November 8, 2000

Mr. Oliver D. Kingsley, President
Nuclear Generation Group
Commonwealth Edison Company
Executive Towers West III
1400 Opus Place, Suite 500
Downers Grove, IL 60515

SUBJECT: LASALLE - EXEMPTION FROM THE REQUIREMENTS OF 10 CFR 50.60 AND APPENDIX G (TAC NOS. MA8403 AND MA8404)

Dear Mr. Kingsley:

By letter dated February 29, 2000, as supplemented on June 26 and August 18, 2000, Commonwealth Edison Company (ComEd) submitted a license amendment request to update the pressure-temperature (P-T) limit curves for the LaSalle County Station, Units 1 and 2. In addition to the license amendment, ComEd also requested an exemption to use two methods that would allow ComEd to deviate from complying with the requirements in 10 CFR Part 50, Appendix G, for generating the P-T limit curves. Requests for such exemptions are allowed pursuant to 10 CFR 50.60(b), which allow licensees to use alternatives to the requirements of 10 CFR Part 50, Appendices G and H, if an exemption to use the alternatives is granted by the Commission pursuant to 10 CFR 50.12. According to 10 CFR 50.12(a)(1), the Commission may grant exemptions to the requirements of 10 CFR Part 50, if the exemptions are authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security.

Approval of the first of these exemption requests would allow ComEd to use ASME Code Case N-588 as the basis for determining the most limiting material in the LaSalle reactor pressure vessels (RPVs). Code Case N-588 is applicable only for the cases where a circumferential weld is determined to be the most limiting material in the beltline region of the RPV. This Code Case method allows licensees to apply the lower tensile stresses to a circumferential crack postulated in the circumferential weld and, thus, allows the licensee to use the next most limiting base metal or axial weld material in the RPV as the basis for evaluating the vessel. In addition, Code Case N-588 allows the use of an alternative procedure for calculating the applied stress intensity factors for axial and circumferential flaws. However, this method of calculating the applied stress intensity factor is the same as that specified in Appendix G of Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code), 1996 Addenda, which is endorsed by 10 CFR 50.55(a) of the regulations.

The second of these exemption requests would allow ComEd to use ASME Code Case N-640 (previously designated as Code Case N-626) as the basis for establishing the fracture toughness (K_{1R}) values used in P-T limit calculations. Code Case N-640 permits application of the lower bound static initiation fracture toughness value (K_{1c}) equation as the basis for establishing the K_{1R} values. This is in contrast to using the lower bound crack arrest fracture toughness value (K_{1a}) equation as the basis for establishing the K_{1R} values, (i.e., the method invoked by Appendix G to Section XI of the ASME Code). Since use of the K_{1c} equation results in the calculations of greater (less conservative) K_{1R} values than use of the K_{1a} equation,

licensees need staff approval to apply the Code Case methods to the P-T limit calculations. The ASME Working Group on Plant Operating Criteria concluded that the application of both Code Case N-588 and Code Case N-640 to plant P-T limits are still sufficient to ensure the structural integrity of RPVs during plant operations.

The staff has reviewed ComEd's submittals of June 26 and August 18, 2000, and determined that ComEd's exemption request to use Code Case N-588 is not necessary for LaSalle, Units 1 and 2. The Code Case N-588 method for defining the postulated flaw orientation and for evaluating the stress intensity factors for the axially oriented flaws (postulated in axial welds or base metal materials) does not deviate from the methods for evaluating them in the 1996 Addenda of Appendix G to Section XI of the ASME Code unless the Code Case is applied to a RPV that is limited by a circumferential weld in the beltline region. This is not the case for the LaSalle RPVs since the most limiting material in the beltline region is not a circumferential weld.

However, the staff has determined that ComEd has provided sufficient technical bases for using the methods of Code Case N-640 in the calculation of the P-T limits for LaSalle, Units 1 and 2. In addition, the staff has determined that the exemption request to use Code Case N-640 for the proposed P-T limits is consistent with the criteria in 10 CFR 50.12(a)(2) for exempting the P-T limits from meeting the requirements of 10 CFR 50.60(a), "Acceptance Criteria for Fracture Prevention Measures for Lightwater Nuclear Power Reactors for Normal Operations," and Appendix G to 10 CFR Part 50, "Fracture Toughness Requirements." The staff, therefore, concludes that, pursuant to 10 CFR 50.12(a)(1), the granting of this exemption to use Code Case N-640 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. This exemption request is granted, and ComEd may use the alternate methods of Code Case N-640 as the bases for generating the P-T limits curves for LaSalle, Units 1 and 2. The staff's safety evaluation (SE) of the exemption requests is provided as Enclosure 2.

