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Regulatory File Cy.

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U.S. ATOMIC ENERGY COMMISSION
Regulatory Mail Section

Mr. Edson G. Case
Acting Director
Directorate of Licensing
Office of Regulation
U.S. Atomic Energy Commission
Washington, D.C. 20545

Subject: Dresden Station Units 2 and 3, Proposed Amendment to Facility Operating ~~Licenses~~ DPR-19 and DPR-25, AEC Dockets 50-237 and 50-249

Dear Mr. Case:

Pursuant to Section 50.59 of 10 CFR 50, Commonwealth Edison Company requests the attached proposed amendments to DPR-19 and DPR-25 Appendix A (Technical Specifications).

The purpose of these changes are to revise the reactor vessel pressurization temperature limits consistent with 10 CFR 50 Appendix G and to add operability limits for the primary coolant leak detection system. The changes are indicated on the attached revised pages 88, 90, 92, 92A, 93, 94, and 94A for DPR-19 and the same pages for DPR-25.

Since the proposed reactor vessel pressurization temperature limits are consistent with 10 CFR 50 Appendix G, and the leak detection system operability requirements are additions which do not affect existing limits, it was concluded no additional safety analysis was required. On the basis of this evaluation, it has been determined that the proposed Technical Specification changes do not increase the probability of occurrence or consequences of an accident or malfunction of equipment important to safety, does not create the possibility of an accident of malfunction of a type different than previously evaluated and does not reduce the margin of safety defined in the bases for the Technical Specifications. These proposed Specification changes involve no significant hazard considerations.

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The attached proposed Technical Specification changes have received Onsite and Offsite review and approval on the bases of the above evaluation of safety considerations.

The attached proposed Technical Specification changes respond to Questions 4. b and 4.c of a letter from Mr. D. L. Ziemann to Mr. J. S. Abel dated June 25, 1974. A response to Question 4.a will be submitted by December 1, 1974; however, it is our intent to develop an inservice inspection plant for Class 2 and 3 system using ASME Boiler and Pressure Vessel Code Section XI for guidance.

Three (3) signed originals and 37 copies of this letter are submitted with 40 copies of the proposed revised pages of DPR-19 and 40 copies of the proposed revised pages of DPR-25.

Very truly yours,

Byron Lee Jr

Byron Lee, Jr.
Vice-President

Att.

SUBSCRIBED and SWORN to before me this 11th day of September, 1974.

Vivian D. Lentz

Notary Public

2250.2

PROPOSED AMENDMENT

to DPR-19

2250.3

3.6 LIMITING CONDITION FOR OPERATION	4.6 SURVEILLANCE REQUIREMENT

B. Pressurization Temperature

1. The reactor vessel shall be vented and power operation shall not be conducted unless the reactor vessel temperature is equal to or greater than that shown in Figure 3.6.1 as modified by the increase in temperature required by neutron exposure as shown in Figure 3.6.2.

2. The reactor vessel head bolting studs shall not be under tension unless the temperature of the vessel shell immediately below the vessel flange is $\geq 100^{\circ}F$.

C. Coolant Chemistry

1. The reactor coolant system radioactivity concentration in water shall not exceed 20 microcuries of total iodine per ml of water.

B. Pressurization Temperature

1. Reactor Vessel shell temperature and reactor coolant pressure shall be permanently recorded at 15 minute intervals whenever the shell temperature is below 220°F and the reactor vessel is not vented.

2. When the reactor vessel head bolting studs are tightened or loosened the reactor vessel shell temperature immediately below the head flange shall be permanently recorded.

3. Neutron flux monitors and samples shall be installed in the reactor vessel adjacent to the vessel wall at the core midplane level. The monitor and sample program shall as a minimum conform to ASTM E 185. The monitors and samples shall be removed and tested during the third refueling outage to experimentally verify the calculated values of integrated neutron flux that are used to determine the NDTT for Figure 4.6.1.

C. Coolant Chemistry

1. a. A sample of reactor coolant shall be taken at least every 96 hours and analyzed for radio-activity.

   b. Isotopic analysis of a sample of reactor coolant shall be made at least once per month.

3.6 LIMITING CONDITION FOR OPERATION

an orderly shutdown shall be initiated and the reactor shall be in a Cold Shutdown condition within 24 hours.

2. The primary containment sump sampling system and an air sampling system shall be operable during power operation. If either a sump water sample or a containment air sample cannot be obtained for any reason, reactor operation is permissible only during the succeeding seven days unless the system is made operable during this period.

