

September 28, 2006

Mr. Christopher M. Crane
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: RELOCATE SURVEILLANCE TEST INTERVALS TO
LICENSEE-CONTROLLED PROGRAM (TAC NOS. MC3567 AND MC3568)

Dear Mr. Crane:

The Commission has issued the enclosed Amendment No. 186 to Facility Operating License No. NPF-39 and Amendment No. 147 to Facility Operating License No. NPF-85 for the Limerick Generating Station, Units 1 and 2, respectively. These amendments consist of changes to the Technical Specifications (TSs) in response to your application dated June 11, 2004, as supplemented by letters dated December 12, 2005, April 4, 2006, and July 28, 2006.

These amendments would relocate surveillance test intervals of various TS surveillance requirements to a new program, the Surveillance Frequency Control Program, located in the Administrative Controls section of the TSs. The proposed amendments are pilot submittals in support of the Boiling Water Reactor Owners' Group Risk-Informed Initiative 5b, "Relocate Surveillance Test Intervals to Licensee Control."

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/

Richard V. Guzman, Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-352 and 50-353

Enclosures:

1. Amendment No. 186 to NPF-39
2. Amendment No. 147 to NPF-85
3. Safety Evaluation

cc w/encls: See next page

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The Commission has issued the enclosed Amendment No. 186 to Facility Operating License No. NPF-39 and Amendment No. 147 to Facility Operating License No. NPF-85 for the Limerick Generating Station, Units 1 and 2, respectively. These amendments consist of changes to the Technical Specifications (TSs) in response to your application dated June 11, 2004, as supplemented by letters dated December 12, 2005, April 4, 2006, and July 28, 2006.

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Office of Nuclear Reactor Regulation

Docket Nos. 50-352 and 50-353

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1. Amendment No. 186 to NPF-39
2. Amendment No. 147 to NPF-85
3. Safety Evaluation

cc w/encls: See next page

DISTRIBUTION:

PUBLIC LPL1-2 R/F RidsNrrDorLp11-2 RidsNrrPMRGuzman
RidsOgcRp GHill (4) RidsNrrDirsltsb RidsNrrPMJKim
RidsDeEeeb RidsDraSpsb RidsNrrLACRaynor RidsRgn1MailCenter

Package Accession Number: **ML062420047**

Amendment Accession Number: **ML062420049**

TSs Accession Number: **ML062720028**

OFFICE	LPL1-2/PE	LPL1-1/PM	LPL1-2/LA	SPSB/BC	EEEB/BC	ITSB/BC	OGC	LPL1-2/BC(A)
NAME	JKim:rsa	RGuzman	CRaynor	LMrowca	GWilson	TKobetz	MZobler	BPoole
DATE	8/29/06	9/5/06	9/1/06	8/31/06	8/31/06	8/30/06	9/21/06	9/28/006

OFFICIAL RECORD COPY

Limerick Generating Station, Unit Nos. 1 and 2

cc:

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Director, Bureau of Radiation Protection
Pennsylvania Dept. of Environmental
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Chairman
Board of Supervisors of Limerick Township
646 West Ridge Pike
Linfield, PA 19468

Dr. Judith Johnsrud
National Energy Committee
Sierra Club
433 Orlando Avenue
State College, PA 16803

EXELON GENERATION COMPANY, LLC

DOCKET NO. 50-352

LIMERICK GENERATING STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 186
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 June 11, 2004, as supplemented by letters dated December 12, 2005, April 4, 2006, and July 28, 2006, 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:

Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 186, 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.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Brooke D. Poole, Acting Chief
Plant Licensing Branch 1-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Facility Operating License and
Technical Specifications

Date of Issuance: September 28, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 256

FACILITY OPERATING LICENSE NO. NPF-39

DOCKET NO. 50-352

Replace the following page of Facility Operating License No. NPF-39 with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Remove
3

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

Remove

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EXELON GENERATION COMPANY, LLC

DOCKET NO. 50-353

LIMERICK GENERATING STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 147
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 June 11, 2004, as supplemented by letters dated December 12, 2005, April 4, 2006, and July 28, 2006, 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:

Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 147, are hereby incorporated into this license. Exelon Generation Company, LLC 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.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Brooke D. Poole, Acting Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Facility Operating License and
Technical Specifications

Date of Issuance: September 28, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 147

FACILITY OPERATING LICENSE NO. NPF-85

DOCKET NO. 50-353

Replace the following page of Facility Operating License No. NPF-85 with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

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

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6-14d

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 186 AND 147 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 application dated June 11, 2004 (Reference 1), Exelon Generating Company, LLC (the licensee) submitted a license amendment request (LAR) for a change to the Limerick Generating Station (LGS), Units 1 and 2 facility operating licenses in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.90. The Nuclear Regulatory Commission (NRC or the Commission) staff issued requests for additional information (RAI) on October 18, 2005, and May 31, 2006, with the licensee and the Nuclear Energy Institute (NEI) providing formal RAI responses on December 12, 2005, April 4, 2006, and July 28, 2006 (References 2, 3 and 4, respectively). The supplements provided additional information that clarified the application, but 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* on May 24, 2005 (70 FR 29793).

