July 20, 1995

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Mr. John P. Stetz
Sr. Vice President- Nuclear
Centerior Service Company
c/o Toledo Edison Company
Davis-Besse Nuclear Power Station
5501 North State Route 2
Oak Harbor, OH 43449

SUBJECT: AMENDMENT NO. 199 TO FACILITY OPERATING LICENSE NO. NPF-3 - DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1 (TAC NO. M91557)

Dear Mr. Stetz:

The Commission has issued the enclosed Amendment No. 199 to Facility Operating License No. NPF-3 for the Davis-Besse Nuclear Power Station, Unit No. 1. The amendment revises the Technical Specifications (Ts) in response to your application dated January 30, 1995.

This amendment revises TS 3/4.4.9.1 Pressure-Temperature Limits, Reactor Coolant System (RCS), Figures 3.4-2, 3.4-3, and 3.4-4, Bases Section 3/4.4.9, and License Condition 2.C(3)(d). These TS changes reflect pressure-temperature limits that were analyzed for 21 effective full power years (EFPY) in lieu of the current 10-year EFPY limit.

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

Sincerely,

Original signed by:
Linda L. Gundrum

Linda L. Gundrum, Project Manager
Project Directorate III-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosures: 1. Amendment No. 199 to License No. NPF-3
2. Safety Evaluation

cc w/encls: See next page

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

July 20, 1995

Mr. John P. Stetz
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Docket No. 50-346

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2. Safety Evaluation

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

TOLEDO EDISON COMPANY

CENTERIOR SERVICE COMPANY

AND

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

DOCKET NO. 50-346

DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 199
License No. NPF-3

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by the Toledo Edison Company, Centerior Service Company, and the Cleveland Electric Illuminating Company (the licensees) dated January 30, 1995, 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 of Facility Operating License No. NPF-3 is hereby amended to read as follows:

2.C.(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 199, are hereby incorporated in the license. The Toledo Edison Company shall operate the facility in accordance with the Technical Specifications.

2.C.(3)(d) Prior to operation beyond 21 Effective Full Power Years, the Toledo Edison company shall provide to the NRC a reanalysis and proposed modifications, as necessary, to ensure continued means of protection against low temperature reactor coolant system overpressure events.

3. This license amendment is effective as of its date of issuance and shall be implemented not later than 90 days after issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Linda L. Gundrum

Linda L. Gundrum, Project Manager
Project Directorate III-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of issuance: July 20, 1995