E. Safety and Relief Valves

1. During reactor power operating conditions and whenever the reactor coolant pressure is greater than 90 psig and temperature greater than 320°F, all eight of the safety valves shall be operable. The solenoid activated pressure valves shall be operable as required by Specification 3.5.D.

2. If Specification 3.6.E.1 is not met, an orderly shutdown shall be initiated and the reactor coolant pressure and temperature shall be 90 psig and 320°F within 24 hours.

4.6 SURVEILLANCE REQUIREMENT

2. The primary containment sump sampling and air sampling system operability will be observed daily as part of 4.6.D.2.

E. Safety and Relief Valves

A minimum of 1/2 of all safety valves shall be bench checked or replaced with a bench checked valve each refueling outages. The popping point of the safety valves shall be set as follows:

Number of Valves	Set Point (Psig)
2	1210
2	1220
2	1230
2	1240

The allowable set point error for each valve is ±1%

All relief valves shall be checked for set pressure each refueling outage. The set pressures shall be:

Number of Valves	Set Point (Psig)
1	1125
2	1130
2	1135

b) the relationship between RT_{NDT} and and integrated neutron flux (fluence, at energies > 1 Mev), and

c) the fluence at the location of a postulated flow.

The initial RT_{NDT} of the main closure flange, the shell and head materials connecting to these flanges, and connecting welds is $10^{\circ}F$. However, the vertical electroslag welds which terminate immediately below the vessel flange have an RT_{NDT} of $40^{\circ}F$. Reference Appendix F to the FSAR. The closure flanges and connecting shell materials are not subject to any appreciable neutron radiation exposure, nor are the vertical electroslag seams. The flange area is moderately stressed by tensioning the head bolts. Therefore, as is indicated in curves (a) and (b) of Figure 3.6.1, the minimum temperature of the vessel shell immediately below the vessel flange is established as $100^{\circ}F$ below a pressure of 400 psig. ($40^{\circ}F + 60^{\circ}F$, where $40^{\circ}F$ is the RT_{NDT} of the electroslag weld and $60^{\circ}F$ is a conservatism required by the ASME Code). Above approximately 400 psig pressure, the stresses associated with pressurization are more limiting than the bolting stresses, a fact that is reflected in the non-linear portion of curves (a) and (b). Curve (c), which defines the temperature limitations for critical core operation, was established per Section IV 2.c. of Appendix G of 10CFR50. Each of the curves, (a), (b) and (c) define temperature limitations for unirradicated ferrectic steels. Provision has been made for the modification of these curves to account for the change in RT_{NDT} as a result of neutron embrittlement. Figure 3.6.2 defines the functional relationship between RT_{NDT} and integrated neutron flux (fluence, for neutrons > 1 Mev). This figure has been extrapolated from Figure A-4400.1 of the Summer 1973 Addenda to Section XI of the ASME Code.

The relationship given in Figure 3.6.2 is represented of the best information currently available on the effects of fluence on nil-ductility temperature. This figure, as stated in the ASME Code, is intended to be very conservative since the recommended procedure is to determine the irradiation effects from surveillance specimens of the actual material and product form in question. The curve for copper content which was not controlled, was used, since the trace element content of the reactor materials has not been adequately documented as yet.

Using Figure 3.6.2 and referring to the total neutron fluence at the inside surface of the shell at the elevation of peak core flux (2.4×10^{17} Section 3.6-12 of FSAR), the maximum change in RT_{NDT} is $36^{\circ}F$.

This change in RT_{NDT} will be added incrementally to the temperature limits defined in Figure 3.6.1 at appropriate intervals during the life of the unit. Maintaining, thereby, the integrity of the reactor pressure vessel and adjoining components throughout the 40 year design life of the core.

The integrated flux at the vessel wall is calculated from core physics data and will be confirmed using flux monitors installed inside the vessel. Ultimately, the measurement of the neturon flux at the vessel wall will be used to establish an accurate value for the change in RT_{NDT}. In addition, vessel material samples will be located within the vessel to monitor the affect of neutron exposure on these materials. The samples include specimens of base metal, weld zone metal, heat affected zone metal, and standard specimens. These samples will receive neutron exposure more rapidly than the vessel wall material and, therefore, will lead the vessel in integrated neutron flux exposure. These samples will provide further assurance that the shift in RT_{NDT} used in the specification is conservative. The material surveillance program will comply with Appendix H of 10CFR50.

C. Coolant Chemistry - A radioactivity concentration limit of 20 μCi/ml total iodine can be reached if the gaseous effluents are near the limit as set forth in Specification 3.8.C.1 or there is a failure or a prolonged shutdown of the cleanup demineralizer. In the event of a steam line rupture, outside the drywell, the resultant radiological dose at the site boundary would be about 10 rem to the thyroid. This dose was calculated on the basis of a total iodine activity limit of 20 μCi/ml, meteorology corresponding

FIGURE 3.6.1.

