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Rulemaking Item

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(54FR52946)

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NUCLEAR REGULATORY COMMISSION

10 CFR Part 50

RIN: 3150 - AD01

Fracture Toughness Requirements For Protection Against
Pressurized Thermal Shock Events

AGENCY: Nuclear Regulatory Commission.

ACTION: Proposed rule.

SUMMARY: The Nuclear Regulatory Commission (NRC) is proposing to amend its regulations for light-water nuclear power plants to change the procedure for calculating the amount of radiation embrittlement that a reactor vessel receives. The pressurized thermal shock rule (PTS rule) establishes a screening criterion. This criterion limits the amount of embrittlement of a reactor vessel beltline material beyond which the plant cannot continue to operate without justification based on a plant-specific analysis. The proposed amendment does not change the screening criterion. The PTS rule also prescribes the procedure that must be used for calculating the amount of embrittlement for comparison to the screening criterion. The proposed amendment would update the procedure and make it consistent with the one given in Regulatory Guide 1.99, Revision 2, published in May 1988.

DATE: Comment period expires (75 days after publication in the Federal Register). Comments received after this date will be considered if it is

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practical to do so, but assurance of consideration cannot be given except for comments received on or before this date.

ADDRESSES: Mail written comments to: Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Docketing and Service Branch. Deliver comments to: 11555 Rockville Pike, Rockville, Maryland between 7:30 am and 4:15 pm Federal workdays. Copies of comments received may be examined at the NRC Public Document Room, 2120 L Street NW. (Lower Level), Washington, DC.

FOR FURTHER INFORMATION CONTACT: Pryor N. Randall, Division of Engineering, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555, Telephone: (301)492-3842.

SUPPLEMENTARY INFORMATION:

Background

Pressurized thermal shock events are system transients in a pressurized water reactor (PWR) that can cause severe overcooling followed by immediate repressurization to a high level. The thermal stresses caused by rapid cooling of the reactor vessel inside surface combine with the pressure stresses to increase the potential for fracture if an initiating flaw is present in low toughness material. This material may exist in the reactor vessel beltline, adjacent to the core, where neutron radiation gradually embrittles the material during plant lifetime. The degree of embrittlement depends on the chemical composition of the steel, especially the copper and nickel contents.

The toughness of reactor vessel materials is characterized by a "reference temperature for nil ductility transition" (RT_{NDT}), which can be defined as follows. For many reactors now in operation, toughness of the beltline materials at room temperature is too low to permit full pressurization of the vessel with adequate safety margins. As temperature is raised, toughness increases slowly at first; but at the temperature defined as RT_{NDT}, toughness begins to increase much more rapidly. The transition in toughness from low values to high that takes place above RT_{NDT} occurs over a temperature interval of about 150°F. Thus at normal operating temperatures, vessel materials are quite tough. RT_{NDT} is determined by destructive tests of material specimens. Radiation embrittlement moves RT_{NDT} to higher temperatures. Correlations based on test results for unirradiated and irradiated specimens have been developed to calculate the shift in RT_{NDT} as a function of neutron fluence for various material compositions. The value of RT_{NDT} at a given time in a vessel's life is used in fracture mechanics calculations to determine whether assumed pre-existing flaws would propagate as cracks when the vessel is stressed.

The Pressurized Thermal Shock (PTS) rule, 10 CFR 50.61, adopted on July 23, 1985 (50 CFR 29937), establishes a screening criterion. This screening criterion establishes a limiting level of embrittlement beyond which operation cannot continue without further plant-specific evaluation. The screening criterion is given in terms of RT_{NDT}, calculated as a function of the copper and nickel contents of the material and the neutron fluence according to the procedure given in the PTS rule, and called RT_{PTS} to distinguish it from other procedures for calculating RT_{NDT}.

The PTS rule requires each PWR licensee to report the results of the calculations of predicted RT_{PTS} values for each beltline material, (including the copper, nickel and fluence values that provided the basis for the calculations) from the time he submits his report to the expiration date of the operating license (EOL). The PTS rule further provides that if RT_{PTS} for the controlling material is predicted to exceed the screening criterion before EOL, the licensee should submit plans and a schedule for flux reduction programs that are reasonably practicable to avoid reaching the screening criterion. Finally, the PTS rule requires licensees of plants that would reach the screening criterion before EOL despite the flux reduction program to submit a plant-specific safety analysis justifying operation beyond the screening criterion. The licensee must submit the analysis at least 3 years before the plant is predicted to reach that limit. Regulatory Guide 1.154, "Format and Content of Plant-Specific Pressurized Thermal Shock Safety Analysis Reports for Pressurized Water Reactors" provides guidance for the preparation of the report and describes acceptance criteria that the NRC staff would use.