1.1 Proposed License Amendments

The proposed amendments would relocate the surveillance frequencies, also known as surveillance test intervals (STIs), of various technical specification (TS) surveillance requirements (SRs) from the TSs to a licensee-controlled document, which would be controlled in accordance with the requirements stipulated in a new program, the Surveillance Frequency Control Program (SFCP) in the Administrative Controls Section of the TSs. Revisions to the STIs would be made in accordance with the SFCP and NEI 04-10 Rev. 0, July 2006, as discussed below.

The amendment request was a pilot submittal in support of Risk-informed Technical Specifications Task Force Initiative 5b. NEI has separately developed a risk-informed methodology, documented in NEI 04-10, Rev. 0, July 2006, (Reference 5), which provides a method to evaluate and revise STIs within the SFCP in support of Initiative 5b. This methodology document was separately submitted to the NRC for review, has been approved, and is to be referenced in the SFCP and incorporated by reference into the Administrative Controls Section of the TSs.

The licensee proposed to replace various STIs specified within individual SRs with a reference to the licensee-controlled program with the words "in accordance with the Surveillance Frequency Control Program." The proposed change is applied to surveillances that are performed on a fixed periodicity, which are identified by the licensee in its LAR. The proposed change is not applied to STIs which meet the following criteria:

- (a) the STI has no time component but is purely event driven; or
- (b) the STI is event driven but has a time component for a one-time performance of the surveillance; or
- (c) the STI already references an established and approved licensee program rather than a specific interval.

A new TS Section 6.8.4.j, "Surveillance Frequency Control Program," is added to describe the means for licensee control of surveillance frequencies within the licensee-controlled document. The proposed wording is as follows, and is consistent with NEI 04-10, Rev. 0:

6.8.4.j Surveillance Frequency Control Program

This program provides controls for surveillance frequencies. The program shall ensure that surveillance requirements specified in the technical specifications are performed at intervals sufficient to assure the associated limiting conditions for operation are met.

- a. The Surveillance Frequency Control Program shall contain a list of frequencies of those surveillance requirements for which the frequency is controlled by the program.
- b. Changes to the frequencies listed in the Surveillance Frequency Control Program shall be made in accordance with NEI 04-10, "Risk-Informed Method for Control of Surveillance Frequencies," Revision 0.
- c. The provisions of Surveillance Requirements 4.0.2 and 4.0.3 are applicable to the Frequencies established in the Surveillance Frequency Control Program.

1.2 Related NRC Activities

This LAR is related to NEI 04-10 (Reference 5), which was submitted by NEI on behalf of the nuclear industry for NRC review and approval. The staff review and approval of NEI 04-10 Rev. 0, for referencing in licensing actions by licensees wishing to adopt risk-informed Initiative 5b for implementation of an SFCP has proceeded in parallel with this LAR, which is an industry pilot for the process. The licensee has proposed that changes made to surveillance frequencies within the SFCP will be made in accordance with the requirements of NEI 04-10 Rev. 0, as referenced in the Administrative Controls Section of the TSs. Therefore, issues that the NRC staff is separately considering in the review and approval of NEI 04-10 Rev. 0, were considered in evaluating this LAR.

2.0 REGULATORY EVALUATION

In 10 CFR 50.36, the Commission established its regulatory requirements related to the content

of TSs. Pursuant to 10 CFR 50.36, TSs are required to include items in the following five specific categories related to station operation: (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting conditions for operation; (3) SRs; (4) design features; and (5) administrative controls. The rule does not specify the particular requirements to be included in a plant's TSs. As stated in 10 CFR 50.36(c)(3), "Surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met."

Certain General Design Criteria (GDC) in 10 CFR 50 Appendix A require that systems be testable. In particular, GDC 17, "Electric power systems," requires, in part, that nuclear power plants have onsite and offsite electric power systems to permit the functioning of structures, systems, and components (SSCs) that are important to safety. The onsite system is required to have sufficient independence, redundancy, and testability to perform its safety function, assuming a single failure. GDC-18, "Inspection and testing of electric power systems," requires that electric power systems that are important to safety shall be designed to permit appropriate periodic inspection and testing to assess the continuity of the systems and the condition of their components. In addition, in some cases industry codes and standards recommend frequencies for the performance of surveillances, which should be considered in the determination of STIs.

The SFCP shall ensure that SRs specified in the TSs are performed at intervals sufficient to assure the above NRC regulatory requirements are met. Existing regulatory requirements, such as 10 CFR 50.65 (requirements for monitoring the effectiveness of maintenance at nuclear power plants) and 10 CFR Part 50, Appendix B (Quality Assurance Criteria), require monitoring of surveillance test failures and action be taken to address such failures. One of these actions may be to consider increasing the frequency at which a surveillance is performed. In addition, the SFCP implementation guidance NEI 04-10 requires monitoring of surveillance test performance for which surveillance frequencies are changed.

Changes to surveillance frequencies in the SFCP using NEI 04-10, including qualitative considerations, results of risk analyses, sensitivity studies, and any bounding analyses, and recommended monitoring of SSCs, are required to be documented. This documentation may be subject to regulatory review. In addition, the SFCP implementation will be subject to regulatory oversight.