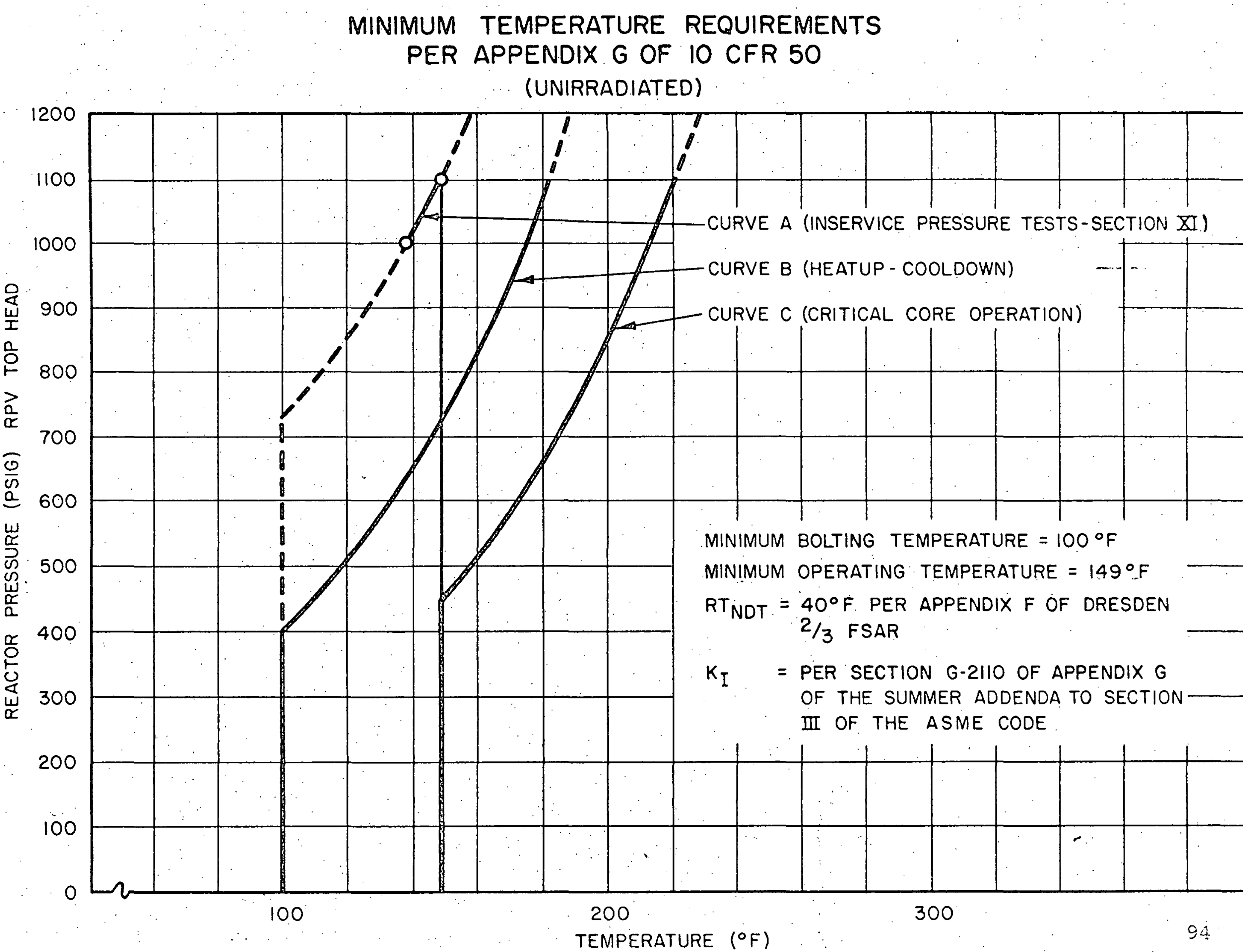