In response to the PTS rule, the licensees of operating reactors have submitted the fluence predictions and material composition data and (with 2 or 3 exceptions) these have now been accepted. Of greater importance are the flux reduction programs that have been undertaken by licensees for those plants having high values of RT_{PTS}.

Need for the Proposed Amendment

The primary purpose of the proposed amendment is to change the procedure for calculating RT_{PTS} to reflect recent findings that embrittle-

ment is occurring faster than predicted by the PTS rule for some reactor vessel materials. Although the PTS rule was adopted on July 23, 1985, the procedure for calculating RT_{PTS} was developed in 1981-1982 and not updated because a number of licensees were using the 1982 formulations as the basis for flux reduction programs. Meanwhile, plant surveillance data were being added to the data base and there were extensive new and more accurate correlations made. These culminated in Revision 2 to Regulatory Guide 1.99, "Radiation Embrittlement of Reactor Vessel Materials," published in May 1988. Revision 2 provides the basis for pressure-temperature limit calculations. Peer review of the new correlations was provided by the public comments on Revision 2.

In the regulatory analysis prepared for Revision 2, and repeated in the regulatory analysis for this proposed amendment, the NRC evaluated the impact of amending the PTS rule to be consistent with the Guide. Copper and nickel contents and fluence values for each PWR reactor vessel were taken from the PTS submittals from licensees. When the values of RT_{PTS} were recalculated using these quantities and the procedure developed for Revision 2, the results were higher for approximately half the vessels, including three vessels where the value may be over 60°F higher than previously thought. This would increase the probability of PTS-induced vessel failure by a factor of at least 30 for those plants.

The NRC believes these changes in the nonconservative direction are greater than can be absorbed by the uncertainties believed to exist and taken into account by the NRC when the RT_{PTS} -based screening limit was set. (A margin of 48°F is added in the calculation of RT_{PTS} to cover not only the uncertainty in the formula for embrittlement but also the uncertainties in the copper, nickel, and fluence values entered in the

formula.) Based on this new information, the probability of reactor vessel failure by fracture during a PTS event is presently higher in some vessels than the probability based on the procedure for calculating RT_{PTS} which is given in the present PTS rule. Moreover, a few of those reactor vessels will reach the screening criterion in the 1990's. Thus, the current PTS rule needs to be amended.

Explanation of the Proposed New Requirements

The proposed amendment changes the procedure for calculating RT_{PTS} and requires all licensees of operating PWR's to resubmit projected values of RT_{PTS} using the new procedure. If the copper and nickel contents and fluence projections are the same as in the previous submittal, they need only be listed. If there are changes in these projections, justification for the changes must be provided. If a licensee has already submitted the information required by paragraph (b)(1) of this proposed amendment, the licensee may simply reference the earlier submittal.

The proposed amendment modifies the requirement for fluence projections in the calculation of RT_{PTS} to take into consideration the potential for a request for change in the expiration date for operation of the facility. This applies to requests to change the end of licensed life from 40 calendar years after the date of the construction permit to 40 years after the date of the operating license. It also applies to requests for license renewal and the need to consider projected values of RT_{PTS} at the end of a renewal term.

An additional change is proposed to be made in paragraph (b)(4) with regard to the schedule for submittal of a safety analysis justifying

operation beyond the screening criterion. In the present PTS rule, this analysis must be submitted at least 3 years before reaching the screening criterion or by one year after issuance of Commission guidance and acceptance criteria, whichever is later. Regulatory Guide 1.154, which contains the necessary guidance and criteria was issued in January, 1987. Therefore, this alternative schedule was omitted in the proposed amendment. However, because one or two plants might reach the screening criterion in less than 3 years after publication, when RT_{PTS} is recalculated using the amended rule, the submittal will be required at least three years before reaching the screening criterion or by one year after the effective date of the amended rule, whichever is later. The safety implications of this change in the schedule requirement are considered to be acceptably small, because RT_{PTS} increases very slowly near the screening criterion.

