

October 31, 2000

Mr. Mike Reandeau
Director - Licensing
Clinton Power Station
P.O. Box 678
Clinton, IL 61727

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WBeckner
WBateman

SUBJECT: CLINTON POWER STATION, UNIT 1 - ISSUANCE OF AMENDMENT
(TAC NO. MA9862)

Dear Mr. Reandeau:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 134 to Facility Operating License No. NPF-62 for the Clinton Power Station, Unit 1. The amendment is in response to your application dated August 25, 2000, as supplemented September 21, October 14, and October 25, 2000.

The amendment revises the Technical Specification reactor vessel pressure-temperature limits.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly Federal Register notice.

Sincerely,

/RA/

Jon B. Hopkins, Senior Project Manager, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-461

Enclosures: 1. Amendment No. 134 to NPF-62
2. Safety Evaluation

cc w/encls: See next page

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**See previous concurrence

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NAME	JHopkins		THarris	J&H	KWichman*		AHodgdon**		AMendiola
DATE	10/20/00		10/26/00		10/18/00		10/24/00		10/31/00

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*See 10/18/00 memo from K Wichman to A Mendiola

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UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

October 31, 2000

Mr. Mike Reandeau
Director - Licensing
Clinton Power Station
P.O. Box 678
Mail Code V920
Clinton, IL 61727

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Mike Reandeau

Clinton Power Station, Unit 1
AmerGen Energy Company, LLC

cc:

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

AMERGEN ENERGY COMPANY, LLC

DOCKET NO. 50-461

CLINTON POWER STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 134
License No. NPF-62

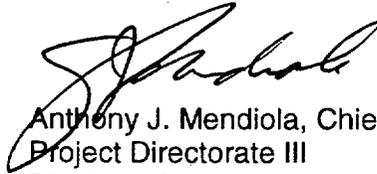
1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by AmerGen Energy Company, LLC (the licensee), dated August 25, 2000, as supplemented September 21, October 14, and October 25, 2000, complies with the standards and requirements of the Atomic 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-62 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 134 are hereby incorporated into this license. AmerGen Energy 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 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Anthony J. Mendiola, Chief, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: October 31, 2000

ATTACHMENT TO LICENSE AMENDMENT NO. 134

FACILITY OPERATING LICENSE NO. NPF-62

DOCKET NO. 50-461

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

Remove Pages

3.4-28

3.4-29

3.4-32

Insert Pages

3.4-28

3.4-29

3.4-32

3.4-32a

3.4-32b

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>C. -----NOTE----- Required Action C.2 shall be completed if this Condition is entered. ----- Requirements of the LCO not met in other than MODES 1, 2, and 3.</p>	<p>C.1 Initiate action to restore parameter(s) to within limits. <u>AND</u> C.2 Determine RCS is acceptable for operation.</p>	<p>Immediately Prior to entering MODE 2 or 3</p>

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.4.11.1 -----NOTE----- Only required to be performed during RCS heatup and cooldown operations and RCS inservice leak and hydrostatic testing. ----- Verify: a. RCS pressure and RCS temperature are within the limits of Figures 3.4.11-1, 3.4.11-2 and 3.4.11-3; and b. RCS heatup and cooldown rates are as indicated on the figures.</p>	<p>30 minutes</p>

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.4.11.2 -----NOTE----- Only required to be met during control rod withdrawal for the purpose of achieving criticality. -----</p> <p>Verify RCS pressure and RCS temperature are within the criticality limits of Figure 3.4.11-3.</p>	<p>Once within 15 minutes prior to control rod withdrawal for the purpose of achieving criticality</p>
<p>SR 3.4.11.3 -----NOTE----- Only required to be met in MODES 1, 2, 3, and 4 during recirculation pump start. -----</p> <p>Verify the difference between the bottom head coolant temperature and the reactor pressure vessel (RPV) coolant temperature is $\leq 100^{\circ}\text{F}$.</p>	<p>Once within 15 minutes prior to each startup of a recirculation pump</p>
<p>SR 3.4.11.4 -----NOTE----- Only required to be met in MODES 1, 2, 3, and 4 during recirculation pump start. -----</p> <p>Verify the difference between the reactor coolant temperature in the recirculation loop to be started and the RPV coolant temperature is $\leq 50^{\circ}\text{F}$.</p>	<p>Once within 15 minutes prior to each startup of a recirculation pump</p>

(continued)

