995. The new TS would provide for the following:
  - (a) Actions to restore battery cells with float voltage < 2.13 volts; and

- (b) Actions to equalize and test battery cells that have been discovered with electrolyte levels below the minimum established design limit.

The licensee proposed that the existing battery cell voltage TS Table 4.8.2.1-1 Category A and B Limits of 2.13 volts be relocated to a new Administrative Controls Specification, TS 6.8.4.i, "Battery Monitoring and Maintenance Program." This program would also require that restoration and maintenance of this limit be provided. The existing actions of Table 4.8.2.1-1, Footnotes (1) and (2), would be relocated to the implementing procedures for this new program, and supplemented with IEEE Standard 450-1995 corrective actions to address the restoration and maintenance of the battery when cells below this limit are discovered. Furthermore, the licensee proposed new limitations in TS 6.8.4.i that would require provisions to equalize and test battery cells that have been discovered with electrolyte level below the minimum established design limit. Testing of these cells would be based on the informational Annex D attached to IEEE Standard 450-1995.

Based on the above, the NRC staff finds the proposed change to be consistent with TSTF-360, Revision 1, and NUREG-1433, Revision 2. In addition, the staff finds that the proposed relocated cell voltage limit and the new programmatic requirements associated with the new Battery Monitoring and Maintenance Program will ensure that the batteries are maintained in a highly reliable condition. The change is therefore acceptable.

**(6) Provide Specific Actions with Increased Restoration Time for Certain Battery and Battery Cell Parameter Out-Of-Limits Conditions**

- The proposed change would add new Action b. (b.1, b.2, b.3, b.4, b.5, and b.6) to TSs 3.8.2.1 and 3.8.2.2. New Action b. would replace existing Table 4.8.2.1-1 Footnotes (1), (2), and (3) (which provided Action restoration times for out-of-limits parameters) and would provide for the following:
  - (a) Actions to impose a 24-hour restoration time for cell voltages < 2.07 volts (Action b.1);
  - (b) Actions to restore cell electrolyte level to the top of the plates within 8 hours and verify no evidence of leakage is found within 12 hours; and Actions to impose a 31-day restoration time of cell electrolyte level to minimum established design limits (Action b.3);
  - (c) Actions to restore pilot cell electrolyte temperature to the minimum established design limits within 12 hours (Action b.4);
  - (d) Actions to restrict any concurrent degradations to one DC division (Action b.5); and
  - (e) Actions to impose a 2-hour restoration time for any battery having cell(s) voltage < 2.07 volts and a float current not within limits (Action b.6).

- The proposed change would also revise the existing Action for TS 3.8.2.1 (renumbered as Action c.) to be more restrictive in allowing the 2-hour restoration time to be applied only when battery(ies) on one division are inoperable.

The proposed new Action b to TSs 3.8.2.1 and 3.8.2.2. would replace existing TS Table 4.8.2.1-1, Footnotes (1), (2), and (3), (which provided Action for out of limits parameters) in the following manner:

- (a) (Action b.1) – Cell voltages < 2.07 volts with restoration time of 24 hours. With any cell voltage < 2.07 volts, the battery is considered degraded. The Action is to verify: (1) the battery terminal voltage to be greater than or equal to minimum established float voltage; and (2) the battery float current is within limits. Indications that float current > 2 amps for Division 1 or 2, and with float current > 1 amp for Division 3 or 4 are signs indicating that a partial discharge of the battery capacity has occurred; and thus the proposed (Action b.2) requires that within 2 hours, verification of the required battery charger operability is made by monitoring the battery terminal voltage. These above proposed actions assure that there is still sufficient capacity in the battery to perform its intended function. Continued operations up to 24 hours is permitted to allow the restoration of the affected cells' voltage to  $\geq 2.07$  volts.
- (b) (Action b.3) – Cell electrolyte level less than minimum established design limits with restoration time of 31 days provided level is above the top of the plates within 8 hours and no evidence of leakage is found within 12 hours. The footnote to Action b.3 assures verification that there is no evidence of leakage and is completed regardless of when electrolyte level is restored. If the level is above the top of the battery plates, but below the minimum established design limit, the battery still has sufficient capacity. With the electrolyte level below the top of the plates, there is a potential for dryout and plate degradation. These Actions restore the level and ensure that the cause of the loss of electrolyte level is not due to a leak in the battery casing. These actions are only required if the level in the battery is found below the top of the battery plates. In addition, the Battery Monitoring and Maintenance Program described in proposed TS 6.8.4.i and discussed under paragraph (5) above, would require action, based on IEEE Standard 450-1995, to equalize and test battery cells that have been discovered with an electrolyte level below the minimum established level limit.
- (c) (Action b.4) – Pilot cell electrolyte temperature less than minimum established design limits with restoration time of 12 hours. A low electrolyte temperature limits the current and power available from the battery. However, because the battery is sized with adequate margins to perform its intended functions (refer to UFSAR Section 8.3.2.1.1.2), the proposed 12-hour restoration time is reasonable to reestablish the battery electrolyte temperature.

