

Template NRR-058

Mr. Charles H. Cruse  
Vice President - Nuclear Energy  
Baltimore Gas and Electric Company  
Calvert Cliffs Nuclear Power Plant  
1650 Calvert Cliffs Parkway  
Lusby, MD 20657-4702

March 20, 2000

SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 1 - AMENDMENT  
RE: PRESSURE-TEMPERATURE LIMITS EVALUATION (TAC NO. MA7220)

Dear Mr. Cruse:

The Commission has issued the enclosed Amendment No. 234 to Facility Operating License No. DPR-53 for the Calvert Cliffs Nuclear Power Plant, Unit No. 1. This amendment consists of changes to the Technical Specifications (TSs) in response to your application transmitted by letter dated November 18, 1999.

The amendment incorporates a change in the pressure-temperature (P-T) limit curves in the Calvert Cliffs Unit 1 Technical Specifications. Baltimore Gas and Electric Company (BGE) changed the fluence level for which the curves are valid from  $2.61 \times 10^{19}$  n/cm<sup>2</sup> to  $4.49 \times 10^{19}$  n/cm<sup>2</sup>.

BGE did not report the effective full-power years or calendar year that they project the  $4.49 \times 10^{19}$  n/cm<sup>2</sup> fluence level. The staff requests that you provide your projection for tracking purposes.

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

Sincerely,

/RA/

Alexander W. Dromerick, Sr. Project Manager, Section 1  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-317

Enclosures: 1. Amendment No. 234 to DPR-53  
2. Safety Evaluation

cc w/encls: See next page

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NAME	Alderson, ck: cn		SLittle	J. G. Miller			MGamberoni (A)	KWichman
DATE	03/23/00		03/8/00	03/14/00			03/17/00	Memo dtd 2/11/00

Official Record Copy

DATED: March 20, 2000

AMENDMENT NO. TO FACILITY OPERATING LICENSE NO. DPR-53-CALVERT  
CLIFFS UNIT 1

File Center  
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UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

March 20, 2000

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Vice President - Nuclear Energy  
Baltimore Gas and Electric Company  
Calvert Cliffs Nuclear Power Plant  
1650 Calvert Cliffs Parkway  
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2. Safety Evaluation

cc w/encls: See next page

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Unit Nos. 1 and 2

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

BALTIMORE GAS AND ELECTRIC COMPANY

DOCKET NO. 50-317

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 234  
License No. DPR-53

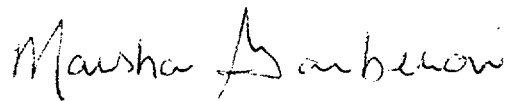
1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Baltimore Gas and Electric Company (the licensee) dated November 18, 1999, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's 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. DPR-53 is hereby amended to read as follows:

2. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 234 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION



Marsha Gamberoni, Acting Chief, Section 1  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: March 20, 2000