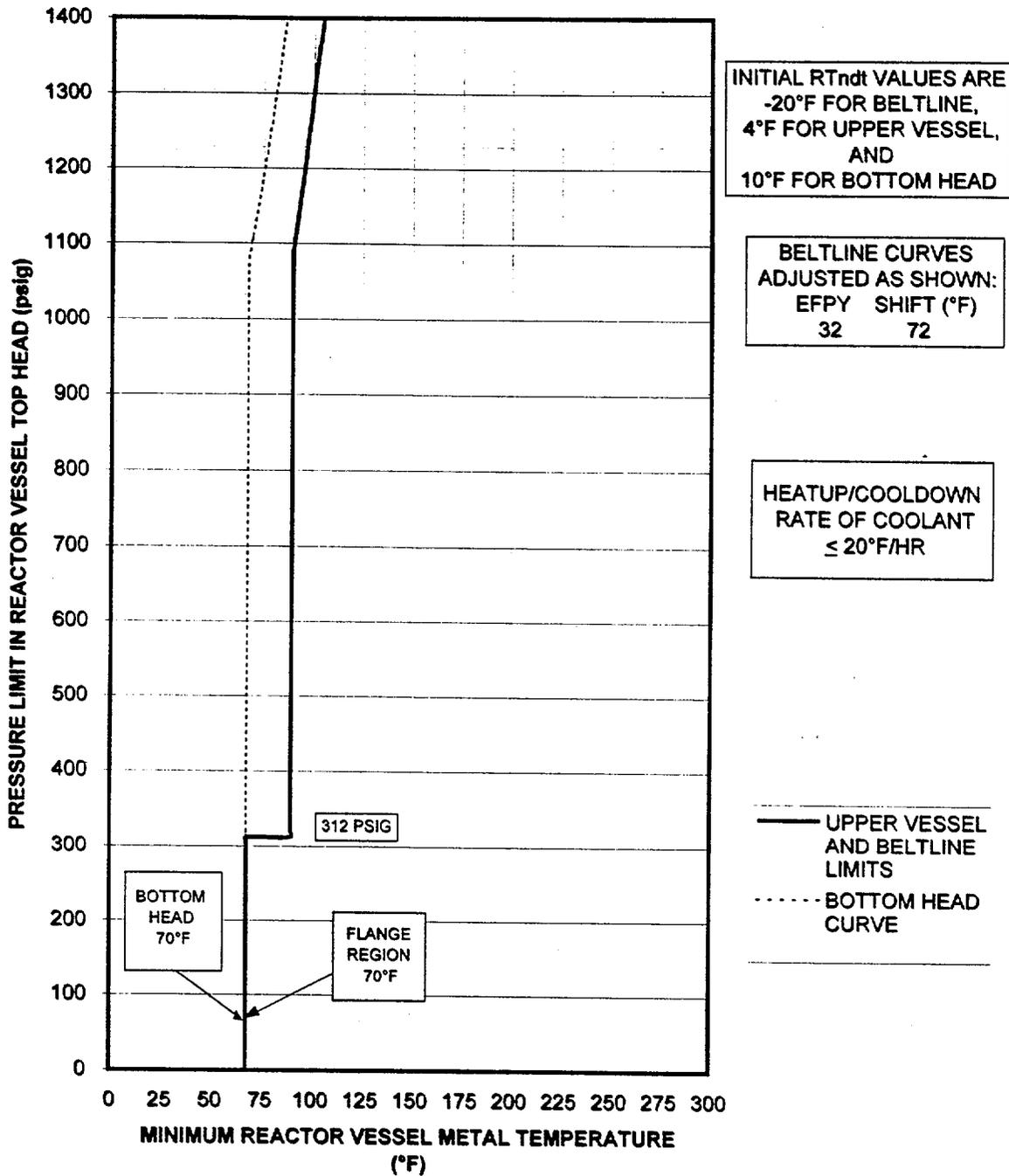


Figure 3.4.11-1
Bottom Head and RCS Composite P/T Curves
for Pressure Tests [Curve A] up to 32 EFPY