- (d) (Action b.5) – This Action restricts any concurrent degradations to one DC division. If two or more batteries are degraded for any parameters discussed above, there is not sufficient assurance that the DC system will be able to perform its intended function. With two batteries with an out-of-limit parameter, loss of an assumed function for systems that depend upon the batteries is possible. Thus, it is proposed that battery parameters be restored to within limits on at least one division within 2 hours.
- (e) (Action b.6) – This Action imposes a 2-hour restoration time for any battery having cell(s) voltage < 2.07 volts and a float current not within limits. Discovering one or more batteries in one division with one or more battery cell float voltages < 2.07 volts and float current not within limits indicates that the battery capacity may not be sufficient to perform the intended functions. This 2-hour restoration time is more restrictive than the current requirement. In addition, the licensee proposed to delete the current specification for electrolyte temperature compensation for cell voltage, an optional allowance which is not required for mild environment applications.

The licensee also stated that while the above proposed new Actions provide increased restoration time for various battery and battery charger degradations, the existing Action for TS 3.8.2.1 (renumbered Action c.) is being made more restrictive in allowing the 2-hour restoration time to be applied only when battery(ies) on one division are inoperable. For TS 3.8.2.1, multiple divisions with inoperable battery(ies) will result in no longer applying the existing 8-hour restoration time, but will require applying the newly proposed "Otherwise, ..." default Action, which will be more restrictive than the current TS requirements.

Based on the above, the NRC staff finds the above proposed change to be consistent with TSTF-360, Revision 1, and NUREG-1433, Revision 2. In addition, the staff finds that the proposed change imposes additional restrictions, and will continue to maintain plant safety; and therefore, is acceptable.

**(7) Eliminate Once-per-60-Month Restriction on Crediting Performance Discharge Test for Service Test - Restrict to "Modified" Performance Discharge Test**

- The proposed change would revise SR 4.8.2.1.e, (which currently allows a battery performance discharge test) to be performed in lieu of a battery service test once-per-60 months, and allow unrestricted substitution. However, only a "modified" performance discharge test is allowed to satisfy this substitution.

SR 4.8.2.1.e, which currently allows a battery performance discharge test to be performed in lieu of a battery service test once-per-60 months, would be revised to allow unrestricted substitution; however, only a "modified" performance discharge test is allowed to satisfy this substitution. Since the modified performance discharge test completely encompasses the load profile of the battery service test, the staff finds it adequate to perform in place of the service test to verify the battery capacity to supply the design-basis load profile.

Based on the above, the NRC staff finds the above proposed change to be consistent with TSTF-360, Revision 1, and NUREG-1433, Revision 2. Further, the staff finds that the proposed change provides for appropriate verification of battery capacity, and will continue to maintain plant safety; and therefore, is acceptable.

**(8) Delete Excessive Surveillance Requirement Detail of 4.8.2.1.d.2**

- The proposed editorial change would delete SR 4.8.2.1.d.2, which reflects a specific method of performing the battery service test that is also required by SR 4.8.2.1.d.1.

The NRC staff reviewed the current SR 4.8.2.1.d.2 and finds that the SR specifies a testing method for testing battery capacity that is also required by SR 4.8.2.1.d.1 to maintain OPERABLE status for the battery to meet the required emergency loads. Thus the proposed change is editorial in nature; and therefore, is acceptable.

**(9) Revise Battery Charger Service Test 8-Hour Duration to 4 Hours**

- The proposed change would revise SR 4.8.2.1.c.4 (renumbered SR 4.8.2.1.d.1), which currently requires battery charger testing for at least 8 hours, to require a 4-hour duration.

The proposed change revises SR 4.8.2.1.c.4 (being renumbered SR 4.8.2.1.d.1), which currently requires battery charger testing for at least 8 hours, to require a 4-hour duration. The licensee stated that the 8-hour duration in the current TS is based on engineering judgment. According to NUREG-1433 Bases, the duration is intended to provide sufficient time for the battery charger temperature to have stabilized and have been maintained for 2 hours. The battery manufacturer has confirmed that, while operating at rated current, the battery charger electronic components reach temperature stability within 2 hours. The NRC staff finds the proposed change to a 4-hour duration meets the criteria in TS-360, Revision 1, and NUREG-1433, Revision 2. The staff also finds that the proposed change provides for the intended 2-hour operation at stable temperature, and will continue to maintain plant safety; and therefore, is acceptable.