These regulatory requirements, and the monitoring required by NEI 04-10, ensure that surveillance frequencies which are insufficient to assure the requirements of 10 CFR 50.36 are satisfied, will be identified and appropriate corrective actions taken.

3.0 TECHNICAL EVALUATION

The licensee is required, by TSs, to follow NEI 04-10, which provides a risk-informed method to change surveillance frequencies. Probabilistic risk assessment (PRA) methods are used, in combination with plant performance data and other considerations, to identify and justify modifications to the surveillance frequencies of equipment at nuclear power plants. This is in accordance with guidance provided in Regulatory Guides (RGs) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," and 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," (References 6 and 7, respectively) in support of changes to surveillance test intervals.

RG 1.174 and RG 1.177 identify five key safety principles to be met for risk-informed changes to TSs. Each of these principles is addressed by the industry methodology document NEI 04-10, as discussed below.

3.1 The proposed change meets the current regulations unless it is explicitly related to a requested exemption or rule change.

Section 50.36(c) of 10 CFR provides that TSs will include SRs, which are “requirements relating to test, calibration, or inspection to assure that necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met.” NEI 04-10 supports relocating the surveillance frequencies from the TSs to a licensee-controlled program by providing a NRC-approved methodology for control of the surveillance frequencies. The SRs themselves would remain in the TSs, as required by 10 CFR 50.36(c). However, neither 10 CFR 50.36 nor the GDCs specifically addresses any surveillance frequency intervals associated with the SRs.

This change is consistent with other NRC-approved TS changes in which surveillance frequencies have been relocated to licensee-controlled documents, such as surveillances performed in accordance with the In-Service Testing Program or the Primary Containment Leakage Rate Testing Program. Thus, the NRC staff has concluded that this proposed change meets the first key safety principle of RG 1.177 by complying with current regulations, and is, therefore, acceptable.

3.2 The proposed change is consistent with the defense-in-depth philosophy.

Consistency with the defense-in-depth philosophy is maintained if:

- A reasonable balance is preserved among prevention of core damage, prevention of containment failure, and consequence mitigation.
- Over-reliance on programmatic activities to compensate for weaknesses in plant design is avoided.
- System redundancy, independence, and diversity are preserved commensurate with the expected frequency, consequences of challenges to the system, and uncertainties (e.g., no risk outliers). Because the scope of the proposed methodology is limited to revision of surveillance frequencies, the redundancy, independence, and diversity of plant systems are not impacted.
- Defenses against potential common cause failures are preserved, and the potential for the introduction of new common cause failure mechanisms is assessed.
- Independence of barriers is not degraded.
- Defenses against human errors are preserved.
- The intent of the GDC in 10 CFR Part 50, Appendix A, is maintained.

NEI 04-10 uses both the core damage frequency (CDF) and the large early release frequency (LERF) metrics to evaluate the impact of proposed changes to surveillance frequencies. Consistency with the guidance of RG 1.174 and RG 1.177 for changes to CDF and LERF is achieved by evaluation using a comprehensive risk analysis, which assesses the impact of proposed changes including contributions from human errors and common cause failures. Defense-in-depth is also included explicitly in the methodology as a qualitative consideration

outside of the risk analysis, as is the potential impact on detection of component degradation that could lead to increased likelihood of common cause failures.

The NRC staff finds that the quantitative risk analysis and the qualitative considerations assure a reasonable balance of defense-in-depth is maintained to ensure protection of public health and safety, satisfying the second key safety principle of RG 1.177, and is, therefore acceptable.

3.3 The proposed change maintains sufficient safety margins.

The design, operation, testing methods, and acceptance criteria for SSCs, specified in applicable codes and standards (or alternatives approved for use by the NRC) will continue to be met as described in the plant licensing basis (including the updated final safety analysis report and bases to TSs), and as assured by the NEI 04-10 process. Similarly, there is no impact to safety analysis acceptance criteria as described in the plant licensing basis.

The NRC staff's evaluation focused on the licensee's proposed LAR and how the licensee addressed those steps in the proposed NEI guidance methodology NEI 04-10. Areas specifically addressed are in 6 of the 20 steps found in the NEI methodology, shown in Figure 1 of NEI 04-10:

- STIs associated with committed industry codes, standards and NRC RGs. (Steps 7, 15 and 16)
- Potential for tighter TS acceptance criteria for longer STIs. (Steps 7, 15 and 16)
- Effect of less pre-conditioning from exercising with less frequent testing because of longer STIs. (Steps 7, 15 and 16)
- Criteria for multiple extensions of STIs using the proposed methodology. (Steps 0, 15 and 16)
- Criteria for returning to the previous STI following unsuccessful experience at the new extended STI. (Steps 19 and 20)

3.3.1 STIs associated with committed industry codes, standards and NRC RGs.

The licensee's LAR contained a note that stated, "various TS surveillance requirements, including in some cases their associated surveillance test intervals (STIs), were established based on commitments to RGs, or based on implementation of NRC-approved Licensing Topical Reports." The present surveillances, surveillance test intervals and acceptance criteria were established over a 40-year history of industry consensus standards development, e.g., in the form of the Institute of Electrical and Electronics Engineers (IEEE) standards, and regulatory endorsement through the RG processes. The licensee's proposed process will allow the licensee's integrated decision-making panel (IDP) to alter STIs to a frequency different from those recommended in previously-approved consensus standards and RG processes. A comparison of selected LGS TSs for the emergency diesel generators and the safety-related batteries to the latest IEEE standards and NRC RGs documented a direct tie to the latest industry standards.