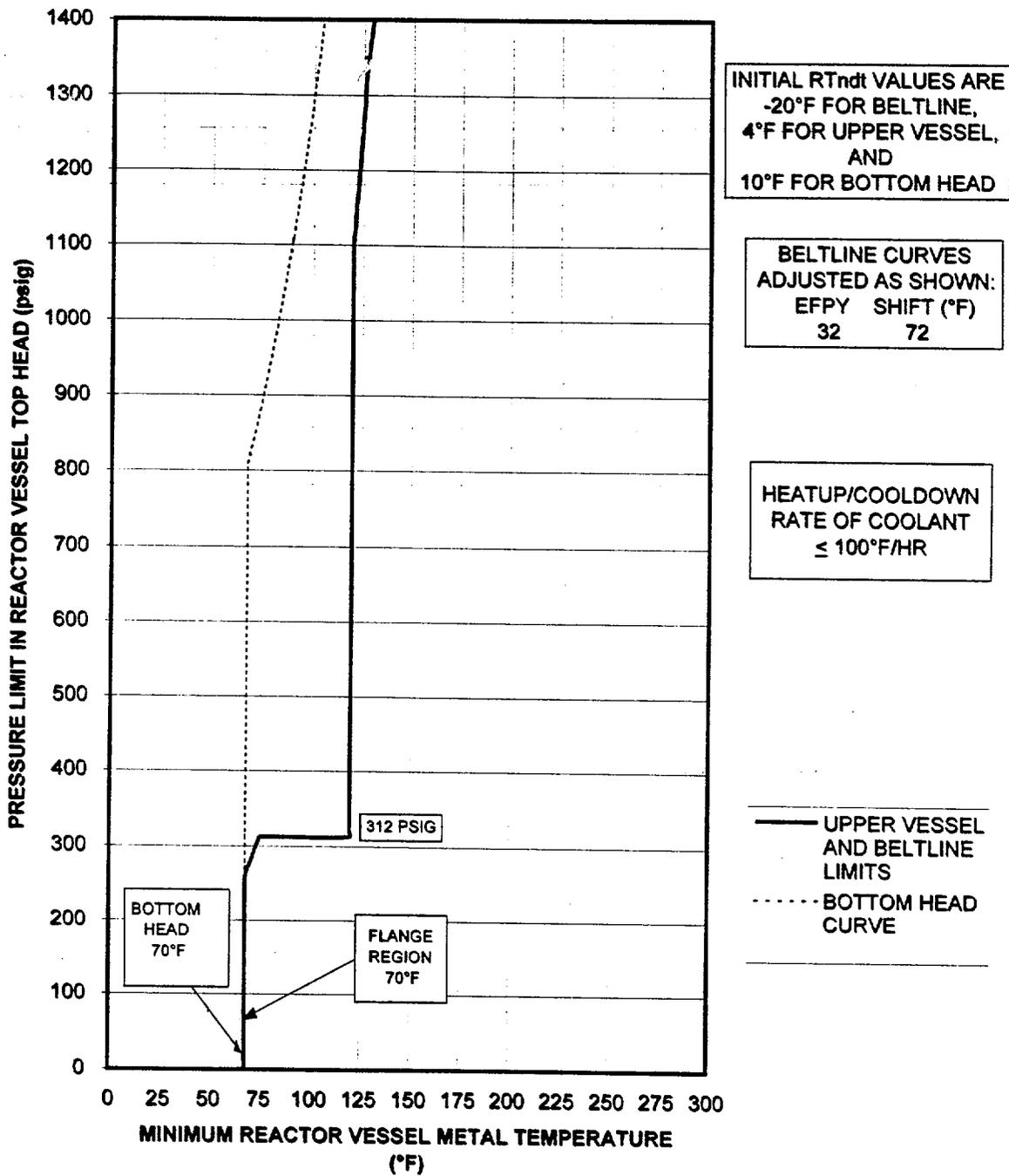


Figure 3.4.11-2
Bottom Head and RCS Composite P/T Curves
for Core Not Critical Operation [Curve B] up to 32 EPY