That portion of the February 29, 2000, application requesting to amend your license to change certain Technical Specifications is being handled as a separate action.

Sincerely,

/RA/

Donna M. Skay, Project Manager, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-373, 50-374

Enclosures: 1. Exemption
2. Safety Evaluation

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Docket Nos. 50-373, 50-374

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*Input provided by memo dated September 15, 2000; no major revisions
See previous concurrence

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7590-01-P

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
COMMONWEALTH EDISON COMPANY	)	Docket Nos. 50-373
	)	50-374
(LaSalle County Station, Units 1 and 2)	)	

EXEMPTION

I.

Commonwealth Edison Company (ComEd, the licensee) is the holder of Facility Operating Licenses Nos. NPF-11 and NPF-18 for operation of LaSalle County Station, Units 1 and 2, located in LaSalle County, Illinois. The licenses state, among other things, that the facility is subject to all of the rules, regulations, and orders of the U.S. Nuclear Regulatory Commission (the Commission) now or hereafter in effect.

II.

Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix G, 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, “The appropriate requirements on both the pressure-temperature limits and the minimum permissible temperature must be met for all conditions.” Appendix G of 10 CFR Part 50 specifies that the P-T limits must meet the safety margin requirements specified in the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code), Section XI, Appendix G. ASME Code specifies use of K_{1A} fracture toughness curve.

To address provisions of the proposed amendments to the technical specification (TS) P-T limits, in its submittal of February 29, 2000, the licensee requested that the staff exempt

LaSalle from application of specific requirements of 10 CFR 50.60(a) and Appendix G, and substitute use of ASME Code Case N-640.

Code Case N-640 permits the use of an alternate reference fracture toughness (K_{1c} fracture toughness curve instead of K_{1a} fracture toughness curve) for reactor vessel materials in determining the P-T limits. Since the K_{1c} fracture toughness curve shown in ASME Code, Section XI, Appendix A, Figure A-2200-1 provides greater allowable fracture toughness than the corresponding K_{1a} fracture toughness curve of ASME Code, Section XI, Appendix G, Figure G-2210-1 (the K_{1a} fracture toughness curve), using Code Case N-640 for establishing the P-T limits would be less conservative than the methodology currently endorsed by 10 CFR Part 50, Appendix G and, therefore, an exemption to apply the Code Case would be required.

Code Case N-640 (formerly Code Case N-626)

The licensee has proposed an exemption to allow the use of ASME Code Case N-640 in conjunction with ASME Code, Section XI; 10 CFR 50.60(a); and 10 CFR Part 50, Appendix G, to determine P-T limits.

The proposed amendments to revise the P-T limits for LaSalle rely in part on the requested exemption. These revised P-T limits have been developed using the K_{1c} fracture toughness curve, in lieu of the K_{1a} fracture toughness curve, as the lower bound for fracture toughness.

Use of the K_{1c} curve in determining the lower bound fracture toughness in the development of P-T operating limits curve is more technically correct than use of the K_{1a} curve since 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_{1c} 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_{1a}

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_{1a} curve is well beyond the margin of safety required to protect the public health and safety from potential RPV failure. In addition, P-T curves based on the K_{1c} curve would enhance overall plant safety by opening the P-T operating window with the greatest safety benefit in the region of low temperature operations.

Since the reactor coolant system (RCS) P-T operating window is defined by the P-T operating and test limit curves developed in accordance with the ASME Code, Section XI, Appendix G, continued operation of LaSalle with these P-T curves without the relief provided by ASME Code Case N-640 would unnecessarily require that the RPV maintain a temperature exceeding 212 degrees Fahrenheit in a limited operating window during pressure tests. Consequently, steam vapor hazards would continue to be one of the safety concerns for personnel conducting inspections in primary containment. Implementation of the proposed P-T curves, as allowed by ASME Code Case N-640, does not significantly reduce the margin of safety and would eliminate steam vapor hazards by allowing inspections in primary containment to be conducted at lower coolant temperature. Thus, pursuant to 10 CFR 50.12(a)(2)(ii), the underlying purpose of the regulation will continue to be served.