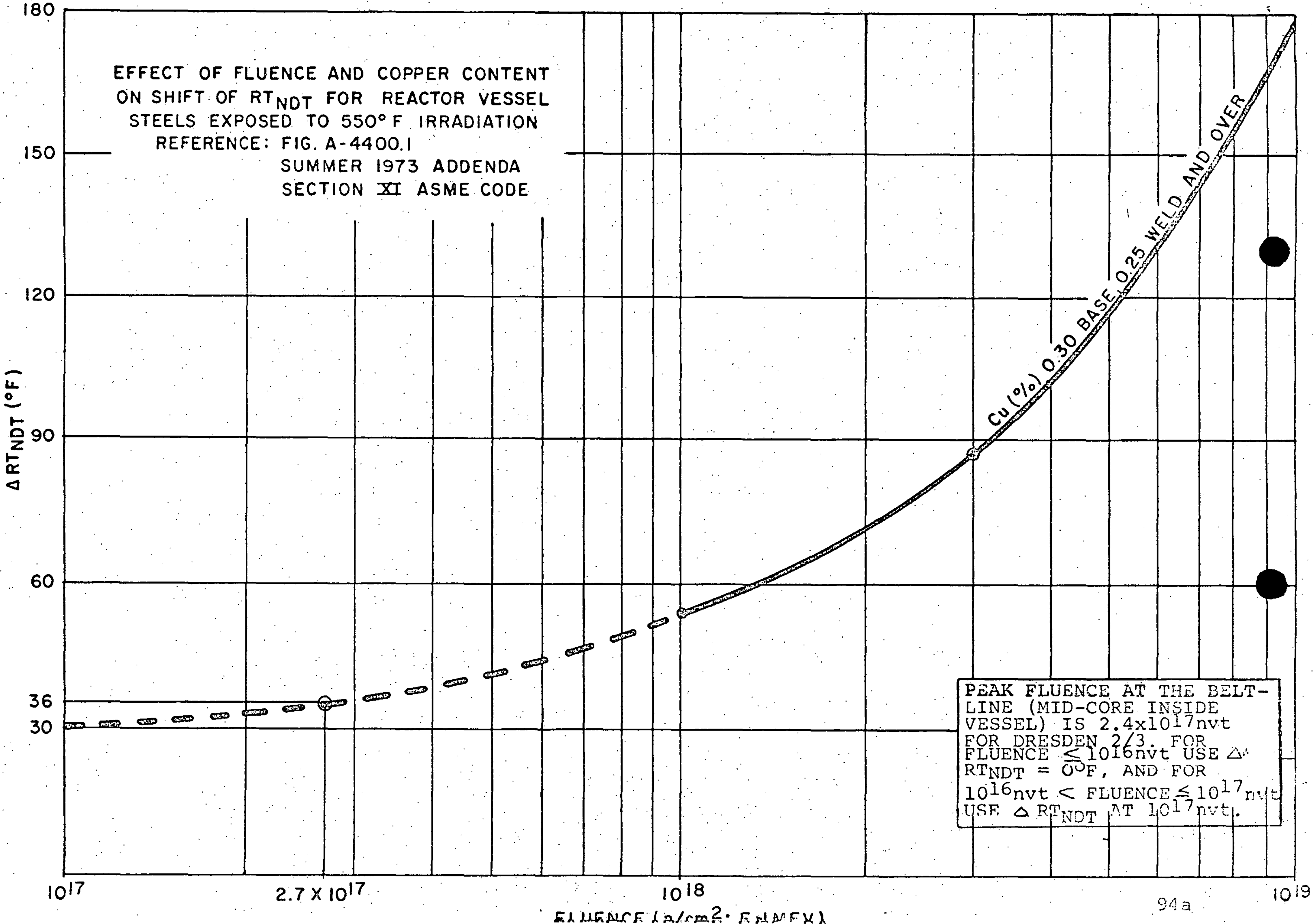