The licensee confirmed that within the licensee-controlled program, the SRs themselves will

remain in the TS, will not be changed and will continue to be performed in accordance with applicable RGs or Topical Reports, as appropriate. However, associated STIs may be modified in accordance with the SFCP. Where the associated STIs were established based on commitments documented in the plant's safety analysis, those commitments would be subject to review by an IDP using the guidance of NEI 99-04, "Commitment Control," and could potentially be changed by the licensee-controlled program without prior NRC approval. This provision is addressed in steps 1 through 4 of the NEI 04-10 guidance methodology, consistent with NEI 99-04.

In NEI 04-10, Step 7, "Identify Qualitative Considerations to be Addressed (by the IDP)," technical justification will be provided for changes to the STIs found in committed industry standards. Consideration of committed industry standards and the current revisions of those standards will be documented. The NRC staff finds this acceptable due to the rigorous review and documentation required to justify an STI change related to an industry code or standard.

3.3.2 Potential for tighter TS acceptance criteria for longer STIs.

NUREG 0800, Standard Review Plan, Chapter 19, "Use of Probabilistic Risk Assessment in Plant-Specific Risk-Informed Decisionmaking: General Guidance," refers to the four elements of RG 1.174. Element 2 provides for an engineering analysis and consists of two main parts: evaluation of defense-in-depth and evaluation of the safety margins. In addition, a critical attribute for any calibration or surveillance test is the interval between calibrations or tests. Any change to the interval should be accompanied with consideration of a corresponding change to the acceptance criteria. The as-left acceptance criteria should factor in the potential for drift over the extended interval including any new uncertainties in the new drift value. The licensee indicated that the IDP review of a proposed STI change may result in a tighter acceptance criteria in the implementing test procedure. The NRC staff finds this approach acceptable due to the evaluation of safety margins and adoption of tighter TS acceptance criteria if necessary.

3.3.3 Conditioning provided by existing STIs.

The effect of less pre-conditioning from exercising with longer STIs is a requirement in NEI 04-10, Step 7 to consider any conditioning exercise that maintains equipment operability. Examples provided included lubrication of bearings and electrical contact wiping (cleaning) of built up oxidation. The NRC staff finds this requirement acceptable, since equipment operability may be dependent upon performance of a conditioning exercise at a certain periodicity.

3.3.4 Criteria for multiple extensions of STIs using the proposed methodology.

NEI included a requirement in NEI 04-10, Step 0, "Select Proposed STIs for Adjustment," that an approach similar to that previously taken in guidance document NUMARC 93-01, Rev. 3, "Industry Guideline on Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," to limit the rate at which STIs can be increased. NEI proposed that prior to considering additional STI changes, the limit on how quickly the methodology can be applied to the same STI is: three successive successful surveillances for STIs less than, or equal to, six months; and two successive successful surveillances for STIs greater than six months. While the potential rate of change to an STI appeared arbitrary, the basis is rational in that the licensee indicated that the confidence in λ -sub-t, the change in standby failure rate versus STI, would cause larger and larger uncertainty values beyond the second extension and would be a

review factor for the IDP re-assessment. The NRC staff finds this requirement acceptable since it provides a logical basis for proposed STI extensions.

3.3.5 Criteria for returning to the previous STI following unsuccessful experience at the new extended STI.

If the results of an emergent assessment indicate that the time interval between successive performances of a surveillance is a factor in the cause of its unsatisfactory performance, this would result in a re-assessment by the IDP. This is addressed in methodology steps 19 and 20. The NRC staff finds this requirement acceptable in light of the review and reassessment requirements imposed when adopting a new STI.

Therefore, as discussed above, sufficient safety margins are maintained by the proposed methodology of NEI 04-10, and the third key safety principle of RG 1.177 is satisfied.

3.4 When proposed changes result in an increase in core damage frequency (CDF) or risk, the increases should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.

RG 1.177 provides a framework for risk evaluation of proposed changes to surveillance frequencies, which requires identification of the risk contribution from impacted surveillances, determination of the risk impact from the change to the proposed surveillance frequency, and performance of sensitivity and uncertainty evaluations. NEI 04-10 Rev. 0 sets forth criteria for risk analyses of changes to surveillance frequencies which satisfies RG 1.177 guidelines for evaluation of the change in risk, and for assuring that such changes are small.

The licensee has committed to the methodology of NEI 04-10 Rev. 0 by reference in the Administrative Controls of the TSs as the basis for subsequent revisions to the surveillance frequencies. The NRC staff has evaluated the licensee's capabilities with regard to the scope and quality of its probabilistic risk assessment (PRA) models against the requirements of the SFCP as described in NEI 04-10, Rev. 0.