In summary, the ASME Code, 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 Code, Section XI, Appendix G, requirements by application of ASME 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.

III.

Pursuant to 10 CFR 50.12(a), 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 are present whenever, according to 10 CFR 50.12(a)(2)(ii), "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 underlying purpose of the requirement to use the K_{1a} curve to develop P-T limits is to provide an adequate margin of safety against brittle failure of the RPV. Code Case N-640 permits application of the lower bound static initiation fracture toughness value (K_{1c}) equation as the basis for establishing the curves in lieu of using the lower bound crack arrest fracture toughness value equation (i.e., the K_{1a} equation, which is based on conditions needed to arrest a dynamically propagating crack, and which is the method invoked by Appendix G to Section XI of the ASME Code). Use of the K_{1c} equation in determining the lower bound fracture toughness in the development of the P-T operating limits curve is more technically correct than the use of the K_{1a} equation since 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_{1c} equation appropriately implements the use of the static initiation fracture toughness behavior to evaluate the controlled heatup and cooldown process of a reactor vessel. Therefore, use of the K_{1c} curve in developing

P-T limits provides an adequate margin against brittle failure of the RPV. As a result, the application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule.

Therefore, the staff concludes that requesting an 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 LaSalle County Station, Units 1 and 2.

IV.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), the exemption is authorized by law, will not endanger life or property or common defense and security, and is, otherwise, in the public interest, and that special circumstances are present. Therefore, the Commission hereby grants Commonwealth Edison Company an exemption from the requirements of 10 CFR 50.60(a) and 10 CFR Part 50, Appendix G, for LaSalle County Station, Units 1 and 2.

Pursuant to 10 CFR 51.32, an environmental assessment and finding of no significant impact has been prepared and published in the Federal Register (65 FR 60986). Accordingly, based upon the environmental assessment, the Commission has determined that the granting of this exemption will not result in any significant effect on the quality of the human environment.

This exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

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

Dated at Rockville, Maryland,
this 8th day of November 2000

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE EXEMPTION FROM CERTAIN REQUIREMENTS OF 10 CFR 50.60(a)

COMMONWEALTH EDISON COMPANY

LASALLE COUNTY STATION, UNITS 1 AND 2

DOCKET NOS. 50-373 AND 50-374

1.0 INTRODUCTION

1.1 Requirements for Generating Pressure-Temperature (P-T) Limits for Nuclear Power Generation Facilities

The U.S. Nuclear Regulatory Commission (NRC) has established requirements in Appendix G of Part 50 to Title 10, *Code of Federal Regulations* (10 CFR Part 50, Appendix G), to protect the integrity of the reactor coolant pressure boundary in nuclear power plants. The Appendix to Part 50 requires the P-T limits for an operating plant to be at least as conservative as those that would be generated if the methods of Appendix G to Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) were applied. Appendix G of Section XI of the ASME Code, 1996 Addenda, is endorsed by 10 CFR 50.55(a).

The methodology of Appendix G to the Code postulates the existence of a sharp surface flaw in the reactor pressure vessel (RPV) that is normal to the direction of the maximum applied stress. For materials in the beltline and upper and lower head regions of the RPV, the maximum flaw size is postulated to have a depth that is equal to one-fourth of the thickness and a length equal to 1.5 times the thickness. For the case of evaluating RPV nozzles, the surface flaw is postulated to propagate parallel to the axis of the nozzle's corner radius.

