February 7, 2002

Mr. Robert G. Byram
Senior Vice President
and Chief Nuclear Officer
PPL Susquehanna, LLC
2 North Ninth Street
Allentown, PA 18101

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2, EXEMPTION FROM THE REQUIREMENTS OF 10 CFR PART 50, SECTION 50.60(a) AND APPENDIX G (TAC NOS. MB2515 AND MB2517)

Dear Mr. Byram:

The Commission has approved the enclosed exemption from specific requirements of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.60(a) and Appendix G, for the Susquehanna Steam Electric Station, Units 1 and 2. This action is in response to your letter dated July 17, 2001, and supplements dated July 26, and October 15, 2001, concerning changes to the reactor pressure vessel pressure-temperature limits.

A copy of the exemption is enclosed. The exemption has been forwarded to the Office of the Federal Register for publication.

Sincerely,

/RA/

Daniel S. Collins, Project Manager, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

Enclosure: Exemption

cc w/encl: See next page

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Units 1 &2

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

PPL SUSQUEHANNA, LLC

ALLEGHENY ELECTRIC COOPERATIVE, INC.

SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2

DOCKET NOS. 50-387 AND 50-388

EXEMPTION

1.0 BACKGROUND

PPL Susquehanna, LLC (PPL, the licensee), is the holder of Facility Operating License Nos. NPF-14 and NPF-22 which authorize operation of the Susquehanna Steam Electric Station, Units 1 and 2 (SSES-1 and 2). The license provides, among other things, that the facility is subject to all rules, regulations, and orders of the U.S. Nuclear Regulatory Commission (NRC, the Commission) now or hereafter in effect.

The facility consists of two boiling-water reactors located in Luzerne County in Pennsylvania.

2.0 REQUEST/ACTION

Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.60(a), requires nuclear power reactors to meet the fracture toughness requirements set forth in 10 CFR Part 50, Appendix G. Appendix G of 10 CFR Part 50 requires that pressure-temperature (P-T) limits be established for reactor pressure vessels (RPVs) during normal operating and hydrostatic or leak rate testing conditions. Specifically, 10 CFR Part 50, Appendix G, states that “[t]he appropriate requirements on...the pressure-temperature limits

and minimum permissible temperature must be met for all conditions." Appendix G of 10 CFR Part 50 specifies that the requirements for these limits are the American Society of Mechanical Engineers (ASME) Code, Section XI, Appendix G, limits.

To address provisions of amendments to the technical specification (TS) P-T limits in the submittal dated July 17, 2001, as supplemented July 26 and October 15, 2001, the licensee requested, pursuant to 10 CFR Part 50, Section 50.60(b), that the NRC staff exempt SSES-1 and 2, from application of specific requirements of 10 CFR Part 50, Section 50.60(a), and Appendix G, and substitute use of ASME Code Case N-640 as the basis for establishing the P-T limit curves. Code Case N-640 permits the use of an alternate reference fracture toughness (K_{Ic} fracture toughness curve instead of K_{Ia} fracture toughness curve) for reactor vessel materials in determining the P-T limits. Because use of the K_{Ic} fracture toughness curve results in the calculation of less conservative P-T limits than the methodology currently required by 10 CFR Part 50, Appendix G, an exemption to apply the Code Case would be required by 10 CFR 50.60.

The licensee proposed to revise the P-T limits for SSES-1 and 2, using the K_{Ic} fracture toughness curve, in lieu of the K_{Ia} fracture toughness curve, as the lower bound for fracture toughness.

Use of the K_{Ic} curve in determining the lower bound fracture toughness in the development of P-T operating limit curves is more technically correct than the K_{Ia} curve because the rate of loading during a heatup or cooldown is slow and is more representative of a static condition than a dynamic condition. The K_{Ic} curve appropriately implements the use of static initiation fracture toughness behavior to evaluate the controlled heatup and cooldown process of a reactor vessel. The staff has required use of the initial conservatism of the K_{Ia} curve since 1974 when the curve was codified. This initial conservatism was necessary due to the limited knowledge of RPV materials. Since 1974, additional knowledge has been gained

about RPV materials, which demonstrates that the lower bound on fracture toughness provided by the K_{Ia} curve is well beyond the margin of safety required to protect the public health and safety from potential RPV failure. Additionally, P-T curves based on the K_{Ic} curve will enhance overall plant safety by opening the operating window, with the greatest safety benefit in the region of low-temperature operations.

In summary, the ASME Section XI, Appendix G, procedure was conservatively developed based on the level of knowledge existing in 1974 concerning RPV materials and the estimated effects of operation. Since 1974, the level of knowledge about these topics has been greatly expanded. The NRC staff concurs that this increased knowledge permits relaxation of the ASME Section XI, Appendix G requirements by applying the K_{Ic} fracture toughness, as permitted by Code Case N-640, while maintaining, pursuant to 10 CFR 50.12(a)(2)(ii), the underlying purpose of the ASME Code and the NRC regulations to ensure an acceptable margin of safety.

3.0 DISCUSSION

Pursuant to 10 CFR 50.12, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 50, when (1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) when special circumstances are present. Special circumstances include, but are not limited to, the following case:

- pursuant to 10 CFR 50.12(a)(2)(ii), the circumstance that application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.

The NRC staff accepts the licensee's determination that an exemption would be required to approve the use of Code Case N-640. The staff examined the licensee's rationale to support the exemption request and concurred that the use of the Code Case would meet the underlying intent of these regulations. Based upon a consideration of the conservatism that is explicitly incorporated into the methodologies of 10 CFR Part 50, Appendix G; Appendix G of the Code; and Regulatory Guide 1.99, Revision 2, the staff concluded that application of Code Case N-640 as described would provide an adequate margin of safety against brittle failure of the RPV. Since strict compliance with the requirements of 10 CFR 50.60(a) and 10 CFR Part 50, Appendix G, is not necessary to serve the overall intent of the regulations, the NRC staff concludes that application of Code Case N-640 to the P-T limit curves meets the special circumstance provision of 10 CFR 50.12(a)(2)(ii). This is also consistent with the determination that the staff has reached for other licensees under similar conditions based on the same considerations. Therefore, the NRC staff concludes that requesting the exemption under the special circumstances of 10 CFR 50.12(a)(2)(ii) is appropriate and that the methodology of Code Case N-640 may be used to revise the P-T limits for SSES-1 and 2.

4.0 CONCLUSION

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. Also, special circumstances are present. Therefore, the Commission hereby grants PPL Susquehanna, LLC, an exemption from the requirements of 10 CFR Part 50, Section 50.60(a) and Appendix G, for generating the P-T limit curves for SSES-1 and 2.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will not have a significant effect on the quality of the human environment (67 FR 5322).

This exemption is effective upon issuance.

Dated at Rockville, Maryland, this 7th day of February 2002.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

John A. Zwolinski, Director
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

February 7, 2002

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and Chief Nuclear Officer
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