3.4.1 Quality of the PRA.

The quality of the PRA must be compatible with the safety implications of the proposed TS changes and the role the PRA plays in justifying the changes. The NRC has developed regulatory guidance to address PRA technical adequacy, RG 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities" (Reference 8), which addresses the use of the American Society of Mechanical Engineers (ASME)RA-Sa-2003, Addenda to ASME RA-S-2002, "Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications" (Reference 9), and the NEI peer review process NEI 00-02, "PRA Peer Review Process Guidance" (Reference 10). NEI 04-10 requires an assessment of the PRA models used to support the SFCP against the criteria of RG 1.200 to assure that the PRA models are capable of determining the change in risk due to changes to surveillance frequencies of SSCs, using plant-specific data and models. Capability Category II of ASME RA-Sa-2003 is applied as the standard, and any identified deficiencies to those requirements are assessed further in sensitivity studies to determine any impacts to proposed changes to surveillance frequencies. This level of PRA quality, combined with the proposed sensitivity studies, is sufficient to support the evaluation of changes to

surveillance frequencies within the SFCP, and is consistent with Regulatory Position 2.3.1 of RG 1.177.

The LGS PRA model for internal events received a formal industry peer review in November 1998. This review identified findings and observations of varying levels of significance. The licensee stated that the significant items (i.e., those identified by the review team as significance level 'A' or 'B,' consistent with the guidance of NEI 00-02) were addressed as part of the 2001 PRA model update, with the exception of two 'B' level items. These two items were discussed by the licensee in its submittal as to the potential impact on this proposed change.

One open item identified a documentation issue, in that a ventilation system dependency of certain systems was not shown on a dependency diagram in the PRA model documents. The licensee identified this issue as related solely to the documentation of the PRA model, and not impacting on the actual risk analysis capability of the model.

The second open item identified the lack of plant-specific failure data used in the PRA model for systems other than the emergency diesel generators. The licensee identified this item as potentially impacting the application of NEI 04-10 Rev. 0 to evaluate changes to surveillance frequencies within the SFCP. In response to an RAI (Reference 2), the licensee stated that an update of the PRA model had been completed since the submittal of the original LAR. This update included adoption of plant-specific failure rates for significant components, which addressed this open item.

The original LAR submittal (Reference 1) was also proposed as an industry pilot for RG 1.200. In the LAR, the licensee provided the results of an evaluation of its PRA technical adequacy against the guidance contained in RG 1.200, applying Capability Category II of ASME RA-Sa-2003, Addenda to ASME RA-S-2002, consistent with the requirements of NEI 04-10 Rev. 0. The NRC staff conducted an independent assessment of the LGS PRA, using RG 1.200 Rev. 0 as part of the industry pilot review of RG 1.200. The staff noted that the licensee had used Draft Guide (DG) DG-1122, because RG 1.200 had not yet been issued at the time the licensee conducted its evaluation. Subsequent to the original submittal, the licensee identified that it had completed an update to its PRA models and conducted a peer review using RG 1.200 Rev. 0 and draft Addendum B to ASME RA-Sa-2003. The NRC staff is aware of these pending changes to the standard, and the use of the draft Addendum B represents the use of the best available requirements for assessing PRA technical adequacy.

This evaluation conducted by the licensee identified 84 items that would improve the technical adequacy of the PRA model if appropriate changes were incorporated into the LGS PRA. In attachment 5 of reference 1, the licensee identified 15 of the 84 items that would impact this application. Three of the 15 items were addressed by making changes to the PRA model, and the remaining 12 items were proposed to be addressed within the SFCP using sensitivity studies, consistent with the requirements of NEI 04-10 Rev. 0. The NRC staff reviewed these 12 open items to determine if the proposed use of sensitivity studies was appropriate for this application.

Two items address credit for repair of failed equipment (items 2 and 45). NEI 04-10 Rev. 0 specifically prohibits crediting repair of equipment when assessing the risk of increasing the surveillance test interval, and therefore these items cannot be addressed by sensitivity studies. In response to an RAI, the licensee stated that an update of the PRA model had been

completed since the submittal of the original LAR. This update included a re-evaluation of the use of repair terms in the model, addressing this item. Therefore, the item is resolved and no further consideration is required.

Three items address plant-specific data (items 49, 52, and 64), which was also an open item from the peer review in 1998. As noted above, the licensee stated that an update of the PRA model had been completed. This update included adoption of plant-specific failure rates for significant components. Therefore, the item is resolved and no further consideration is required.

The NRC staff agrees that sensitivity studies are appropriate for the remaining seven open items identified, consistent with NEI 04-10 Rev. 0, until the items are resolved. The sensitivity studies will provide a probable range of failure rates that will translate into effects on risk and the acceptability of a proposed change.

The licensee identified plant changes which are implemented but not yet incorporated into the PRA model, and assessed their potential impact on this application. Nineteen unincorporated changes were identified, and all were dispositioned either as being conservative, having no impact, or having only a minimal impact, on the evaluation of surveillance frequencies. The staff agrees on the acceptability of the changes with respect to their impact on surveillance frequencies.