ATTACHMENT TO LICENSE AMENDMENT NO. 199

FACILITY OPERATING LICENSE NO. NPF-3

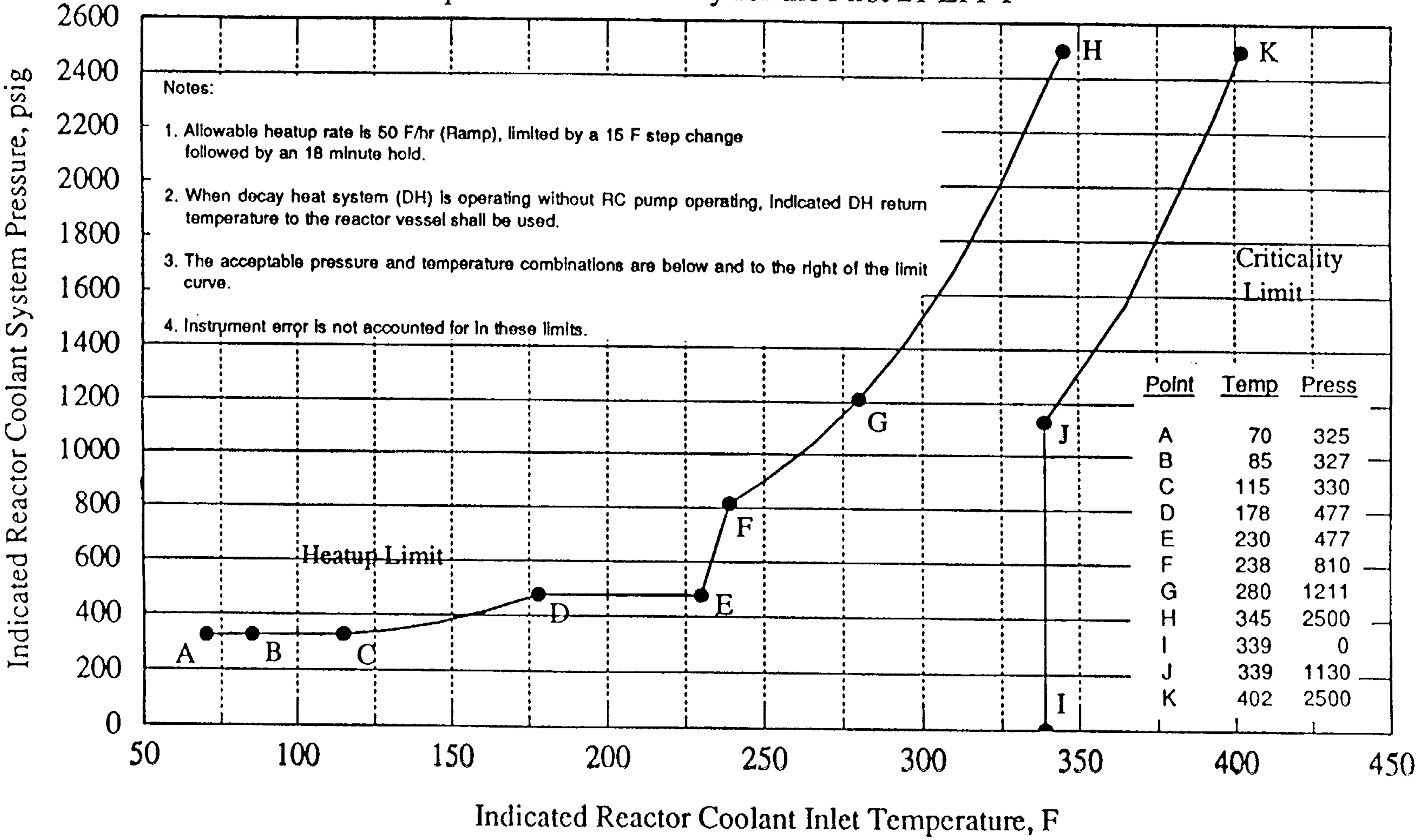
DOCKET NO. 50-346

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

Remove	Insert
3/4 4-25	3/4 4-25
3/4 4-26	3/4 4-26
3/4 4-27	3/4 4-27
B 3/4 4-10	B 3/4 4-10
B 3/4 4-11	B 3/4 4-11