MINIMUM TEMPERATURE REQUIREMENTS
PER APPENDIX G OF 10 CFR 50
(UNIRRADIATED)
REACTOR PRESSURE (PSIG) RPV TOP HEAD
TEMPERATURE (°F)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
100
200
300
CURVE A (INSERVICE PRESSURE TESTS-SECTION XI)
CURVE B (HEATUP-COOLDOWN)
CURVE C (CRITICAL CORE OPERATION)
MINIMUM BOLTING TEMPERATURE = 100 °F
MINIMUM OPERATING TEMPERATURE = 149 °F
RT NDT = 40°F PER APPENDIX F OF DRESDEN 2/3 FSAR
K I = PER SECTION G-2110 OF APPENDIX G OF THE SUMMER ADDENDA TO SECTION III OF THE ASME CODE

FIGURE 3.6.2.


EFFECT OF FLUENCE AND COPPER CONTENT ON SHIFT OF RTNDT FOR REACTOR VESSEL STEELS EXPOSED TO 550° F IRRADIATION
REFERENCE: FIG. A-4400.1
SUMMER 1973 ADDENDA
SECTION XI ASME CODE
Cu(%) 0.30 BASE, 0.25 WELD AND OVER
PEAK FLUENCE AT THE BELT-LINE (MID-CORE INSIDE VESSEL) IS 2.4x10^17 nvt FOR DRESDEN 2/3. FOR FLUENCE ≤ 10^16 nvt USE Δ RTNDT = 0°F, AND FOR 10^16 nvt < FLUENCE ≤ 10^17 nvt USE Δ RTNDT AT 10^17 nvt.
ΔRTNDT (°F)
180
150
120
90
60
36
30
10^17
2.7 X 10^17
10^18
10^19
FLUENCE (n/cm^2· E>1MEV)

PROPOSED AMENDMENT

to DPR-25

3.6 LIMITING CONDITION FOR OPERATION	4.6 SURVEILLANCE REQUIREMENT

3.6 LIMITING CONDITION FOR OPERATION

B. Pressurization Temperature

1. The reactor vessel shall be vented and power operation shall not be conducted unless the reactor vessel temperature is equal to or greater than that shown in Figure 3.6.1 as modified by the increase in temperature required by neutron exposure as shown in Figure 3.6.2.

2. The reactor vessel head bolting studs shall not be under tension unless the temperature of the vessel shell immediately below the vessel flange is ≥ 100°F.

C. Coolant Chemistry

1. The reactor coolant system radioactivity concentration in water shall not exceed 20 microcuries of total iodine per ml of water.

4.6 SURVEILLANCE REQUIREMENT

B. Pressurization Temperature

1. Reactor Vessel shell temperature and reactor coolant pressure shall be permanently recorded at 15 minute intervals whenever the shell temperature is below 220°F and the reactor vessel is not vented.

2. When the reactor vessel head bolting studs are tightened or loosened the reactor vessel shell temperature immediately below the head flange shall be permanently recorded.

3. Neutron flux monitors and samples shall be installed in the reactor vessel adjacent to the vessel wall at the core midplane level. The monitor and sample program shall as a minimum conform to ASTM E 185. The monitors and samples shall be removed and tested during the third refueling outage to experimentally verify the calculated values of integrated neutron flux that are used to determine the NDTT for Figure 4.6.1.

C. Coolant Chemistry

1. a. A sample of reactor coolant shall be taken at least every 96 hours and analyzed for radio-activity.

   b. Isotopic analysis of a sample of reactor coolant shall be made at least once per month.

3.6 LIMITING CONDITION FOR OPERATION

an orderly shutdown shall be initiated and the reactor shall be in a Cold Shutdown condition within 24 hours.

2. The primary containment sump sampling system and an air sampling system shall be operable during power operation. If either a sump water sample or a containment air sample cannot be obtained for any reason, reactor operation is permissible only during the succeeding seven days unless the system is made operable during this period.

E. Safety and Relief Valves

1. During reactor power operating conditions and whenever the reactor coolant pressure is greater than 90 psig and temperature greater than 320°F, all eight of the safety valves shall be operable. The solenoid activated pressure valves shall be operable as required by Specification 3.5.D.

2. If Specification 3.6.E.1 is not met, an orderly shutdown shall be initiated and the reactor coolant pressure and temperature shall be 90 psig and 320°F within 24 hours.

4.6 SURVEILLANCE REQUIREMENT

2. The primary containment sump sampling and air sampling system operability will be observed daily as part of 4.6.D.2.

E. Safety and Relief Valves

A minimum of 1/2 of all safety valves shall be bench checked or replaced with a bench checked valve each refueling outages. The popping point of the safety valves shall be set as follows:

20

Number of Valves	Set Point (Psig)
1	1125*
2	1240
2	1250
2	1260
2	1260

The allowable set point error for each valve is ±1%

All relief valves shall be checked for set pressure each refueling outage. The set pressures shall be:

Number of Valves	Set Point (Psig)
1	1125*
2	≤ 1130
2	≤ 1135

20 *Target Rock combination safety/relief valve

(Rev. w/Ch. 20 dated 5/24/74)

Bases:

A. Thermal Limitations – The reactor vessel design specification requires that the reactor vessel be designed for a maximum heatup and cooldown rate of the contained fluid (water) of 100°F per hour averaged over a period of one hour. This rate has been chosen based on past experience with operating power plants. The associated time periods for heatup and cooldown cycles when the 100°F per hour rate is limiting provides for efficient, but safe, plant operation.

The reactor vessel manufacturer has designed the vessel to the above temperature criterion. In the course of completing the design, the manufacturer performed detailed stress analysis. This analysis includes more severe thermal conditions than those which would be encountered during normal heating and cooling operations.