Based on the peer review completed in 1998, the self-assessment using DG-1122 in 2003, and the peer review using RG 1.200, and draft Addendum B of ASME RA-Sa-2003, the licensee has demonstrated that the LGS PRA model for internal events is of adequate quality to support implementation of the SFCP consistent with the PRA quality requirements of NEI 04-10 Rev. 0.

3.4.2 Scope of the PRA.

NEI 04-10 evaluates each proposed surveillance frequency change to determine its potential impact on risk, due to impacts from internal events, fires, seismic events, other external events, and from shutdown conditions. Consideration is made of both CDF and LERF metrics. Where quantitative risk models are unavailable, bounding analyses or other conservative quantitative evaluations are performed. A qualitative screening analysis may be used when the surveillance frequency impact on plant risk can be shown to be negligible or zero. The guidance provided in NEI 04-10 is sufficient to ensure the scope of the risk contribution of each surveillance is properly identified for evaluation, and is consistent with Regulatory Position 2.3.2 of RG 1.177.

The licensee is required to follow the methodology of NEI 04-10 Rev. 0, which has been incorporated by reference into the Administrative Controls Section of the TSs as the basis for subsequent revisions to the surveillance frequencies. Therefore, changes to surveillance frequencies will address the scope of risk analyses identified in NEI 04-10 Rev. 0. The staff's review of the licensee's PRA finds it acceptable to implement the NEI 04-10 methodology in the evaluation of surveillance frequencies.

3.4.3 PRA Modeling.

NEI 04-10 determines if the SSCs affected by a surveillance are modeled in the PRA. Where the SSC is directly or implicitly modeled, a quantitative evaluation of the risk impact is carried out. The methodology adjusts the failure probability of the impacted SSCs, including any impacted common cause failure modes, based on the proposed change to the surveillance frequency. Where the SSC is not modeled in the PRA, bounding analyses are performed to characterize the impact of the proposed change to surveillance frequency. Potential impacts on the risk analyses due to screening criteria and truncation levels are adequately addressed by the requirements for PRA technical adequacy addressed by RG 1.200, and by sensitivity studies identified in NEI 04-10. Therefore, the guidance provided in NEI 04-10 for PRA modeling is sufficient to ensure an acceptable evaluation of risk due to the change in surveillance frequency, and is consistent with Regulatory Position 2.3.3 of RG 1.177.

The licensee has committed to the methodology of NEI 04-10 Rev. 0 by reference in the Administrative Controls Section of the TSs as the basis for subsequent revisions to the surveillance frequencies. Therefore, changes to surveillance frequencies will be analyzed using the PRA modeling attributes identified in NEI 04-10 Rev. 0.

3.4.4 Assumptions.

The failure probabilities of SSCs modeled in a PRA include a standby time-related contribution and a cyclic demand-related contribution. NEI 04-10 adjusts the time-related failure contribution of SSCs affected by the proposed change to surveillance frequency. This is consistent with RG 1.177 Section 2.3.3, which permits separation of the failure rate contributions into demand and standby for evaluation of SRs. If the available data do not support distinguishing between the time-related failures and demand failures, then the change to surveillance frequency is conservatively assumed to impact the total failure probability of the SSC, including both standby and demand contributions. The SSC failure rate (per unit time) is assumed to be unaffected by the change in test frequency, and is confirmed by the required monitoring and feedback implemented after the change in surveillance frequency is implemented.

The NEI 04-10 process requires consideration of qualitative sources of information with regard to potential impacts of test frequency on SSC performance, including industry and plant-specific operating experience, vendor recommendations, industry standards, and code-specified test intervals. Thus, the process is not reliant upon risk analyses as the sole basis for the proposed changes.

NEI 04-10 does not explicitly address staggered or sequential test strategies and their potential impact on risk, and any existing TS requirements for these strategies are not relocated to the SFCP, and are therefore not subject to revision by NEI 04-10. Staggered or sequential test strategy requirements are not relocated to the SFCP, but the surveillance frequency can be relocated. The potential beneficial risk impacts of reduced surveillance frequency, including reduced downtime, lesser potential for restoration errors, reduction of potential for test-caused transients, and reduced test-caused wear of equipment, are identified qualitatively, but are conservatively not required to be quantitatively assessed. Therefore, NEI 04-10 employs reasonable assumptions with regard to extensions of surveillance test intervals, and is consistent with Regulatory Position 2.3.4 of RG 1.177.

The licensee has committed to the methodology of NEI 04-10 Rev. 0 by reference into the Administrative Controls Section of the TSs as the basis for subsequent revisions to the

surveillance frequencies. Therefore, changes to surveillance frequencies will employ assumptions consistent with those identified in NEI 04-10 Rev. 0.

3.4.5 Sensitivity and Uncertainty Analyses.

NEI 04-10 requires sensitivity studies to assess the impact of uncertainties from key assumptions of the PRA, uncertainty in the failure probabilities of the affected SSCs, the impact to the frequency of initiating events, and the impact of any identified deviations from Capability Category II of ASME RA-Sa-2003. Where the sensitivity analyses identify a potential impact on the proposed change, revised surveillance frequencies are considered, along with any qualitative considerations that may bear on the results of such sensitivity studies. Required monitoring and feedback of SSC performance once the revised surveillance frequencies are implemented are also used. Thus, NEI 04-10 appropriately considers the possible impact of PRA model uncertainty and sensitivity to key assumptions and model limitations, consistent with Regulatory Position 2.3.5 of RG 1.177.