ATTACHMENT TO LICENSE AMENDMENTS

AMENDMENT NO. 234 FACILITY OPERATING LICENSE NO. DPR-53

DOCKET NO. 50-317

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

3.4.3-3  
3.4.3-4  
3.4.12-6

Insert Pages

3.4.3-3  
3.4.3-4  
3.4.12-6

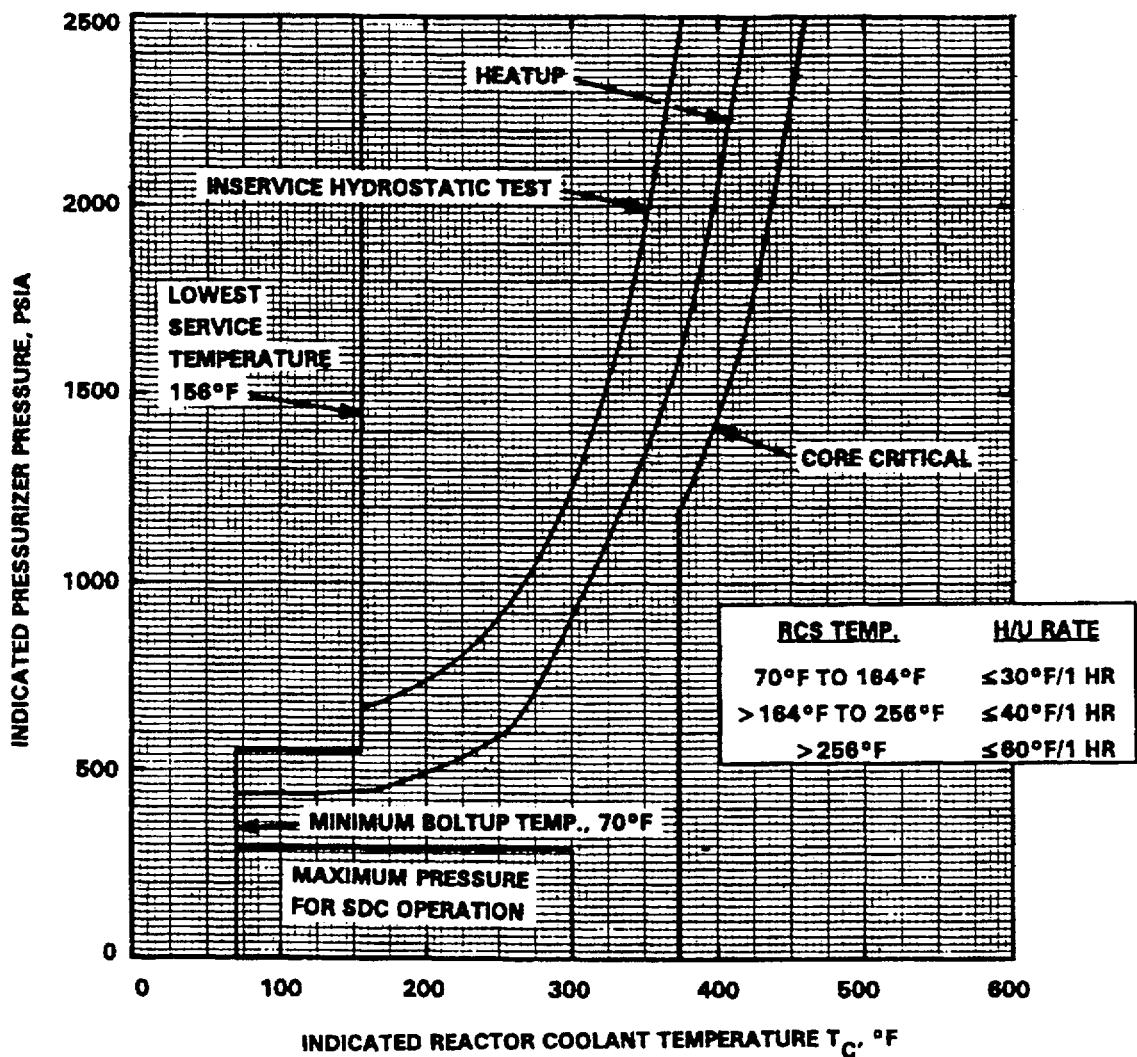


Figure 3.4.3-1  
Calvert Cliffs Unit 1 Heatup Curve, for Fluence  $\leq 4.49 \times 10^{19}$  n/cm<sup>2</sup>  
Reactor Coolant System Pressure Temperature Limits