Specific analyses were made based on a heating and cooling rate of 100°F/hour applied continuously over a temperature range of 100°F to 550°F. Because of the slow temperature-time response of the massive flanges relative to the adjacent head and shell sections, calculated temperatures obtained were 500°F (shell) and 360°F (flange) (140°F differential). Both axial and radial thermal stresses were considered to act concurrently with full primary loadings. Calculated stresses were within ASME Boiler and Pressure Vessel Code Section III stress intensity and fatigue limits even at the flange area where maximum stress occurs.

The flange metal temperature differential of 140°F occurred as a result of sluggish temperature response and the fact that the heating rate continued over a 450°F coolant temperature range.

The uncontrolled cooldown rate of 240°F was based on the maximum expected transient over the lifetime of the reactor vessel. This maximum expected transient is the injection of cold water into the vessel by the high pressure coolant injection subsystem. This transient was considered in the design of the pressure vessel and five such cycles were considered in the design. Detailed stress analyses were conducted to assure that the injection of cold water into the vessel by the HPCI would not exceed ASME stress code limitations.

B. Pressurization Temperature - The reactor coolant system is a primary barrier against the release of fission products to the environs. In order to provide assurance that this barrier is maintained at a high degree of integrity, restrictions have been placed on the operating conditions to which it can be subjected. These restrictions on inservice hydrostatic testing, on heatup and cooldown, and on critical core operation, shown in Figure 3.6.1, were established to be in conformance with Appendix G to 10CFR50.

In evaluating the adequacy of ferritic steels Sa302B
it is necessary that the following be established:

a) The reference nil-ductility temperature (RT_{NDT}) for all vessel and adjoining materials,

b) the relationship between RT_{NDT} and and integrated neutron flux (fluence, at energies > 1 Mev), and
c) the fluence at the location of a postulated flow.

The initial RT_{NDT} of the main closure flange, the shell and head materials connecting to these flanges, and connecting welds is 10°F. However, the vertical electroslag welds which terminate immediately below the vessel flange have an RT_{NDT} of 40°F. Reference Appendix F to the FSAR. The closure flanges and connecting shell materials are not subject to any appreciable neutron radiation exposure, nor are the vertical electroslag seams. The flange area is moderately stressed by tensioning the head bolts. Therefore, as is indicated in curves (a) and (b) of Figure 3.6.1, the minimum temperature of the vessel shell immediately below the vessel flange is established as 100°F below a pressure of 400 psig. (40°F + 60°F, where 40°F is the RT_{NDT} of the electroslag weld and 60°F is a conservatism required by the ASME Code). Above approximately 400 psig pressure, the stresses associated with pressurization are more limiting than the bolting stresses, a fact that is reflected in the non-linear portion of curves (a) and (b). Curve (c), which defines the temperature limitations for critical core operation, was established per Section IV 2.c. of Appendix G of 10CFR50. Each of the curves, (a), (b) and (c) define temperature limitations for unirradicated ferrectic steels. Provision has been made for the modification of these curves to account for the change in RT_{NDT} as a result of neutron embrittlement. Figure 3.6.2 defines the functional relationship between RT_{NDT} and integrated neutron flux (fluence, for neutrons > 1 Mev). This figure has been extrapolated from Figure A-4400.1 of the Summer 1973 Addenda to Section XI of the ASME Code.

The relationship given in Figure 3.6.2 is represented of the best information currently available on the effects of fluence on nil-ductility temperature. This figure, as stated in the ASME Code, is intended to be very conservative since the recommended procedure is to determine the irradiati effects from surveillance specimens of the actual material and product form in question. The curve for copper content which was not controlled, was used, since the trace element content of the reactor materials has not been adequately documented as yet.

Using Figure 3.6.2 and referring to the total neutron fluence at the inside surface of the shell at the elevation of peak core flux (2.4×10^{17} Section 3.6-12 of FSAR), the maximum change in RT_{NDT} is 36°F.

This change in RT_{NDT} will be added incrementally to the temperature limits defined in Figure 3.6.1 at appropriate intervals during the life of the unit. Maintaining, thereby, the integrity of the reactor pressure vessel and adjoining components throughout the 40 year design life of the core.

The integrated flux at the vessel wall is calculated from core physics data and will be confirmed using flux monitors installed inside the vessel. Ultimately, the measurement of the neturon flux at the vessel wall will be used to establish an accurate value for the change in RT_{NDT}. In addition, vessel material samples will be located within the vessel to monitor the affect of neutron exposure on these materials. The samples include specimens of base metal, weld zone metal, heat affected zone metal, and standard specimens. These samples will receive neutron exposure more rapidly than the vessel wall material and, therefore, will lead the vessel in integrated neutron flux exposure. These samples will provide further assurance that the shift in RT_{NDT} used in the specification is conservative. The material surveillance program will comply with Appendix H of 10CFR50.