Environmental Impact: Categorical Exclusion

The NRC has determined that this proposed rule is the type of action described in categorical exclusion 10 CFR 51.22(c)(3)(ii) and (iii). Therefore, neither an environmental impact statement nor an environmental assessment has been prepared for this proposed rule.

Paperwork Reduction Act Statement

This proposed rule amends information collection requirements that are subject to the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.).

This rule has been submitted to the Office of Management and Budget for review and approval of the paperwork requirements.

Public reporting burden for this collection of information is estimated to average 254 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Records and Reports Management Branch (P-530), U.S. Nuclear Regulatory Commission, Washington, DC 20555; and to the Paperwork Reduction Project (3150-0011), Office of Management and Budget, Washington, DC 20503.

Regulatory Analysis

The NRC staff has prepared a regulatory analysis for this proposed amendment, which describes the factors and alternatives considered by the Commission in deciding to propose this rule.

The regulatory analysis for the proposed amendment also discusses why the screening criterion is not being changed when the procedures for calculating RT_{PTS} are changed. An anticipated public comment is that because the probabilistic fracture mechanics calculations used in establishing the screening criterion made use of the formula for RT_{PTS} given in the PTS rule, the proposed change in the formula must change

the calculated probabilities and, in turn, change the screening criterion. As shown in the regulatory analysis, failure probabilities at the same RT_{PTS} screening criterion for the most critical accident scenarios in three plants, when recalculated using the new embrittlement estimates, were somewhat lower, but the differences were quite dependent on the plant configuration and the scenario chosen. Because of the apparent plant-to-plant differences, it is better to trigger plant-specific analyses with a "trip wire" that is believed to generically bound all plants. Furthermore, as described in the regulatory analysis, the screening criterion was based on a variety of considerations besides the probabilistic analysis.

A copy of the regulatory analysis is available for inspection and copying for a fee at the NRC Public Document Room, 2120 L Street NW. (Lower Level), Washington, DC 20555. Single copies of the analysis may be obtained from Pryor N. Randall, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555, Telephone, (301)492-3842.

Regulatory Flexibility Act Certification

As required by the Regulatory Flexibility Act, 5 U.S.C. 605(b), the Commission certifies that this proposed rule does not have a significant economic impact on a substantial number of small entities. This rule specifies minimum fracture toughness properties of irradiated pressure vessel materials to ameliorate the effects of PTS events on nuclear facilities licensed under the provision of 10 CFR 50.21(b) and 10 CFR 50.22. The companies that own these facilities do not fall within the

scope of the definition of "small entities" as set forth in the Regulatory Flexibility Act or the Small Business Size Standards in regulations issued by the small Business Administration at 10 CFR Part 121.

Backfit Analysis

The NRC has concluded, on the basis of the documented evaluation required by 10 CFR 50.109(a)(4), that the backfit requirements contained in this proposed amendment are necessary to ensure that the facility provides adequate protection to the public health and safety, and, therefore, that a backfit analysis is not required and the cost-benefit standards of 10 CFR 50.109(a)(3) do not apply. The documented evaluation given in the regulatory analysis includes a statement of the objectives of and reasons for the backfits that would be required by the proposed rule and sets forth the basis for the NRC's conclusion that these backfits are not subject to the cost-benefit standards of 10 CFR 50.109(a)(3).

List of Subjects in 10 CFR Part 50

Antitrust, Classified information, Fire prevention, Incorporation by reference, Intergovernmental relations, Nuclear power plants and reactors, Penalty, Radiation protection, Reactor siting criteria, Reporting and recordkeeping requirements.

For the reasons set out in the preamble and under the authority of the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act

of 1974, and 5 U.S.C. 553, the NRC is proposing to adopt the following amendments to 10 CFR Part 50.

PART 50 -- DOMESTIC LICENSING OF PRODUCTION AND UTILIZATION FACILITIES

1. The authority citation of Part 50 is revised to read as follows:

AUTHORITY: Secs. 102, 103, 104, 105, 161, 182, 183, 186, 189, 68 Stat. 936, 937, 938, 948, 953, 954, 955, 956, as amended, sec. 234, 83 Stat. 1244, as amended (42 U.S.C. 2132, 2133, 2134, 2135, 2201, 2232, 2233, 2236, 2239, 2282); secs. 201, as amended, 202, 206, 88 Stat. 1242, as amended 1244, 1246, (42 U.S.C. 5841, 5842, 5846).