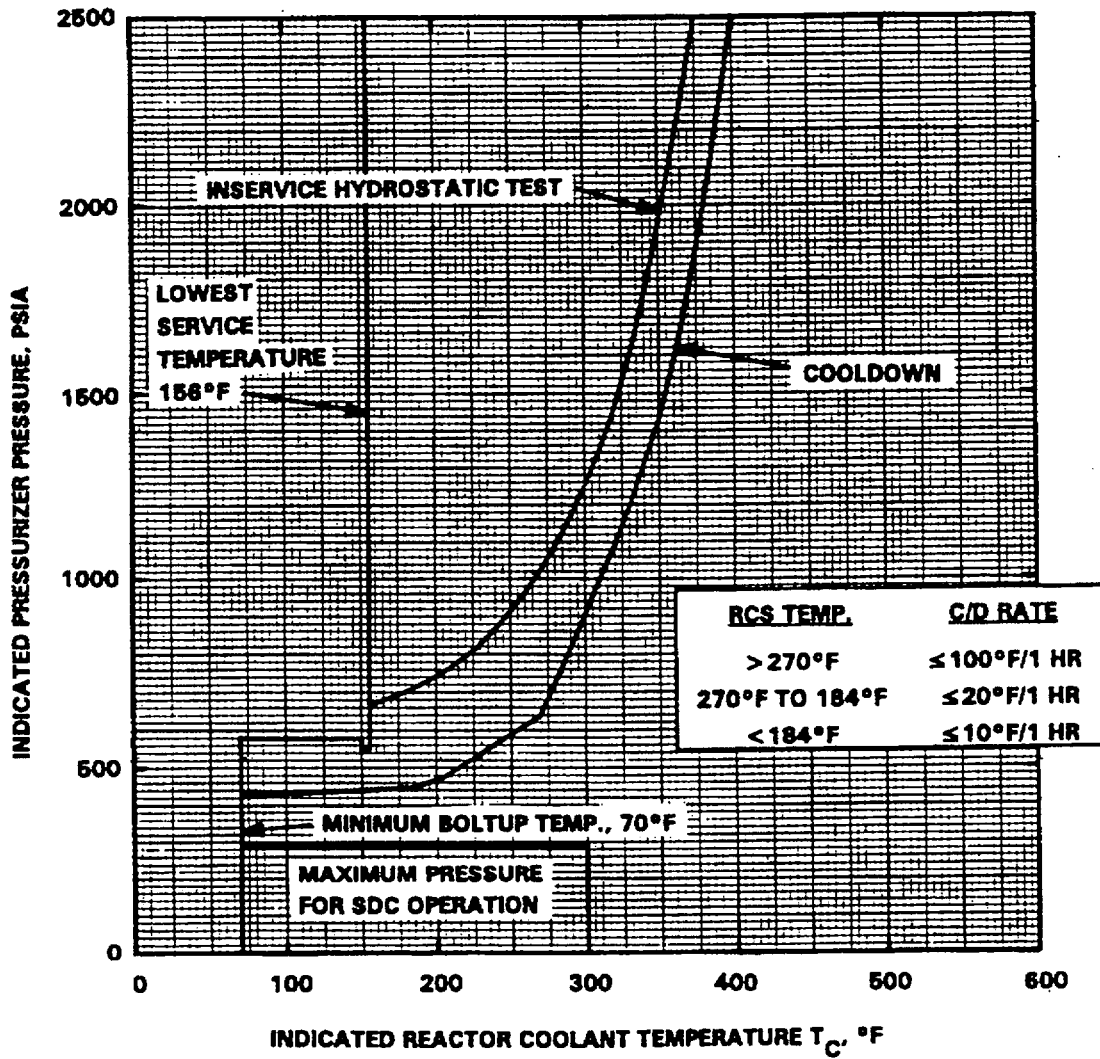


Figure 3.4.3-2  
Calvert Cliffs Unit 1 Cooldown Curve, for Fluence  $\leq 4.49 \times 10^{19}$  n/cm<sup>2</sup>  
Reactor Coolant System Pressure Temperature Limits