The basic parameter in Appendix G to the Code for calculating P-T limit curves is the stress intensity factor, K_1, which is a function of the stress state and flaw configuration. The methodology requires that licensees determine the reference stress intensity (K_{1a}) factors, which vary as a function of temperature, from the reactor coolant system (RCS) operating temperatures, and from the adjusted reference temperatures (ARTs) for the limiting materials in the RPV. Thus, the critical locations in the RPV beltline and head regions are the 1/4-thickness (1/4T) and 3/4-thickness (3/4T) locations, which correspond to the points of the crack tips if the flaws are initiated and grown from the inside and outside surfaces of the vessel, respectively. The methodology of Appendix G requires that P-T curves must satisfy a safety factor of 2.0 on primary membrane and bending stresses during normal plant operations (including heatups,

cooldowns, and transient operating conditions), and a safety factor of 1.5 on primary membrane and bending stresses when leak rate or hydrostatic pressure tests are performed on the RCS. Table 1 to 10 CFR Part 50, Appendix G, provides the staff's criteria for meeting the P-T limit requirements of Appendix G to the Code and 10 CFR Part 50, Appendix G.

Regulatory Guide (RG) 1.99, Revision 2, provides an acceptable method of calculating ARTs for ferritic RPV materials; the methods of RG 1.99, Revision 2, include methods for adjusting the ARTs of materials in the beltline region of the RPV, where the effects of neutron irradiation may induce an increased level of embrittlement in the materials.

1.2 Requested Exemption

By letters dated February 29, 2000, as supplemented on June 26 and August 18, 2000, the Commonwealth Edison Company (ComEd) requested exemptions to use two Code Cases (N-588 and N-640), as methods that would allow ComEd to deviate from complying with the requirements in 10 CFR Part 50, Appendix G, for generating the P-T limit curves. Requests for such exemptions are allowed pursuant to 10 CFR 50.60(b), which allows licensees to use alternatives to the requirements of 10 CFR Part 50, Appendices G and H, if an exemption to use the alternatives is granted by the Commission pursuant to 10 CFR 50.12. According to 10 CFR 50.12, the Commission may, upon request, grant exemptions to the requirements of 10 CFR Part 50, if the exemptions are authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security. In considering the exemptions, the Commission will not consider granting exemptions unless special circumstances are present. These special circumstances include, but are not limited to, the following special cases:

- pursuant to 10 CFR 50.12(a)(2)(ii) - 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;

- pursuant to 10 CFR 50.12(a)(2)(iii) - compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated; and

- pursuant to 10 CFR 50.12(a)(2)(vi) - there is present any other material circumstance not considered when the regulation was adopted for which it would be in the public interest to grant an exemption.

2.0 EVALUATION

2.1 Exemption Request to Use Code Case N-588

ComEd has requested, pursuant to 10 CFR 50.60(b), an exemption to use Code Case N-588 as the basis for evaluating the axial and circumferential welds in the LaSalle RPVs. More specifically, ComEd has requested an exemption to use Code Case N-588 as a basis for using

an alternative procedure for defining the postulated flaw orientation and for calculating the applied stress intensity factors for axial and circumferential flaws.

Approval of this exemption request would allow ComEd to use ASME Code Case N-588 as the basis for determining the most limiting material in the LaSalle RPVs. Code Case N-588 is applicable only for the cases where a circumferential weld is determined to be the most limiting material in the beltline region of the RPV. This Code Case method allows licensees to apply the lower tensile stresses to a circumferential crack postulated in the circumferential weld and, thus, allows the licensee to use the next most limiting base metal or axial weld material in the RPV as the basis for evaluating the vessel. In addition, Code Case N-588 allows the use of an alternative procedure for calculating the applied stress intensity factors for axial and circumferential flaws. However, this method of calculating the applied stress intensity factor is the same as that specified in Appendix G of Section XI of the ASME Code, 1996 Addenda, which is endorsed by 10 CFR 50.55(a) of the regulations.

The current methods of Appendix G to the Code mandate consideration of an axial flaw in full penetration RPV welds and, thus, for circumferential welds, dictate that the flaw be oriented transverse to the axis of the weld. Postulation of an axial weld in a circumferential weld is unrealistic because the length of the flaw would extend well beyond the girth of the circumferential weld and into the adjoining base metal material. Industry experience with the repair of weld indications found during preservice inspection, and data taken from destructive examination of actual vessel welds, confirms that any remaining flaws are small, laminar in nature, and do not transverse the weld bead orientation. Therefore, any potential defects introduced during the fabrication process, and not detected during subsequent nondestructive examinations, would only be expected to be oriented in the direction of weld fabrication. For circumferential RPV welds, the methods of the Code Case, therefore, postulate the presence of a flaw that is oriented in a direction parallel to the axis of the weld (i.e., in a circumferential orientation).