The licensee has committed to the methodology of NEI 04-10 Rev. 0 by reference in the Administrative Controls Section of the TSs as the basis for subsequent revisions to the surveillance frequencies. Therefore, changes to surveillance frequencies will be analyzed using sensitivity and uncertainty analyses consistent with those identified in NEI 04-10 Rev. 0.

3.4.6 Acceptance Guidelines.

NEI 04-10 quantitatively evaluates the change in total risk (including internal and external events contributions) in terms of CDF and LERF for both the individual risk impact of a proposed change in surveillance frequency and the cumulative impact from all individual changes to surveillance frequencies. Each individual change to surveillance frequency must be shown to result in a risk impact below $1E-6$ per year for change to CDF, and below $1E-7$ per year for change to LERF. These are consistent with the limits of RG 1.174 for very small changes in risk. Where the RG 1.174 limits are not met, the process either considers revised surveillance frequencies which are consistent with RG 1.174, or the process terminates without permitting the proposed changes. Where quantitative results are unavailable to permit comparison to acceptance guidelines, appropriate qualitative analyses are required to demonstrate that the associated risk impact of a proposed change to surveillance frequency is negligible or zero. Otherwise, bounding quantitative analyses are required which demonstrate the risk impact is at least one order of magnitude lower than the RG 1.174 acceptance guidelines for very small changes in risk.

In addition to assessing each individual SSC surveillance frequency change, the cumulative impact of all changes must result in a risk impact below $1E-5$ per year for change to CDF, and below $1E-6$ per year for change to LERF, and the total CDF and total LERF must be reasonably shown to be less than $1E-4$ per year and $1E-5$ per year, respectively. These are consistent with the limits of RG 1.174 for acceptable changes in risk, as referenced by RG 1.177 for changes to surveillance frequencies. The assessment of cumulative risk is a requirement to calculate the change in risk from a baseline model utilizing failure probabilities based on surveillance frequencies prior to implementation of the SFCP, compared to a revised model with all changed frequencies included. The cumulative risk assessment is re-performed when the baseline PRA

models are periodically updated. The NRC staff notes that NEI 04-10 allows exclusion of small risk increases associated with individual STI changes once the baseline PRA models are updated to include the effects of the revised surveillance frequencies. Such changes are of low risk significance (less than 0.5% of the allowable cumulative limits), and once incorporated into the baseline PRA models, any synergistic effects with other proposed surveillance changes would be identified. Therefore it is acceptable to omit these risk-insignificant changes from ongoing cumulative risk tracking required by the SFCP.

The quantitative acceptance guidance of RG 1.174 is essential but not sufficient to accept changes in surveillance frequencies. The process also considers qualitative information to evaluate the proposed changes to surveillance frequencies, including industry and plant-specific operating experience, vendor recommendations, industry standards, the results of sensitivity studies, and SSC performance data and test history. The final acceptability of the proposed change is based on all of these considerations and not solely on the PRA results compared to numerical acceptance guidelines. Performance monitoring and feedback are also required to assure that lessons learned from past experience are considered.

Thus, NEI 04-10 provides reasonable acceptance guidelines and methods for evaluating the risk increase of proposed changes to surveillance frequencies, consistent with Regulatory Position 2.4 of RG 1.177.

The licensee has demonstrated that their PRA model is of adequate quality consistent with the requirements in NEI 04-10 Rev. 0. The proposed change to incorporate an SFCP consistent with the methodology of NEI 04-10 Rev. 0 therefore satisfies the fourth key safety principle of RG 1.177 by assuring any increase in risk is small consistent with the intent of the Commission's Safety Goal Policy Statement.

3.5 The impact of the proposed change should be monitored using performance measurement strategies.

NEI 04-10 requires performance monitoring of SSCs whose surveillance frequency has been revised as part of a feedback process to assure that the change in test frequency has not resulted in degradation of equipment performance and operational safety. The monitoring and feedback includes consideration of Maintenance Rule monitoring of equipment performance. In the event of degradation of SSC performance, the surveillance frequency is reassessed in accordance with the methodology, in addition to any corrective actions which may apply as part of the Maintenance Rule requirements. The performance monitoring and feedback specified in NEI 04-10 is sufficient to reasonably assure acceptable SSC performance and is consistent with Regulatory Position 3.2 of RG 1.177. Thus, the fifth key safety principle of RG 1.177 is satisfied.

The licensee has committed to the methodology of NEI 04-10 Rev. 0 by reference in the Administrative Controls Section of the TSs as the basis for subsequent revisions to the surveillance frequencies. Therefore, changes to surveillance frequencies will be subject to the performance measurement strategies identified in NEI 04-10 Rev. 0.

3.6 Summary

The NRC staff reviewed the licensee's submittal and found the proposed changes acceptable.