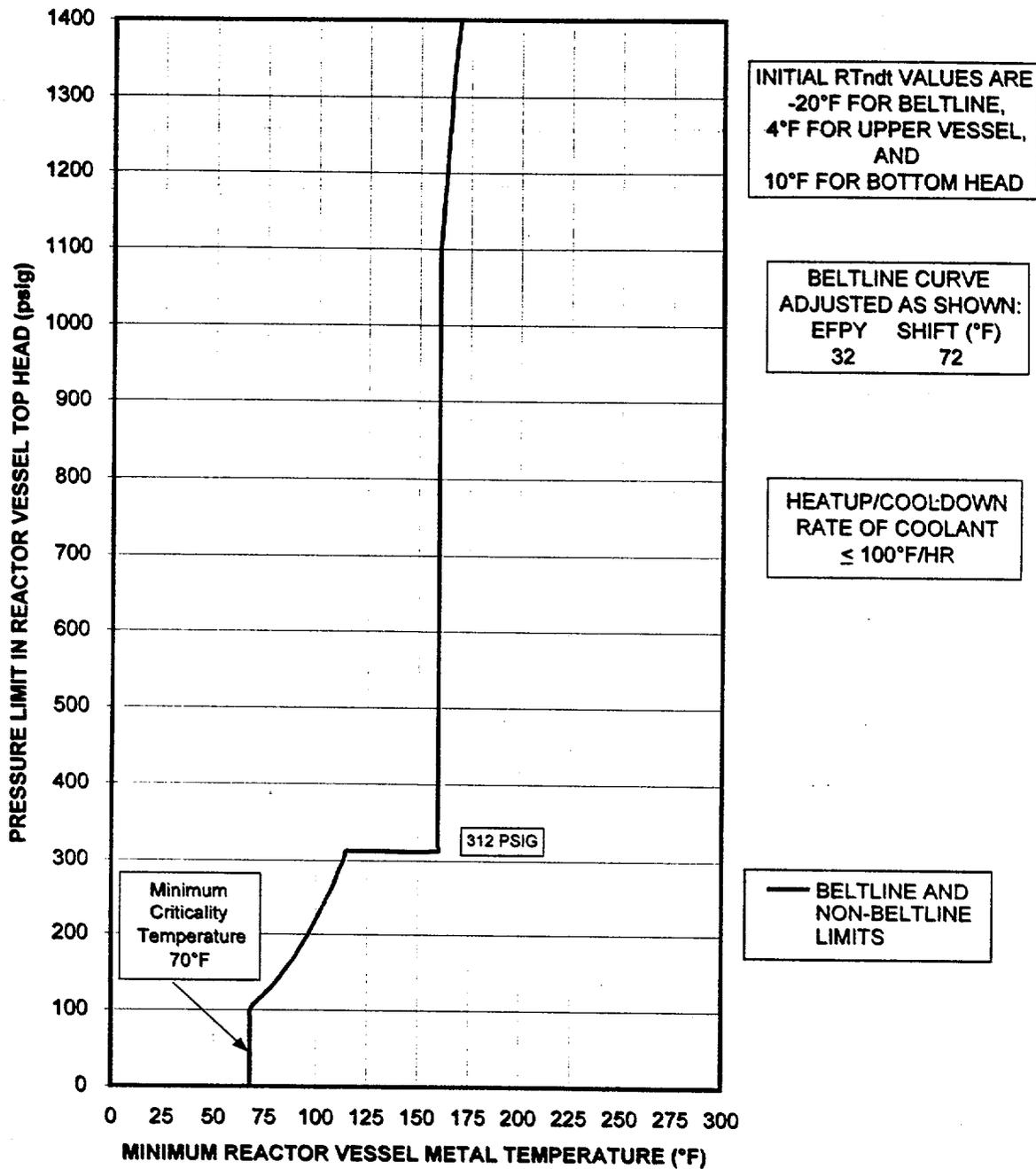


Figure 3.4.11-3
RCS Composite P/T Curves for Core Critical
Operation [Curve C] up to 32 EFPY



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 134 TO FACILITY OPERATING LICENSE NO. NPF-62

AMERGEN ENERGY COMPANY, LLC

CLINTON POWER STATION, UNIT 1

DOCKET NO. 50-461

1.0 INTRODUCTION

By letter dated August 25, 2000, as supplemented September 21, October 14, and October 25, 2000, AmerGen Energy Company, LLC (the licensee), proposed an amendment to the Clinton Power Station (CPS) Technical Specifications (TSs) to revise the reactor vessel pressure-temperature (P-T) limits. Associated with this request are two proposed exemptions from certain requirements of Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Section 50.60(a) and Appendix G, that would substitute use of American Society of Mechanical Engineers (ASME) Code Cases N-588 and N-640. The exemptions are being handled concurrent to this license amendment request but as a separate action.

The supplemental letter of September 21, 2000, provided additional information and did not change the requested amendment or affect the proposed no significant hazards consideration. The supplemental letter of October 14, 2000, made a minor change to the requested TS, which was subsequently rescinded by the letter dated October 25, 2000. This did not change the amendment request as noticed or affect the proposed no significant hazards consideration.