An analysis provided to the ASME Code's Working Group on Operating Plant Criteria (WGOPC) (in which Code Case N-588 was developed) indicated that if an axial flaw is postulated on a circumferential weld, then based on the correction factors for the membrane stress (M_m) given in the Code Case for the inside diameter circumferential (0.443) and axial (0.926) flaw orientations, it is equivalent to applying a safety factor of 4.18 on the pressure loading under normal operating conditions.[1] Appendix G to the Code only requires that a safety factor of two be placed on the contribution of the pressure load in the case of an axially-oriented flaw in an axial weld, shell plate, or forging. By postulating a circumferentially-oriented flaw on a circumferential weld and using the appropriate correction factor, the margin of two is maintained for the contribution of the pressure load to the integrity calculation of the circumferential weld. Consequently, the staff determined that the postulation of an axially-oriented flaw on a circumferential RPV weld is a level of conservatism that is not required to establish P-T limits to protect the RCS pressure boundary from failure during hydrostatic testing, heatup, and cooldown. For this reason, the methods of the Code Case provide for a

1 The margin of safety of 4.18 is arrived at by dividing 0.926 by 0.443 and then multiplying by the required safety factor of two.

reduction in the applied stress intensities for primary membrane and bending stresses for the circumferential flaw by a factor of approximately two ($\approx$ 0.926/0.443).[2] This is realistic since the postulated circumferential flaw in the vessel will propagate if a stress is applied in a direction normal to the axis of the flaw (i.e., by application of an axially oriented stress that results in Mode I crack propagation of the circumferential flaw). Such tensile stresses in the RPVs are typically about half the magnitudes of the corresponding membrane stresses.

ASME Code's WGOPC concluded that application of Code Case N-588 to plant P-T limits are still sufficient to ensure the structural integrity of RPVs during plant operations. The staff concurred with ASME Code's WGOPC's determination and granted an exemption to use Code Case N-588 for the Quad Cities Nuclear Power Station (NRC letter to ComEd dated February 4, 2000). In the letter of February 4, 2000, the staff concluded that the procedure in Appendix G to the Code was developed for axially oriented flaws and that such a procedure was physically unrealistic and overly conservative for postulating flaws of this orientation. The staff also concluded that relaxation of the requirements of Appendix G to the Code by application of Code Case N-588 is acceptable and would maintain, pursuant to 10 CFR 12(a)(2)(ii), the underlying purpose of the ASME Code and the NRC regulations to ensure an acceptable margin of safety for the Quad Cities RPVs and reactor coolant pressure. ComEd's proposal to use Code N-588 for generation of the LaSalle P-T limit curves is predicated on the same technical basis as was used for generation of the Quad Cities P-T limits.

As a result of the staff's evaluation of the licensee's proposal to use Code Case N-588, the staff noted that the Code Case method for evaluating axially oriented flaws postulated in axial welds or base metal materials does not deviate from the methods for evaluating them in the 1995 Edition or in the 1996 Addenda of Appendix G to the Code. Thus, application of Code Case N-588 will only matter if the Code Case is applied for the case where a circumferential weld is the most limiting material in the beltline region of the RPV. Since application of this Code Case method allows licensees to reduce the stress intensities attributed to the circumferential weld, the net effect of the Code Case would allow ComEd to use the next most limiting base metal or axial weld material in the RPV as the basis for evaluating the vessel and generating the P-T limit curves. In this case, the Code Case is not relevant to the evaluation of the LaSalle, Units 1 or 2, RPVs, because neither of the LaSalle RPVs are limited in the beltline region by a circumferential weld. Therefore, the Code Case does not effect the evaluation of the beltline region for the LaSalle, Unit 1, RPV, which is limited by the axial weld fabricated from material heat No. 1P3571, nor does it effect the LaSalle, Unit 2, RPV, which is limited by the lower-intermediate shell plate fabricated from material heat No. C9404-2. Therefore, the staff has determined that an exemption to use Code Case N-588 is not necessary for LaSalle, Units 1 and 2.