Figure 3.4-2

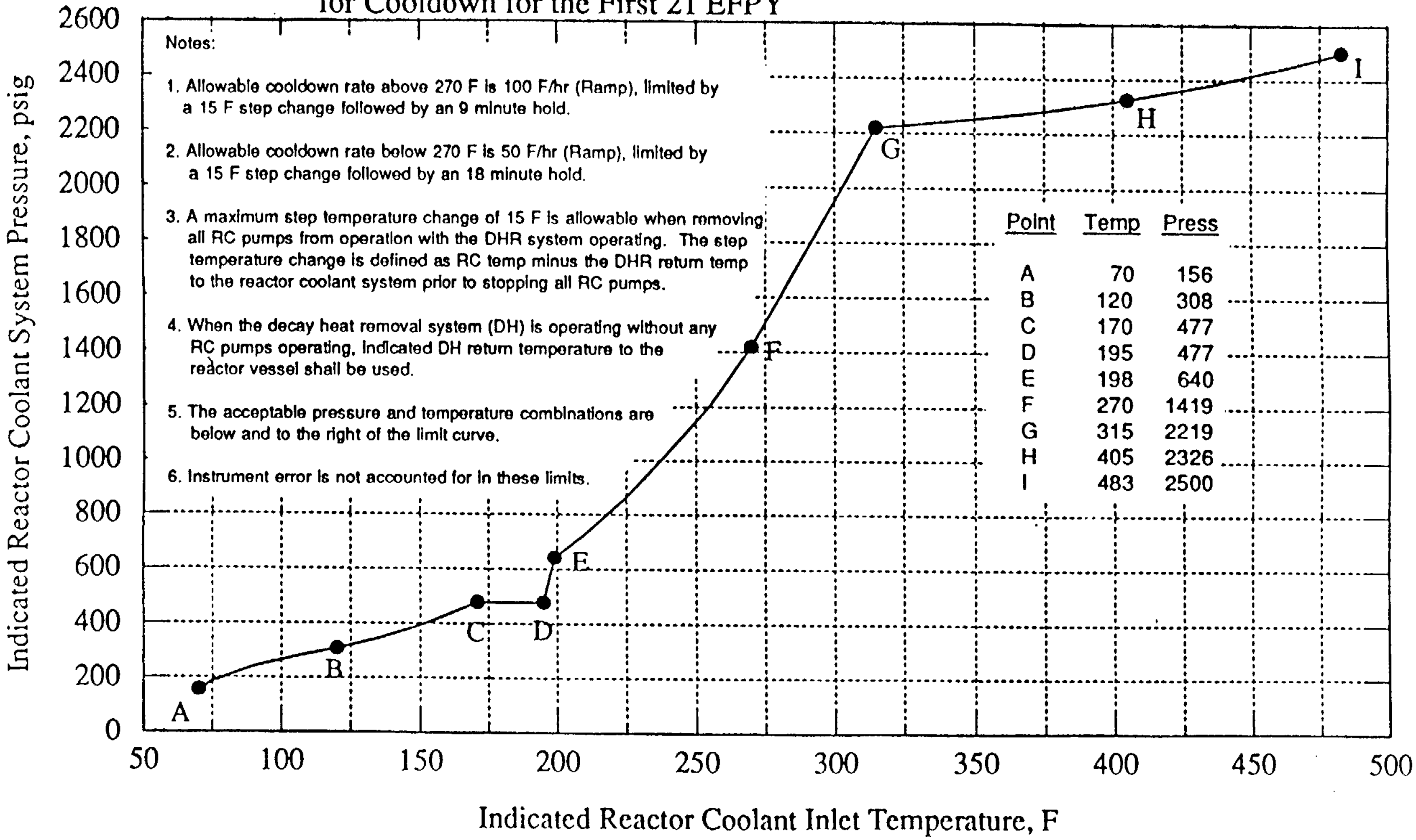
Reactor Coolant System Pressure-Temperature Limits for Heatup and Core Criticality for the First 21 EFPY



Point	Temp	Press
A	70	325
B	85	327
C	115	330
D	178	477
E	230	477
F	238	810
G	280	1211
H	345	2500
I	339	0
J	339	1130
K	402	2500