Section 50.7 also issued under Pub. L. 95-601, sec. 10, 92 Stat. 2951 (42 U.S.C. 5851). Section 50.10 also issued under secs. 101, 185, 68 Stat. 936, 955 as amended (42 U.S.C. 2131, 2235), sec. 102, Pub. L. 91-190, 83 Stat. 853 (42 U.S.C. 4332). Sections 50.13, 50.54(dd), and 50.103 also issued under sec. 108, 68 Stat. 939, as amended (42 U.S.C. 2138). Sections 50.23, 50.35, 50.55, and 50.56 also issued under sec. 185, 68 Stat. 955 (42 U.S.C. 2235). Sections 50.33a, 50.55a and Appendix Q also issued under sec. 102, Pub. L. 91-190, 83 Stat. 853 (42 U.S.C. 4332). Sections 50.34 and 50.54 also issued under sec. 204, 88 Stat. 1245 (42 U.S.C. 5844). Sections 50.58, 50.91, and 50.92 also issued under Pub. L. 97-415, 96 Stat. 2073 (42 U.S.C. 2239). Section 50.78 also issued under sec. 122, 68 Stat. 939 (42 U.S.C. 2152). Sections 50.80-50-81 also issued under sec. 184, 68 Stat. 954, as amended (42 U.S.C. 2234). Appendix F also issued under sec. 187, 68 Stat 955 (42 U.S.C. 2237).

For the purposes of sec. 223, 68 Stat. 958, as amended (42 U.S.C. 2273), §§ 50.46(a) and (b), and 50.54(c) are issued under sec. 161b, 68 Stat. 948, as amended (42 U.S.C. 2201(b)); §§ 50.7(a), 50.10(a)-(c), 50.34(a) and (e), 50.44(a)-(c), 50.46(a) and (b), 50.47(b), 50.48(a), (c), (d), and (e), 50.49(a), 50.54(a), (i), (i)(1), (l)-(n), (p), (q), (t), (v), and (y), 50.55(f), 50.55a(a), (c)-(e), (g), and (h), 50.59(c), 50.60(a), 50.62(c), 50.64(b), and 50.80(a) and (b) are issued under sec. 161i, 68 Stat. 949, as amended (42 U.S.C. 2201 (i)); and §§ 50.49(d), (h), and (j), 50.54(w),(z),(bb),(cc), and (dd), 50.55(e), 50.59(b), 50.61(b), 50.62(d), 50.70(a), 50.71(a)-(c) and (e), 50.72(a), 50.73(a) and (b), 50.74, 50.78, and 50.90 are issued under sec. 161(o), 68 Stat. 950, as amended (42 U.S.C. 2201(o)).

2. In § 50.61, paragraph (b) is revised to read as follows:

§ 50.61 Fracture toughness requirements for protection against pressurized thermal shock events.

* * * * *

(b) Requirements.

(1) For each pressurized water nuclear power reactor for which an operating license has been issued, the licensee shall submit projected values of RT_{PTS} for reactor vessel beltline materials by giving values for the time of submittal, the expiration date of the operating license, the projected expiration date if a change in the operating license has been requested, and the projected expiration date of a renewal term if a request for license renewal has been submitted. The assessment must use the calculative procedures given in paragraph (b)(2) of this section. The assessment must specify the bases for the projection, including the assumptions regarding core loading patterns. The submittal must list the

copper and nickel contents, and the fluence values used in the calculation for each beltline material. If these quantities differ from those submitted in response to the original PTS rule and accepted by the NRC, justification must be provided. This assessment must be submitted by (6 months after the effective date of this section), and must be updated whenever there is a significant change in projected values of RT_{PTS}, or upon a request for a change in the expiration date for operation of the facility.

(2) The pressurized thermal shock (PTS) screening criterion is 270°F for plates, forgings, and axial weld materials, or 300°F for circumferential weld materials. For the purpose of comparison with this criterion, the value of RT_{PTS} for the reactor vessel must be calculated as follows. The calculation must be made for each weld and plate, or forging, in the reactor vessel beltline.