**(10) Revise Battery Performance Discharge Test 18-Month Frequency to 12/24 Months**

- The proposed change would revise SR 4.8.2.1.f to require accelerated frequency for performance discharge tests or modified performance discharge tests from the current frequency of 18 months to:
  - (a) 12 months for batteries that show signs of degradation or have reached 85% of the expected service life with capacity < 100% of manufacturer's rating; and
  - (b) 24 months for batteries that have reached 85% of the expected service life with capacity  $\geq$  100% of manufacturer's rating;



- The proposed change would relocate the definition of "degraded" within the existing SR 4.8.2.1.f to the Bases.

The current SR 4.8.2.1.f requires accelerated frequency for performance discharge tests or modified performance discharge tests. The current frequency of 18 months would be revised to: (i) 12 months for batteries that show signs of degradation or have reached 85% of the expected service life with capacity < 100% of manufacturer's rating, and (ii) 24 months for batteries that have reached 85% of the expected service life with capacity  $\geq$  100% of manufacturer's rating. These revised frequencies are consistent with the 1995 Edition of IEEE Standard 450, Section 5.2.c. The licensee stated that the definition of "degraded" within the existing SR 4.8.2.1.f is relocated to the Bases while committed to the 1995 Edition of IEEE Standard 450.

The NRC staff finds the proposed change revises accelerated frequency for performance discharge tests or modified performance discharge tests for SR 4.8.2.1.f meets criteria in TS-360, Revision 1, and NUREG-1433, Revision 2. In addition, the staff finds that the proposed change is more restrictive, and will continue to maintain plant safety; and therefore, is acceptable.

The above proposed changes have adequately addressed the following areas included in TSTF-360: (1) provided a specific Action & increased Completion Time for an inoperable battery charger, (2) relocated preventive maintenance SRs to licensee-controlled programs, (3) proposed alternate testing criteria for battery charger testing, (4) replaced battery specific gravity monitoring with float current monitoring, (5) relocated maintenance surveillances for cell voltages and electrolyte levels to a licensee-controlled program based on recommendations from IEEE Standard 450-1995, (6) provided specific Actions and increased restoration times for out-of-limits conditions for battery cell voltages, electrolyte levels, and electrolyte temperatures, (7) provided enhanced TS Bases for each of the newly proposed TSs 3.8.4 and 3.8.5, and (8) eliminated the once-per-60-month restriction on replacing the battery service test with the battery modified performance discharge test.

The NRC staff also reviewed the licensee's justifications for adopting the various elements of TSTF-360 for consistency with the revised wording in the Bases submittal by the licensee and with the Bases of the staff-approved TSTF. The associated Bases provided in the licensee's May 31, 2002, submittal were reviewed against those Bases that were accepted by the staff during the review of TSTF-360, Revision 0, and TSTF-360, Revision 1, (submitted by NEI on behalf of the industry on February 4, 2000, and November 6, 2000, respectively). Because the NRC staff finds the proposed revised Bases to contain wording that is consistent with that of the staff-approved wordings in TSTF-360, Revision 1, the NRC staff has no objection to the proposed Bases.

### 3.2 Summary

The NRC staff has reviewed the proposed changes to revise TSs 3.8.2.1, "DC Sources-Operating," and 3.8.2.2, "DC Sources-Shutdown," for the Limerick Generating Station, Units 1 and 2. The staff also reviewed the addition of new Specification 3.8.4.i, "Battery Monitoring and Maintenance Program," and associated revised Bases pages based on guidance and applicable regulatory requirements from TSTF-360, Revision 1, NUREG-1433, Revision 2, 10 CFR 50.36(c)(2)(ii), and 10 CFR 50.65. The changes are related to the conditions, required Actions, restoration times, and SRs of the batteries, the battery chargers, and the DC electrical power subsystems. Additionally, the changes proposed the relocation of a number of existing SRs that require performance of preventive maintenance, and the existing TS Table 4.8.2.1-1, "Battery Surveillance Requirements," to a licensee-controlled program. As described above, the NRC staff finds the proposed changes consistent with TSTF-360, Revision 1, NUREG-1433, Revision 2, 10 CFR 50.36(c)(2)(ii), and 10 CFR 50.65 requirements. For the reasons set forth above, the NRC staff finds the proposed changes acceptable.

### 4.0 REGULATORY COMMITMENTS

The licensee included regulatory commitments in its application. The commitments relevant to the NRC staff evaluations are listed in the following table and are reflected in the TS Bases, as appropriate.

COMMITMENT	Due Date/Event
The existing LGS commitments to IEEE Standard 450, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Application," will be revised to reflect commitment to the 1995 Edition of IEEE Standard 450, with the exception of specific gravity monitoring frequency.	Implemented with implementation of this License Amendment

### 5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Pennsylvania State official was notified of the proposed issuance of the amendments. The State official had no comments.

### 6.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20, and change surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (67 FR 58643). This amendment also relates to changes in

recordkeeping, reporting, or administrative procedures or requirements. Accordingly, the amendments meet the eligibility criteria for categorical exclusions set forth in 10 CFR 51.22(c)(9) and (10). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

## 7.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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Date: January 29, 2003