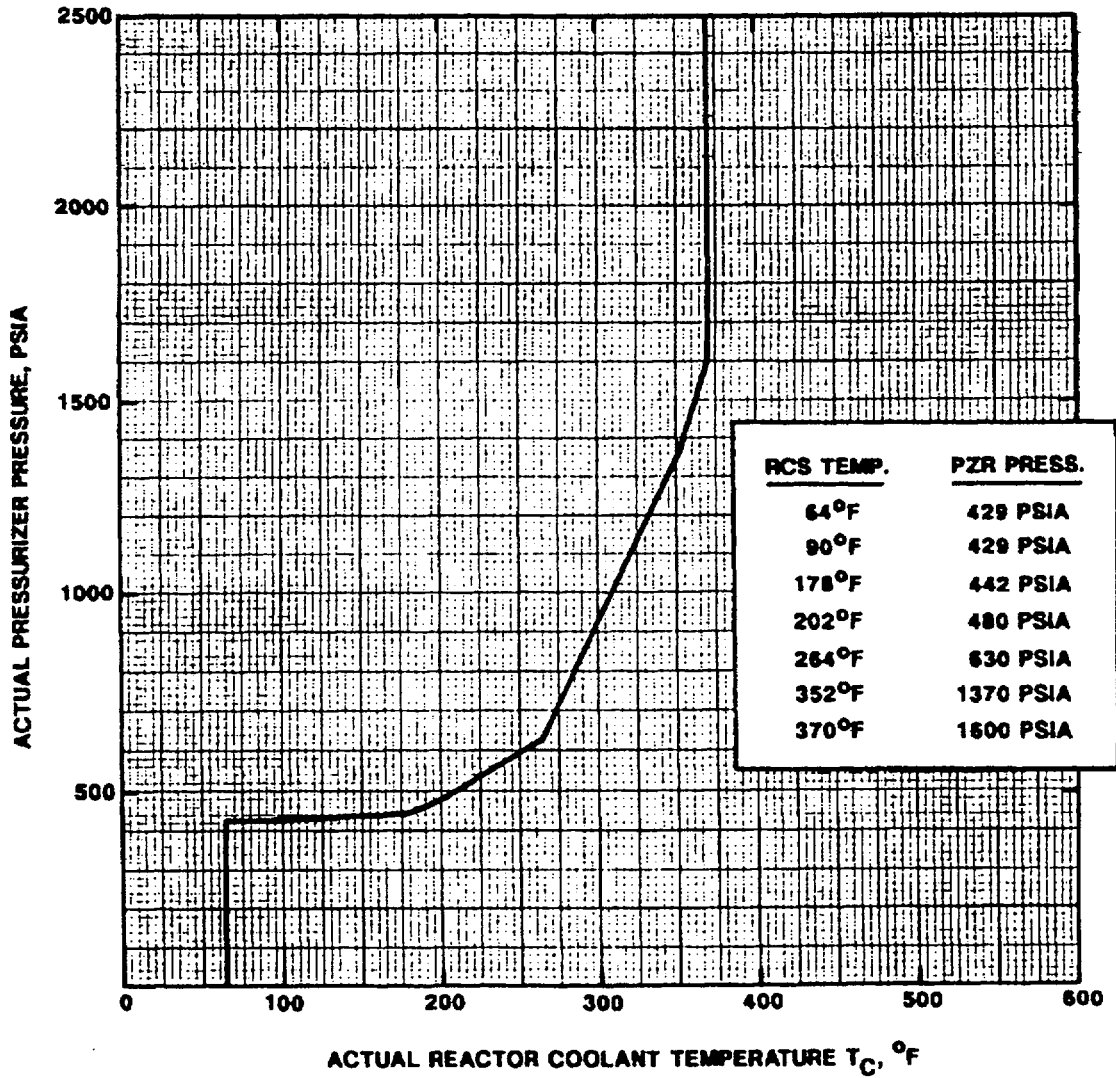


Figure 3.4-12-1  
Calvert Cliffs Unit 1, for Fluence  $\leq 4.49 \times 10^{19}$  n/cm<sup>2</sup>  
Maximum PORV Opening Pressure vs Temperature



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 234 TO FACILITY OPERATING LICENSE NO. DPR-53

BALTIMORE GAS AND ELECTRIC COMPANY

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 1

DOCKET NO. 50-317

1.0 INTRODUCTION

By letter dated November 18, 1999, the Baltimore Gas and Electric Company, (BGE or the licensee), requested an amendment to its operating license. The amendment is to incorporate a change in the pressure-temperature (P-T) limit curves in the Calvert Cliffs Unit 1 Technical Specifications. BGE is changing the fluence level for which the curves are valid from  $2.61 \times 10^{19}$  n/cm<sup>2</sup> to  $4.49 \times 10^{19}$  n/cm<sup>2</sup>.

The NRC staff evaluated the P-T limits based on the following NRC regulations and guidance: Appendix G to 10 CFR Part 50; Generic Letters (GL) 88-11 and 92-01; Regulatory Guide (RG) 1.99, Rev. 2; and Standard Review Plan (SRP) Section 5.3.2. Appendix G to 10 CFR Part 50 requires that P-T limits for the reactor vessel must be at least as conservative as those obtained by Appendix G to Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code). GL 88-11 requires that licensees use the methods in RG 1.99, Rev. 2, to predict the effect of neutron irradiation on the adjusted reference temperature (ART) of reactor vessel materials. The ART is defined as the sum of initial nil-ductility transition reference temperature ( $RT_{NDT}$ ) of the material, the increase in  $RT_{NDT}$  caused by neutron irradiation, and a margin to account for uncertainties in the initial  $RT_{NDT}$ , copper and nickel content, fluence and the calculational procedures. The increase in  $RT_{NDT}$  is calculated from the product of a chemistry factor and a fluence factor.