C. <u>Coolant Chemistry</u> - A radioactivity concentration limit of 20 μCi/ml total iodine can be reached if the gaseous effluents are near the limit as set forth in Specification 3.8.C.1 or there is a failure or a prolonged shutdown of the cleanup demineralizer. In the event of a steam line rupture, outside the drywell, the resultant radiological dose at the site boundary would be about 10 rem to the thyroid. This dose was calculated on the basis of a total iodine activity limit of 20 μCi/ml, meteorology corresponding

FIGURE 3.6.1.

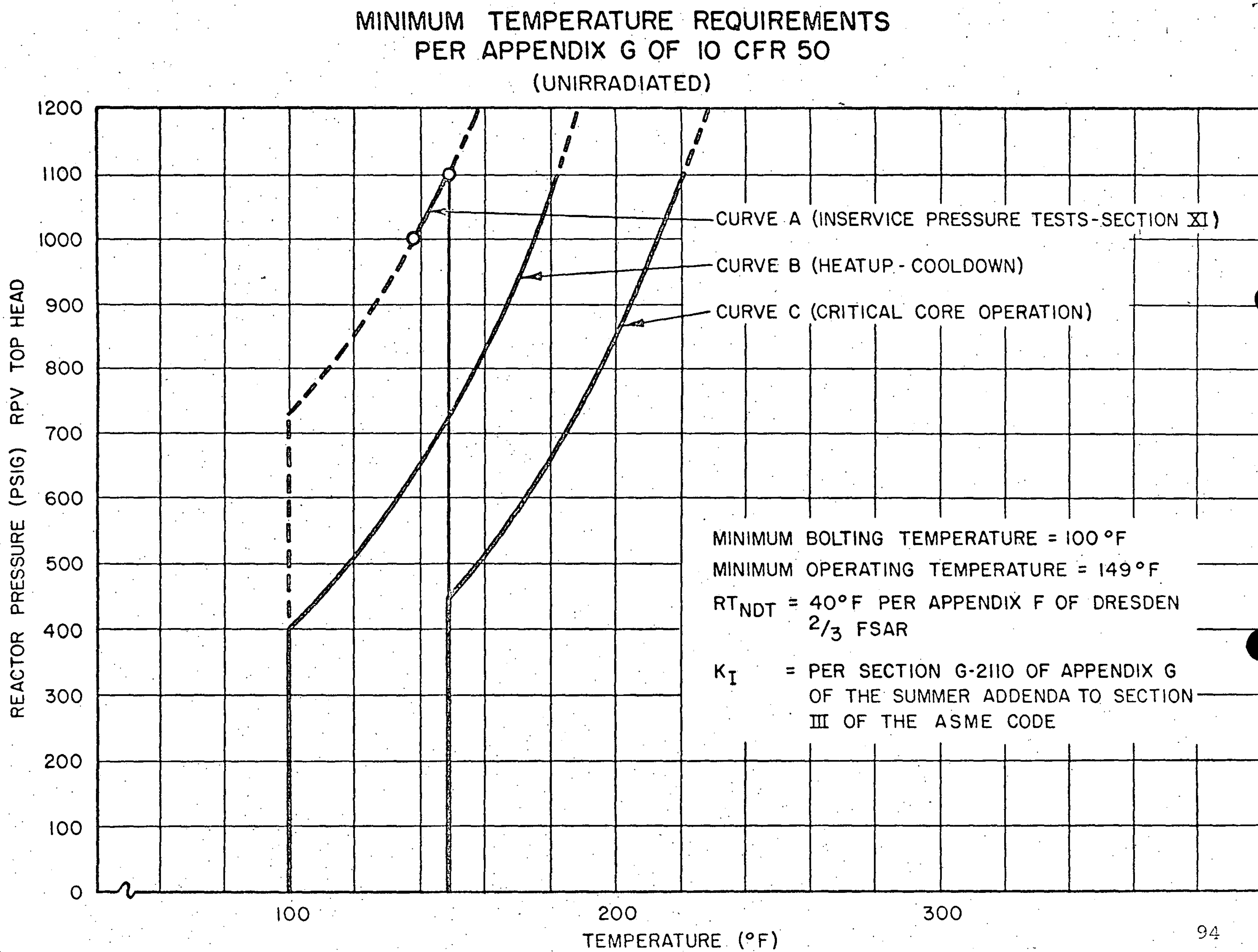
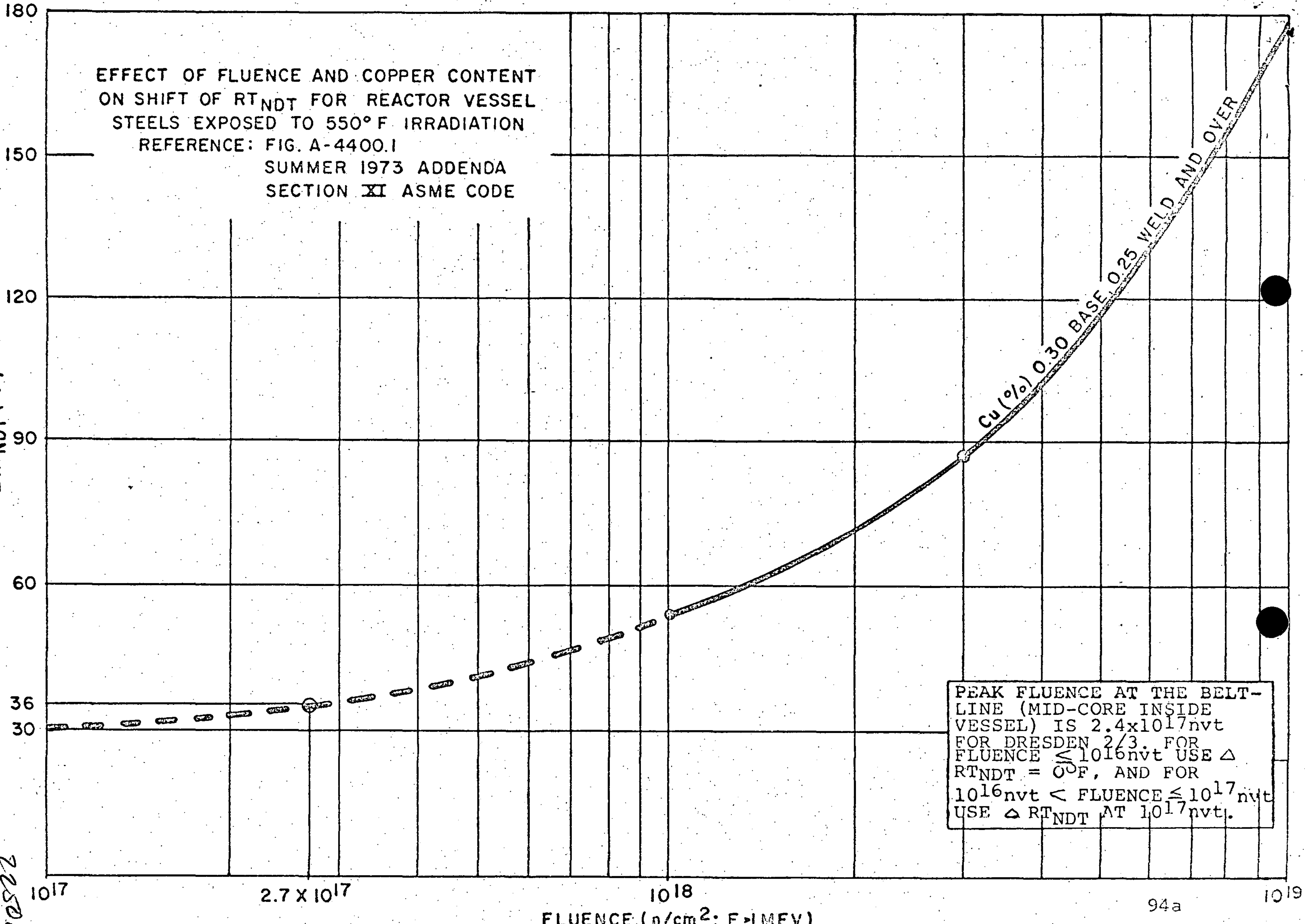

MINIMUM TEMPERATURE REQUIREMENTS
PER APPENDIX G OF 10 CFR 50
(UNIRRADIATED)
REACTOR PRESSURE (PSIG) RPV TOP HEAD
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
100
200
300
TEMPERATURE (°F)
CURVE A (INSERVICE PRESSURE TESTS-SECTION XI)
CURVE B (HEATUP - COOLDOWN)
CURVE C (CRITICAL CORE OPERATION)
MINIMUM BOLTING TEMPERATURE = 100 °F
MINIMUM OPERATING TEMPERATURE = 149 °F
RTNDT = 40°F PER APPENDIX F OF DRESDEN 2/3 FSAR
KI = PER SECTION G-2110 OF APPENDIX G OF THE SUMMER ADDENDA TO SECTION III OF THE ASME CODE

FIGURE 3.6.2.



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