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2 The Code Case accomplishes this by reducing the M_m factors for circumferential welds that are used for calculations of the stress intensities attributed to primary membrane stresses (K_{1m}) and primary bending stresses (K_{1b}). As stated previously, for RPVs with wall thicknesses in the range of 4.0-12.0 inches, the M_m factor for circumferential welds is 0.443. This is the normal wall thickness range for GE designed boiling water reactors.

2.2 Exemption Request to Use Code Case N-640

ComEd has requested, pursuant to 10 CFR 50.60(b), an exemption to use ASME Code Case N-640 (previously designated as Code Case N-626) as the basis for establishing the P-T limit curves. Code Case N-640 permits application of the lower bound static initiation fracture toughness value (K_{1c}) equation as the basis for establishing the curves in lieu of using the lower bound crack arrest fracture toughness value equation (i.e., the K_{1a} equation, which is based on conditions needed to arrest a dynamically propagating crack, and which is the method invoked by Appendix G to Section XI of the ASME Code). Use of the K_{1c} equation in determining the lower bound fracture toughness in the development of the P-T operating limits curve is more technically correct than the use of the K_{1a} equation since 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_{1c} equation appropriately implements the use of the 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_{1a} equation since 1974 when the equation 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. Therefore, the lower bound static fracture toughness K_{1c} equation provides an acceptable method for calculating P-T limits.

In addition, P-T curves based on the K_{1c} equation will enhance overall plant safety by opening the P-T operating window with the greatest safety benefit in the region of low temperature operations. The two primary safety benefits that would be realized during the pressure test are a reduction in the challenges to operators in maintaining a high temperature in a limited operating window and personnel safety while conducting inspections in primary containment at elevated temperatures with no decrease to the margin of safety.

The ASME Code's WGOPC has concluded that application of Code Case N-640 to plant P-T limits are still sufficient to ensure the structural integrity of RPVs during plant operations. The staff concurred with ASME's determination and granted exemptions to use Code Case N-640 for the Quad Cities Nuclear Power Station (NRC letter to ComEd dated February 4, 2000). In the February 4, 2000, letter, the staff concluded that application of Code Case N-640 would not significantly reduce the safety margins required by 10 CFR Part 50, Appendix G, and would eliminate steam vapor hazards by allowing inspections in the primary containment to be conducted at a lower coolant temperature. The staff also concluded that relaxation of the requirements of Appendix G to the Code by application of Code Case N-640 is acceptable and would maintain, pursuant to 10 CFR 12(a)(2)(ii), the underlying purpose of the ASME Code and the NRC regulations to ensure an acceptable margin of safety for the Quad Cities RPVs and reactor coolant pressure boundary. ComEd's proposal to use Code N-640 for generation of the LaSalle P-T limit curves is predicated on the same technical basis as was used for generation of the Quad Cities P-T limits. The staff, therefore, concludes that Code Case N-640 is acceptable for application to the LaSalle P-T limits.

3.0 CONCLUSION

The staff has determined that because the most limiting material of the subject RPVs is not a circumferential weld, the Code Case method for evaluating axially oriented flaws postulated in

axial welds or base metal materials does not deviate from the methods for evaluating them in the 1996 Addenda of Appendix G to the Code. Therefore, ComEd's exemption request to use the methods of Code Case N-588 is not necessary for LaSalle, Units 1 and 2.

The staff has determined that ComEd has provided sufficient technical bases for using the methods of Code Case N-640 in the calculation of the P-T limits for LaSalle, Units 1 and 2. The staff has also determined that application of Code Case N-640 to the P-T limit calculations will continue to serve the purpose in 10 CFR Part 50, Appendix G, for protecting the structural integrity of the LaSalle RPVs and reactor coolant pressure boundaries. In this case, since strict compliance with 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 staff concludes that application of Code Case N-640 to the P-T limit calculations meets the special circumstance provisions in 10 CFR 50.12(a)(2)(ii), for granting exemptions to the regulations and that pursuant to 10 CFR 50.12(a)(1), the granting of this exemption is authorized by law, will not present undue risk to the public health and safety, and is consistent with the common defense and security. The staff, therefore, grants the exemption to 10 CFR 50.60(a) and 10 CFR Part 50, Appendix G, to allow ComEd to use Code Case N-640 as part of the bases for generating the P-T limit curves for LaSalle, Units 1 and 2.

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