The chemistry factor may be calculated using credible surveillance data, obtained by the licensee's surveillance program, as directed by Position 2 of RG 1.99, Rev. 2. If credible surveillance data are not available, the chemistry factor is calculated dependent upon the amount of copper and nickel in the vessel material as specified in Table 1 of RG 1.99, Rev. 2. GL 92-01 requires licensees to submit reactor vessel materials data, which the staff uses in the review of the P-T limits submittals.

Standard Review Plan 5.3.2 provides guidance on calculation of the P-T limits using the linear elastic fracture mechanics methodology specified in Appendix G to Section III of the ASME Code. The linear elastic fracture mechanics methodology postulates sharp surface defects that are normal to the direction of maximum stress and have a depth of one-fourth of the reactor

vessel beltline thickness (1/4T) and a length of 1-1/2 times the beltline thickness. The critical locations in the vessel for this methodology are the 1/4T and 3/4T locations, which correspond to the maximum depth of the postulated inside surface and outside surface defects, respectively.

## 2.0 EVALUATION

When the NRC approved the current P-T limits for Calvert Cliffs, Unit 1 reactor vessel in March 1994, the limiting materials with regard to pressurized thermal shock (PTS) were the intermediate shell axial welds 2-203 A, B, and C. For these welds, BGE projected the PTS screening criterion of 270 °F to be exceeded at a fluence level of  $2.61 \times 10^{19}$  n/cm<sup>2</sup> before the current operating license expires. Since then, developments have significantly changed the previously projected PTS values. Among these, was the NRC approving the use of Duke Power Company's McGuire Unit 1 reactor vessel surveillance results for reactor vessel fracture toughness analyses of Calvert Cliffs Unit 1 Weld Seams 2-203-A, B, and C. Use of the McGuire data changed the chemistry factor for Welds 2-203 A, B, and C significantly, and as a result, these welds are no longer the PTS critical materials. BGE determined that the PTS critical materials are now the axial welds 3-203-A, B, and C. BGE's proposed revision takes advantage of the material properties of the new PTS critical welds to validate the current P-T curves for a higher fluence value.

The current P-T limits for the reactor vessel beltline region were based on the ART values of 241.1 °F and 181.0 °F for the 1/4T and 3/4T locations, respectively. BGE predicted these ART values using RG 1.99 Rev. 2, and the material properties for the then critical welds 2-203-A, B, and C.

Using the material properties of the new PTS critical welds 3-203-A, B, and C, BGE justified using a fluence value of  $4.49 \times 10^{19}$  n/cm<sup>2</sup> for the Unit 1 TS P-T curves. BGE obtained results of 229.3 °F and 181 °F for the ARTs at 1/4T and 3/4T, respectively.

The staff performed an independent calculation of the ART values using the new fluence for the limiting material using the methodology in RG 1.99, Revision 2. The staff's calculated ART value for the limiting material agreed with the licensee's calculated ART value. On the basis of these calculations, the staff determined that the licensee's proposed fluence is acceptable.

The current projection for the peak critical component fluence is  $4.95 \times 10^{19}$  n/cm<sup>2</sup> to the end of the extended license period (48 effective full-power years). This value has been reviewed and approved by the staff. The proposed revision of the P-T curves is for a fluence value of  $4.49 \times 10^{19}$  n/cm<sup>2</sup> which is less than the projected value at the end of extended license period, and therefore, is acceptable.

The staff has performed an independent analysis and verified that the licensee's new fluence value is acceptable. Hence, the new fluence value may be incorporated in the Calvert Cliffs Unit 1 Technical Specifications, and accordingly the amendment request is granted.

### 3.0 STATE CONSULTATION

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

### 4.0 ENVIRONMENTAL CONSIDERATION

The 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. 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 (64 FR 70078). 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.

### 5.0 CONCLUSION

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

Principal Contributor: M. Banic

Date: March 20, 2000

### 6.0 REFERENCES

1. Regulatory Guide 1.99, Radiation Embrittlement of Reactor Vessel Materials, Revision 2, May 1988.
2. NUREG-0800, Standard Review Plan, Section 5.3.2: Pressure-Temperature Limits.
3. Code of Federal Regulations, Title 10, Part 50, Appendix G, Fracture Toughness Requirements.
4. Generic Letter 88-11, NRC Position on Radiation Embrittlement of Reactor Vessel Materials and its Impact on Plant Operations, July 12, 1988.
5. ASME Boiler and Pressure Vessel Code, Section III, Appendix G for Nuclear Power Plant Components, Division 1, "Protection Against Nonductile Failure."