Figure 3.4-3

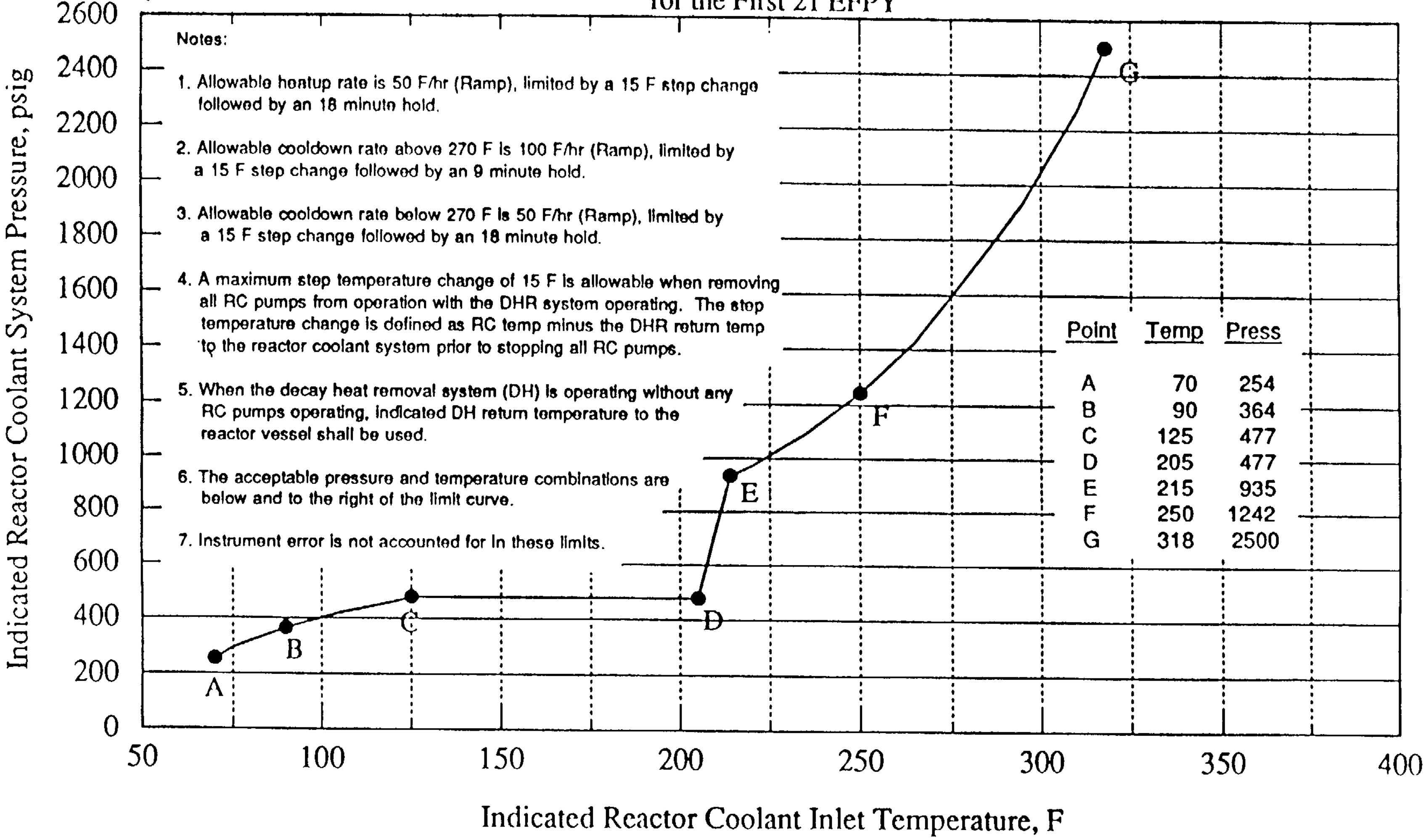
Reactor Coolant System Pressure-Temperature Limits for Cooldown for the First 21 EFPY



Point	Temp	Press
A	70	156
B	120	308
C	170	477
D	195	477
E	198	640
F	270	1419
G	315	2219
H	405	2326
I	483	2500

Figure 3.4-4

Reactor Coolant System Pressure-Temperature Heatup and Cooldown Limits for Inservice Leak and Hydrostatic Tests for the First 21 EFPY



The closure head region is significantly stressed at relatively low temperatures (due to mechanical loads resulting from bolt pre-load). This region largely controls the pressure-temperature limitations of the first several service periods. The outlet nozzles of the reactor vessel also affect the pressure-temperature limit curves of the first several service periods. This is due to the high local stresses at the inside corner of the nozzle which can be two to three times the membrane stresses of the shell. After the first several years of neutron radiation exposure, the RT_{NDT} temperature of the beltline region materials will be high enough so that the beltline region of the reactor vessel will start to control the pressure-temperature limitations of the reactor coolant pressure boundary. For the service period for which the limit curves, are established, the maximum allowable pressure as a function of fluid temperature is obtained through a point-by-point comparison of the limits imposed by the closure head region, outlet nozzles, and beltline region. The maximum allowable pressure is taken to be the lower pressure of the three calculated pressures. The pressure limit is adjusted for the pressure differential between the point of system pressure measurement and the limiting component for all operating reactor coolant pump combinations. The limit curves were prepared based upon the most limiting adjusted reference temperature of all the beltline region materials at the end of twenty-one effective full power years.

The actual shift in RT_{NDT} of the beltline region material will be established periodically during operation by removing and evaluating, in accordance with Appendix H to 10 CFR 50, reactor vessel material irradiation surveillance specimens installed near the inside wall of the reactor vessel in the core area. Since the neutron spectra at the irradiation samples and vessel inside the radius are essentially identical, the measured transition shift for a sample can be applied with confidence to the adjacent section of the reactor vessel. The limit curves must be recalculated when the ΔRT_{NDT} determined from the surveillance capsule is different from the calculated ΔRT_{NDT} for the equivalent capsule radiation exposure.