2.0 BACKGROUND

2.1 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 Boiler and Pressure Vessel Code (Appendix G to the Code) were applied. 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_I , which is a function of the stress state and flaw configuration. The methodology requires that licensees determine the reference stress intensity (K_{Ia}) 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. 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.

The methodology of Appendix G requires that P-T curves must satisfy a safety factor of 2.0 on stress intensities arising from primary membrane and bending stresses during normal plant operations (including heatups, cooldowns, and transient operating conditions), and a safety factor of 1.5 on stress intensities arising from 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 the minimum temperature requirements of the rule for bolting up the vessel during normal and pressure testing operations.

2.2 AmerGen Energy Corporation Submittal of August 25, 2000

On August 25, 2000, the licensee submitted an amendment request to update the pressure-temperature (P-T) limit curves for CPS (Ref. 1). The extension requested corresponds to the end of the current license. The proposed fluence value for 32 effective full power years (EFPY) was determined by extrapolation from the value used for the current pressure temperature curves. Staff review of the submitted information revealed that CPS is lacking plant-specific dosimetry and calculations and that the original fluence value was reduced from averaging similar plant dosimetry and (one dimensional) calculations. In a letter dated September 21, 2000 (Ref. 2), the licensee proposed to limit the applicability of the pressure temperature curves to October 15, 2003 (i.e., to the end of the Cycle 9 operating cycle). In the interim, the licensee will perform credible plant-specific calculations and dosimetry, and will propose revised curves for 32 EFPY prior to the end of the Cycle 9 operating cycle.

On October 30, 2000 (Ref. 3), pursuant to 10 CFR 50.12, the NRC granted two exemptions to allow deviation from the requirements of 10 CFR Part 50 Appendix G, and to use Code Cases N-588 and N-640 as the bases for generating the CPS P-T limit curves effective to 32 EFPY.⁽¹⁾ The staff's assessment of the proposed P-T limit curves is, in part, based on these exemptions and the staff's evaluation of the pressure vessel fast neutron fluence.

3.0 EVALUATION

3.1 Assessment of Neutron Fluence Levels

The staff performed an independent review of the neutron fluence information and values submitted in the licensee's letters of August 25, 2000, and in General Electric Company (GE) non-proprietary Topical Report No. GE-NE-B13-02084-00-01a (Ref. 4). On behalf of the licensee, the GE extrapolated the value of the fluence used in the current P-T curves to the proposed curves for 32 EFPYs. In the licensee's letter of September 21, 2000, the licensee proposed to limit the period of applicability of the 32 EFPY curves to October 15, 2003, which is the end of Cycle 9. (The plant is about to enter Cycle 8). At that time, the licensee will prepare new fluence values in accordance with the guidelines of the draft RG DG-1053 (Ref. 5). Therefore, the review objective is to establish whether the 32 EFPY curves are acceptable through October 15, 2003.

The proposed fluence values have a conservatism of about 35 percent because the calculated value was increased by the estimated uncertainty. It should be noted here that the Appendix G methodology requires best estimate values. In addition, by the end of the proposed period of operation (end of Cycle 9), the estimated operation will be 10.6 EFPYs while the fluence was estimated for 32 EFPYs. This provides a conservatism of about 67 percent. CPS has been operating with longer fuel cycles, which entail low neutron leakage loadings, thus providing another source of conservatism. Finally, the proposed P-T curves are limited by the feedwater nozzle material and not by the beltline material where fluence is a determining factor.

The staff concluded that there is reasonable assurance of safety for the proposed interim application of the proposed P-T curves. Therefore, the staff finds the fluence values acceptable for the P-T curves until October 15, 2003, for CPS.

(1) Approval to use Code Case N-588 allows licensees to evaluate a circumferential weld based on the tensile stresses associated with a postulated circumferential flaw in the weld, and approval to use Code Case N-640 allows licensees to use the lower bound static initiation fracture toughness value equation (K_{Ic} equation) as the basis for establishing the P-T limits in lieu of using the lower bound crack arrest fracture toughness value equation (K_{Ia} equation), which is the method invoked by Appendix G to the Code. The staff's basis for approving these exemptions is given in the Safety Evaluation of October 30, 2000.