Equation 1: $RT_{PTS} = I + M + \Delta RT_{PTS}$

(i) "I" means the initial reference temperature (RT_{NDT}) of the unirradiated material measured as defined in the ASME Code, Paragraph NB-2331. Measured values must be used if available; if not, the following generic mean values must be used: 0°F for welds made with Linde 80 flux, and -56°F for welds made with Linde 0091, 1092 and 124 and ARCOS B-5 weld fluxes.

(ii) "M" means the margin to be added to cover uncertainties in the values of initial RT_{NDT}, copper and nickel contents, fluence and the calculational procedures. In Equation 1, M is 66°F for welds and 48°F

for base metal if generic values of I are used, and M is 56°F for welds and 34°F for base metal if measured values of I are used.

(iii) ΔRT_{PTS} is the mean value of the adjustment in reference temperature caused by irradiation and should be calculated as follows:

Equation 2: $\Delta RT_{PTS} = (CF)f^{(0.28-0.10 \log f)}$

(iv) CF (°F) is the chemistry factor, a function of copper and nickel content. CF is given in Table 1 for welds and in Table 2 for base metal (plates and forgings). Linear interpolation is permitted. In Tables 1 and 2 "Wt-% copper" and "Wt-% nickel" are the best-estimate values for the material, which will normally be the mean of the measured values for a plate or forging or for weld samples made with the weld wire heat number that matches the critical vessel weld. If these values are not available, the upper limiting values given in the material specifications to which the vessel was built may be used. If not available, conservative estimates (mean plus one standard deviation) based on generic data may be used if justification is provided. If there is no information available, 0.35% copper and 1.0% nickel must be assumed.

(v) "f" means the best estimate neutron fluence, in units of 10^{19} n/cm^2 (E greater than 1 MeV), at the clad-base-metal interface on the inside surface of the vessel at the location where the material in question receives the highest fluence for the period of service in question.

(3) For each pressurized water nuclear power reactor for which the value of RT_{PTS} for any material in the beltline is projected to exceed the PTS screening criterion before the expiration date of the operating renewal has been submitted, the licensee shall submit by (9 months after

TABLE 1

CHEMISTRY FACTOR FOR WELDS, °F

Copper, Wt-%	Nickel, Wt-% 0	0.20	0.40	0.60	0.80	1.00	1.20
0	20	20	20	20	20	20	20
0.01	20	20	20	20	20	20	20
0.02	21	26	27	27	27	27	27
0.03	22	35	41	41	41	41	41
0.04	24	43	54	54	54	54	54
0.05	26	49	67	68	68	68	68
0.06	29	52	77	82	82	82	82
0.07	32	55	85	95	95	95	95
0.08	36	58	90	106	108	108	108
0.09	40	61	94	115	122	122	122
0.10	44	65	97	122	133	135	135
0.11	49	68	101	130	144	148	148
0.12	52	72	103	135	153	161	161
0.13	58	76	106	139	162	172	176
0.14	61	79	109	142	168	182	188
0.15	66	84	112	146	175	191	200
0.16	70	88	115	149	178	199	211
0.17	75	92	119	151	184	207	221
0.18	79	95	122	154	187	214	230
0.19	83	100	126	157	191	220	238
0.20	88	104	129	160	194	223	245
0.21	92	108	133	164	197	229	252
0.22	97	112	137	167	200	232	257
0.23	101	117	140	169	203	236	263
0.24	105	121	144	173	206	239	268
0.25	110	126	148	176	209	243	272
0.26	113	130	151	180	212	246	276
0.27	119	134	155	184	216	249	280
0.28	122	138	160	187	218	251	284
0.29	128	142	164	191	222	254	287
0.30	131	146	167	194	225	257	290
0.31	136	151	172	198	228	260	293
0.32	140	155	175	202	231	263	296
0.33	144	160	180	205	234	266	299
0.34	149	164	184	209	238	269	302
0.35	153	168	187	212	241	272	305
0.36	158	172	191	216	245	275	308
0.37	162	177	196	220	248	278	311
0.38	166	182	200	223	250	281	314
0.39	171	185	203	227	254	285	317
0.40	175	189	207	231	257	288	320