The unirradiated transverse impact properties of the beltline region materials, required by Appendices G and H to 10 CFR 50, were determined for those materials for which sufficient amounts of material were available. The adjusted reference temperatures are calculated by adding the predicted radiation-induced ΔRT_{NDT} and the unirradiated RT_{NDT}. The procedures described in Regulatory Guide 1.99, Rev. 2, were used for predicting the radiation induced ΔRT_{NDT} as a function of the material's copper and nickel content and neutron fluence.

Figure 3.4-2 presents the pressure-temperature limit curve for normal heatup. This figure also presents the core criticality limits as required by Appendix G to 10 CFR 50. Figure 3.4-3 presents the pressure-temperature limit curve for normal cooldown. Figure 3.4-4 presents the pressure-temperature limit curves for heatup and cooldown for inservice leak and hydrostatic testing.

All pressure-temperature limit curve are applicable up to twenty-one effective full power years. The protection against non-ductile failure is assured by maintaining the coolant pressure below the upper limits of Figures 3.4-2, 3.4-3 and 3.4-4.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 199 TO FACILITY OPERATING LICENSE NO. NPF-3

TOLEDO EDISON COMPANY

CENTERIOR SERVICE COMPANY

AND

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1

DOCKET NO. 50-346

1.0 INTRODUCTION

By letter dated January 30, 1995, the licensee submitted changes to pressure-temperature (P-T) limits in the Davis-Besse Unit 1 Technical Specifications (TS). The licensee proposed to revise the P-T limits and to extend the applicable period of the P-T limits from a current 10 effective full power years (EFPY) to 21 EFPY. The revised P-T limits include an adjustment in the calculations to account for the pressure difference between the pressure transmitter and the reactor vessel midplane. Additionally, as required by License Condition 2.C.(3)(d), a reanalysis was performed, as necessary, to ensure continued means of protection against low temperature reactor coolant system overpressure events.

The staff evaluates 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, Revision 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 III of the American Society of Mechanical Engineers (ASME) Code. GL 88-11 provides that licensees may use the methods in RG 1.99, Revision 2, to predict the effect of neutron irradiation by calculating 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 prediction method. The increase in RT_{NDT} is calculated from the product of a chemistry factor and a fluence factor. The chemistry factor is calculated using surveillance data, obtained by the licensee's surveillance program, as directed by Regulatory Guide (RG) 1.99, Revision 2, Position 2.

SRP 5.3.2 provides guidance on calculation of the P-T limits using 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 the beltline thickness. The critical locations in the vessel for this methodology is the 1/4T and 3/4T locations, which correspond to the maximum depth of the postulated inside surface and outside surface defects, respectively.

The licensee determined that no changes were necessary to extend low temperature overpressure protection (LTOP) to 21 EFPY. The Davis-Besse LTOP system consists of both active and passive subsystems. The active subsystem uses relief valve (DH-4849) in the 4-inch suction line of the decay heat removal (DHR) system to provide overpressure protection of the reactor coolant system (RCS) temperature is less than 280°F. The passive subsystem is based on the plant design and operating philosophy that prevents it from being in a water-solid condition (except for system hydrotests.) The Davis-Besse RCS is always operated with either a steam or a gas space in the pressurizer; the steam bubble is replaced with nitrogen during plant cooldown when the RCS pressure is reduced.

2.0 EVALUATION

For the Davis-Besse reactor vessel, the licensee determined that the middle circumference weld material, WF-182-1, is the limiting material for both the 1/4T and 3/4T locations. Using surveillance data[1], the licensee calculated an ART of 155°F at the 1/4T location and 114°F at the 3/4T location at 21 EFPY. The neutron fluence used in the ART calculation was 4.365×10^{18} n/cm^2 at the 1/4T location and 1.588×10^{18} n/cm^2 at the 3/4T location.

The staff used the surveillance data, as submitted in previous reports to the NRC[1], to perform an independent calculation of the ART values for the limiting materials using RG 1.99, Revision 2, Position 2. In addition, the staff verified that copper and nickel contents and initial RT_{NDT} agreed with the NRC reactor vessel material database from the licensee's response to GL 92-01. Based on the staff's calculation, the staff verified that the licensee's calculated ARTs for Davis-Besse are acceptable.