The licensee provided sufficient justification for why changes to the surveillance intervals controlled by the guidance found in NEI 04-10, Rev. 0, would not affect the defense-in-depth attributes of the established safety margin beyond the acceptance criteria established in RG 1.174. The evaluation to justify specific STI extensions will be based on site-specific and related-industry performance experience, vendor recommendations, maintenance practices and codes and standards, and will clearly demonstrate that any proposed change to the surveillance test intervals would maintain adequate defense-in-depth and design safety margins.

The NRC staff found that the industry methodology contained in NEI 04-10, Rev. 0, provides adequate guidance for proposed changes to be reviewed and approved by an IDP with the panel membership and qualifications specified in NEI 04-10. The methodology requires that the evaluation by the IDP consider vendor recommendations, performance history, maintenance practices, committed industry codes and standards. The guidance methodology further requires the review of codes and standards to include those revisions both committed to in the licensing basis and the current revision of that standard, document the review, and provide technical justification for any proposed STI differences with the committed standards. The methodology also requires an assessment of any potential conditioning, such as lubrication or contact wiping, inadvertently provided by the original, more frequent, surveillance test intervals.

The methodology document NEI 04-10 places limits on how often a given STI may be changed using the proposed methodology, as well as set criteria to return to a more frequent STI upon multiple time-related failures at the new STI. The staff finds the methodology acceptable.

The staff finds that the licensee's PRA is of sufficient quality to support implementation of an SFCP. Therefore, the proposed change satisfies the risk-related key principles of risk-informed decision making applied to changes to TSs, as delineated in RG 1.177 and RG 1.174, in that:

- The proposed change meets current regulations; and
- The proposed change is consistent with the defense-in-depth philosophy; and the proposed change maintains sufficient safety margins; and
- Increases in risk resulting from the proposed change are controlled to be small and consistent with the Commission's Safety Goal Policy Statement; and
- The impact of the proposed change is monitored with performance measurement strategies.

The NRC staff finds that the licensee's proposed change to relocate surveillance test intervals to the SFCP, and to incorporate NEI 04-10 Rev. 0, a risk-informed methodology using plant-specific risk insights and performance data to revise surveillance frequencies within an SFCP, into the TS Administrative Controls, acceptable.

4.0 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.

5.0 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. 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 made a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comments on such finding (70 FR 29793). Accordingly, the amendments meet the eligibility criteria for categorical exclusions set forth in 10 CFR 51.22(c)(9). 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.

6.0 CONCLUSION

Based on the evaluations discussed in this Safety Evaluation, the staff finds that the licensee's proposed change to relocate surveillance frequencies to a licensee-controlled SFCP, and to revise surveillance frequencies in accordance with NEI 04-10 Rev. 0, is acceptable because the applicable risk-related principles of risk-informed decisionmaking identified in RG 1.174 and RG 1.177 have been satisfied.

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.

7.0 REFERENCES

11. Letter from Michael P. Gallagher, Exelon Generation Company, LLC, to Nuclear Regulatory Commission, "Limerick Generating Station, Units 1 and 2, Facility Operating License Nos. NPF-39 and NPF-85, NRC Docket Nos. 50-352 and 50-353, License Amendment Request, Proposed Technical Specifications Change to Relocate Surveillance Test Intervals to a Licensee-Controlled Program (Risk-Informed Initiative 5b)," June 11, 2004 (ADAMS Accession number ML041830551).
12. Letter from Pamela B. Cowan, Exelon Generation Company, LLC, to Nuclear Regulatory Commission, "Limerick Generating Station, Units 1 and 2, Facility Operating License Nos. NPF-39 and NPF-85, NRC Docket Nos. 50-352 and 50-353, Response to Request for Additional Information, License Amendment Request, Proposed Technical Specifications Change to Relocate Surveillance Test Intervals to a Licensee-Controlled Program (Risk-Informed Initiative 5b)," December 12, 2005 (ADAMS Accession number ML053470284).
13. Letter from Pamela B. Cowan, Exelon Generation Company, LLC, to Nuclear Regulatory Commission, "Limerick Generating Station, Units 1 and 2, Facility Operating License Nos. NPF-39 and NPF-85, NRC Docket Nos. 50-352 and 50-353, Response to Request for Additional Information, License Amendment Request, Proposed Technical Specifications Change to Relocate Surveillance Test Intervals to a Licensee-Controlled Program (Risk-Informed Initiative 5b)," April 4, 2006 (ADAMS Accession number ML060950089).

14. Letter from Biff Bradley, Nuclear Energy Institute, to Timothy J. Kobetz, Chief, Technical Specifications Branch, Division of Inspection and regional Support, Office of Nuclear Reactor Regulation, Nuclear Regulatory Commission, Project Number 689, July 28, 2006 (ML062120084).
15. NEI 04-10, "Risk-Informed Method for Control of Surveillance Frequencies," July 2006.
16. Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," NRC, November 2002.
17. Regulatory Guide 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," NRC, August 1998.
18. Regulatory Guide 1.200 for Trial Use, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," February 2004.
19. ASME RA-Sa-2003, Addenda to ASME RA-S-2002, "Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications," December 2003.
20. NEI 00-02, Probabilistic Risk Assessment (PRA) Peer Review Process Guidance, 2000.

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