TABLE 2

CHEMISTRY FACTOR FOR BASE METAL, °F

Copper, Wt-%	Nickel, Wt-% 0	0.20	0.40	0.60	0.80	1.00	1.20
0	20	20	20	20	20	20	20
0.01	20	20	20	20	20	20	20
0.02	20	20	20	20	20	20	20
0.03	20	20	20	20	20	20	20
0.04	22	26	26	26	26	26	26
0.05	25	31	31	31	31	31	31
0.06	28	37	37	37	37	37	37
0.07	31	43	44	44	44	44	44
0.08	34	48	51	51	51	51	51
0.09	37	53	58	58	58	58	58
0.10	41	58	65	65	67	67	67
0.11	45	62	72	74	77	77	77
0.12	49	67	79	83	86	86	86
0.13	53	71	85	91	96	96	96
0.14	57	75	91	100	105	106	106
0.15	61	80	99	110	115	117	117
0.16	65	84	104	118	123	125	125
0.17	69	88	110	127	132	135	135
0.18	73	92	115	134	141	144	144
0.19	78	97	120	142	150	154	154
0.20	82	102	125	149	159	164	165
0.21	86	107	129	155	167	172	174
0.22	91	112	134	161	176	181	184
0.23	95	117	138	167	184	190	194
0.24	100	121	143	172	191	199	204
0.25	104	126	148	176	199	208	214
0.26	109	130	151	180	205	216	221
0.27	114	134	155	184	211	225	230
0.28	119	138	160	187	216	233	239
0.29	124	142	164	191	221	241	248
0.30	129	146	167	194	225	249	257
0.31	134	151	172	198	228	255	266
0.32	139	155	175	202	231	260	274
0.33	144	160	180	205	234	264	282
0.34	149	164	184	209	238	268	290
0.35	153	168	187	212	241	272	298
0.36	158	173	191	216	245	275	303
0.37	162	177	196	220	248	278	308
0.38	166	182	200	223	250	281	313
0.39	171	185	203	227	254	285	317
0.40	175	189	207	231	257	288	320

renewal has been submitted, the licensee shall submit by (9 months after the effective date of this section) an analysis and schedule for implementation of such flux reduction programs as are reasonably practicable to avoid exceeding the PTS screening criterion set forth in paragraph (b)(2) of this section. The schedule for implementation of flux reduction measures may take into account the schedule for submittal and anticipated Commission approval of detailed plant-specific analyses, submitted to demonstrate acceptable risk at values of RT_{PTS} above the screening limit due to plant modifications, new information or new analysis techniques.

(4) For each pressurized water nuclear power reactor for which the analysis required by paragraph (b)(3) of this section indicates that no reasonably practicable flux reduction program will prevent the value of RT_{PTS} from exceeding the PTS screening criterion before the expiration date of the operating license, or the projected expiration date if a change in the operating license has been requested, or the end of a renewal term if a request for license renewal has been submitted, the licensee shall submit a safety analysis to determine what, if any, modifications to equipment, systems, and operation are necessary to prevent potential failure of the reactor vessel as a result of postulated PTS events if continued operation beyond the screening criterion is allowed. In the analysis, the licensee may determine reactor vessel materials properties based on available information, research results, and plant surveillance data, and may use probabilistic fracture mechanics techniques. This analysis must be submitted at least 3 years before the value of RT_{PTS} as defined in paragraph (b)(2) of this section is projected to exceed the PTS screening criterion or by one year after the effective date of this amendment, whichever is later.

(5) After consideration of the licensee's analyses (including effects of proposed corrective actions, if any) submitted in accordance with paragraphs (b)(3) and (b)(4) of this section, the Commission may, on a case-by-case basis, approve operation of the facility at values of RT_{PTS} in excess of the PTS screening criterion. The Commission will consider factors significantly affecting the potential for failure of the reactor vessel in reaching a decision.

(6) If the Commission concludes, pursuant to paragraph (b)(5) of this section, that operation of the facility at values of RT_{PTS} in excess of the PTS screening criterion cannot be approved on the basis of the licensee's analyses submitted in accordance with paragraphs (b)(3) and (b)(4) of this section, the licensee shall request and receive Commission approval prior to any operation beyond the criterion. The request must be based upon modifications to equipment, systems, and operation of the facility in addition to those previously proposed in the submitted analyses that would reduce the potential for failure of the reactor vessel due to PTS events, or upon further analyses based upon new information or improved methodology.

Dated at Rockville, MD this 12th day of December, 1989.

For the Nuclear Regulatory Commission.

James M. Taylor
Executive Director for Operations