Substituting the ARTs into equations in SRP 5.3.2, the staff verified that the proposed P-T limits for heatup, cooldown, criticality, and inservice hydrostatic test satisfy the requirements in Paragraphs IV.A.2 and IV.A.3 of Appendix G of 10 CFR Part 50.

In addition to beltline materials, Appendix G of 10 CFR Part 50, also imposes a minimum temperature at the closure head flange based on the reference temperature for the flange material. Section IV.A.2 of Appendix G states that when the pressure exceeds 20% of the preservice system hydrostatic test pressure, the temperature of the closure flange regions highly stressed by the bolt preload must exceed the reference temperature of the material in those regions by at least 120°F for normal operation and by 90°F for hydrostatic pressure tests and leak tests. Based on the flange RT_{NDT} of 60°F for Unit 1 provided by the licensee[2], the staff has determined that the proposed P-T

[1] See References 1 through 4

[2] See Reference 5

limits have satisfied the requirement for the closure flange region during normal operation, hydrostatic pressure test and leak test.

The provisions for LTOP were reviewed. As discussed previously, the LTOP system utilizes both passive and active subsystems. As discussed in the plant-specific safety evaluation for Amendment No. 57[3], the water level in the pressurizer must be restricted for a given RCS pressure. Administrative procedures and TSs require the high pressure injection system be disabled when the RCS temperature is below 280°F. The restriction on pressurizer water level for a given RCS pressure ensures that the pressure-temperature limit will not be exceeded if a charging pump pumps the contents of the makeup water tank into the RCS. The active LTOP system is the DHR system relief valve, DH4849, which is the primary means of LTOP during modes 4 and 5. The setpoint of the relief valve is 330 psig. This is less than the allowable pressure limit of 360 psig at 140°F which assures adequate overpressure protection. LTOP protection during Mode 3is provided by the passive LTOP subsystem which consists of administrative controls which are not affected by this proposed amendment.

The staff has performed an independent analysis to verify the licensee's proposed P-T limits. The staff concludes that the proposed P-T limits for heatup, cooldown, inservice hydrostatic test and criticality are valid for 21 effective full power years because (1) the limits conform to the requirements of Appendix G of 10 CFR Part 50 and the provisions of GL 88-11 and (2) the surveillance data used in calculating the P-T limits are consistent with data submitted to the staff in surveillance reports. Hence, the proposed P-T limits may be incorporated in the Davis-Besse Unit 1 TS. In addition, the proposed editorial changes in the Bases section of the TS are consistent with the P-T limits changes; therefore, they are acceptable. The LTOP evaluation performed by the staff has determined no substantive changes have occurred to invalidate previous LTOP evaluations[3].

3.0 STATE CONSULTATION

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

4.0 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 staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluent 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 (60 FR 14029). 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.

[3] See Reference 6

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

Principal Contributors: Glenn Dentel
Chu-Yu Liang
Linda Gundrum

Date: July 20, 1995

REFERENCES

1. BAW-2125, Analysis of Capsule TE1-D, The Toledo Edison Company, Davis-Besse Nuclear Power Station Unit 1 -- Reactor Vessel Surveillance Program--, December 1990.

2. BAW-1882, Analysis of Capsule TE1-A, The Toledo Edison Company, Davis-Besse Nuclear Power Station Unit 1 -- Reactor Vessel Surveillance Program--, June 1989.

3. BAW-1834, Analysis of Capsule TE1-B, The Toledo Edison Company, Davis-Besse Nuclear Power Station Unit 1 -- Reactor Vessel Surveillance Program--, May 1984.

4. BAW-1701, Analysis of Capsule TE1-F, The Toledo Edison Company, Davis-Besse Nuclear Power Station Unit 1 -- Reactor Vessel Surveillance Program--, August 1982.

5. Toledo Edison, Supplemental Information Regarding the License Amendment Request to Revise the Reactor Coolant System Pressure-Temperature Operating Limits and Reactor Vessel Material Surveillance Program, May 4, 1988.

6. Amendment No. 57 to Facility Operating License No. NPF-3, May 5, 1983.