3.2 P-T Limit Curve Assessment

For the CPS RPV, the licensee provided the P-T limit curves for normal operating conditions and pressure testing conditions effective to 22 EFPY and 32 EFPY. For normal operating conditions with the core not critical and for pressure testing conditions, individual P-T curves were proposed for lower head in addition to the composite curves proposed for the beltline and nozzle regions of the RPV. To test the validity of the licensee's proposed curves, the staff performed an independent assessment of the licensee's submittal. The staff applied the methodologies of 1995 Edition of Appendix G to the Code and 10 CFR Part 50, Appendix G, as modified by the methodologies of ASME Code Cases N-588 and N-640, as the basis for its independent assessment. For the evaluation of the RPV nozzles, the staff also modified the methods of Appendix G to the Code by the nozzle evaluation methods proposed in Appendix 5 of Welding Research Council Bulletin WRC-175, "PVRC Recommendations on Toughness Requirements for Ferritic Materials" (August 1972).

The staff's assessment also included an independent calculation of the ART values for both the 1/4T and 3/4T locations of the CPS RPV beltline regions based on the neutron fluence specified in the submittal for the CPS RPV effective to 32 EFPY. For the evaluation of the limiting beltline materials, the staff confirmed that the ARTs and P-T limit curves were based on the methodology of RG 1.99, Revision 2. For the evaluation of the limiting material in the limiting nozzle and lower head evaluations, the staff applied the plant-specific design basis data provided by the licensee.

The staff determined that the licensee's P-T limit methods were based on conservative assumptions that made the proposed P-T limit curves as conservative or slightly more conservative than the P-T limit curves generated by the staff. The staff also confirmed that the licensee's P-T limit curves included appropriate minimum temperature requirements that were at least as conservative as those required in Table 1 to 10 CFR Part 50, Appendix G, as exempted and modified by the Code Case methods.

Based on the staff's review and evaluation of the licensee's proposed P-T limit curves for CPS, the staff has determined that the proposed P-T limit curves are consistent with the alternate criteria of Code Cases N-588 and N-640, and satisfy the requirements of 10 CFR 50.60(a), "Acceptance Criteria for Fracture Prevention Measures for Lightwater Nuclear Power Reactors for Normal Operation;" Appendix G to 10 CFR Part 50, "Fracture Toughness Requirements;" and Appendix G to the 1995 Edition of Section XI of the ASME Code, as exempted by the methods of analyses in Code Cases N-588 and N-640. However, given the uncertainties in the 32 EFPY neutron fluence calculations for CPS, the staff concludes that the updated P-T limit curves proposed by the licensee will continue to provide an acceptable level of margin and safety, and provide sufficient assurance that the CPS reactor will be operated in a manner that will protect the RPV against brittle fracture through October 15, 2003. The proposed curves are therefore approved for incorporation into the CPS TS and for use through October 15, 2003. On September 21, 2000, the licensee informed the staff that the applicability of the proposed P-T limit curves would be limited to October 15, 2003.

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATION

This amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 or changes a surveillance requirement. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding (65 FR 56598). Accordingly, the amendment meets the eligibility criteria for categorical exclusion 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 amendment.

6.0 CONCLUSION

The staff 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 amendment will not be inimical to the common defense and security or to the health and safety of the public.

7.0 REFERENCES

1. Letter from M. T. Coyle, Vice President, AmerGen Energy Corporation, to the U.S. Nuclear Regulatory Commission Document Control Desk, "Clinton Power Station Exemption Request and Proposed Amendment to Facility Operating License No. NPF-62 (LA-00-011)," dated August 25, 2000.
2. Letter from M. T. Coyle, Vice President, AmerGen Energy Corporation, to the U.S. Nuclear Regulatory Commission Document Control Desk, "Supplemental Information for the Amendment Request to Revise P/T Curves for Clinton Power Station, Facility Operating License No. NPF-62 (LA-00-011)," dated September 21, 2000.
3. Letter from J. B. Hopkins, Senior Project Manager, U.S. Nuclear Regulatory Commission, to M. Reandeau, Director - Licensing, Clinton Power Station, "Clinton Power Station - Exemption from the Requirements of 10 CFR Part 50, Section 50.60(a) (TAC NO. MA9841)," dated October 30, 2000.
4. GE-NE-B13-02084-00-01a "Pressure Temperature Curves for the AmerGen, Clinton Power Station Using the K_{ic} Methodology," by B.J. Branlund, et. al., GE Nuclear Energy, dated August, 2000.

5. Draft Regulatory Guide DG-1053 "Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence," August 1999 (to be published by the end of 2000).

Principal Contributors: J. Medoff
L. Lois

Date: October 31, 2000