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

METROPOLITAN EDISON COMPANY
JERSEY CENTRAL POWER AND LIGHT COMPANY
PENNSYLVANIA ELECTRIC COMPANY

DOCKET NO. 50-289

THREE MILE ISLAND NUCLEAR STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 5
License No. DPR-50

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

   A. The application for amendment by Metropolitan Edison Company, Jersey Central Power and Light Company, Pennsylvania Electric Company (the licensees) dated December 13, 1974, 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. Prior public notice of this amendment is not required since the amendment does not involve a significant hazards consideration.

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2. Accordingly, the license is amended by a change to the Technical Specifications as indicated in the attachment to this license amendment and Paragraph 2.c.(2) of Facility License No. DPR-50 is hereby amended to read as follows:

"(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised are hereby incorporated in the license. The licensees shall operate the facility in accordance with the Technical Specifications, as revised by issued changes thereto through Change No. 5"

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Karl R. Goller

Karl R. Goller, Assistant Director
for Operating Reactors
Division of Reactor Licensing

Attachment:
Change No. 5 to the
Technical Specifications

Date of Issuance: MAR 21 1975

ATTACHMENT TO LICENSE AMENDMENT NO. 5

CHANGE NO. 5 TO THE TECHNICAL SPECIFICATION

FACILITY OPERATING LICENSE NO. DPR-50

DOCKET NO. 50-289

Replace pages 3-3, 3-4, and 3-5 with the attached revised pages. Replace page 3-6 with the attached page (no change was made therein but is being replaced for numbering sequence only). Also, replace Figures 3.1-1 and 3.1-2 with the attached revised figures.

## 3.1.2 PRESSURIZATION, HEATUP, AND COOLDOWN LIMITATIONS

Applicability

Applies to pressurization, heatup, and cooldown of the reactor coolant system.

Objective

To assure that temperature and pressure changes in the reactor coolant system do not cause cyclic loads in excess of design for reactor coolant system components.

Specification

3.1.2.1 For the first $1.7 \times 10^6$ thermal megawatt days (approximating two years) the reactor coolant pressure and the system heatup and cooldown rates (with the exception of the pressurizer) shall be limited in accordance with Figure 3.1-1 and Figure 3.1-2 and are as follows:

Heatup:

Allowable combinations of pressure and temperature shall be to the right of and below the limit line in Figure 3.1-1. Heatup rates shall not exceed those shown on Figure 3.1-1.

Cooldown:

Allowable combinations of pressure and temperature for a specific cooldown shall be to the left of and below the limit line in Figure 3.1-2. Cooldown rates shall not exceed those shown on Figure 3.1-2.

Hydro Tests:

For isothermal system hydrotests during the first two years of operations, the system may be pressurized to the limits set forth in Specification 2.2, when there are fuel assemblies in the vessel and to ASME Code Section III limits when no fuel assemblies are present if the system temperature is 215 F or greater. The system may be tested to a pressure of 1150 psig provided system temperature is 175 F or greater. Initial system hydrotests prior to criticality may be conducted if the reactor coolant system temperature is 118 F or greater.

3.1.2.2 The secondary side of the steam generator shall not be pressurized above 200 psig if the temperature of the steam generator shell is below 100 F.

3.1.2.3 The pressurizer heatup and cooldown shall not exceed 100°F in any one hour. The spray shall not be used if the temperature difference between the pressurizer and the spray fluid is greater than 430F. 5

3.1.2.4 Within two years of power operation, Figures 3.1-1 and 3.1-2 shall be updated in accordance with criteria acceptable to the ALC.

Bases

All reactor coolant system components are designed to withstand the effects of cyclic loads due to system temperature and pressure changes.(1) These cyclic

loads are introduced by unit load transients, reactor trips, and unit heatup and cooldown operations. The number of thermal and loading cycles used for design purposes are shown in Table 4-8 of the FSAR. The maximum unit heatup and cooldown rate of 100 F in any one hour satisfies stress limits for cyclic operation.(2) The 200 psig pressure limit for the secondary side of the steam generator at a temperature less than 100°F satisfies stress levels for temperatures below the DTT.(3) The reactor vessel plate material and welds have been tested to verify conformity to specified requirements and a maximum NDTT value of 30 F has been determined based on Charpy V-notch tests. The maximum NDTT value obtained for the steam generator shell material and welds was 40 F.

The heatup and cooldown limits in this specification are not intended to limit instantaneous rates of temperature change, but are intended to limit temperature changes such that there exists no one hour interval, in which a temperature change greater than the limit takes place.

Figures 3.1-1 and 3.1-2 contain the limiting reactor coolant system pressure-temperature relationship for operation at DTT(4) and below to assure that stress levels are low enough to preclude brittle fracture. These stress levels and their bases are defined in Paragraph 4.3.3 of the FSAR.

As a result of fact neutron irradiation in the region of the core, there will be an increase in the NDTT with accumulated nuclear operation. The predicted maximum NDTT increase for the 40-year exposure is shown on Figure 4-10.(4) The actual shift in NDTT will be determined periodically during plant operation by testing of irradiated vessel material samples located in this reactor vessel.(5) The results of the irradiated sample testing will be evaluated and compared to the design curve (Figure 4-11 of the FSAR) being used to predict the increase in transition temperature.

The design value for fast neutron (E > 1 MeV) exposure of the reactor vessel is $3.0 \times 10^{10}$ n/cm$^2$ sec at the reference design power of 2568 MWt and an integrated exposure of $3.0 \times 10^{19}$ n/cm$^2$ for 40 years operation.(6) The calculated maximum values are $2.2 \times 10^{10}$ n/cm$^2$ sec and $2.2 \times 10^{19}$ n/cm$^2$ integrated exposure for 40 years operation at 80 percent load.(4) Figure 3.1-1 is based on the design value which is considerably higher than the calculated value. The DTT value for Figure 3.1-1 is based on the projected NDTT at the end of the first two years of operation. During these two years, the energy output has been conservatively estimated to be $1.7 \times 10^6$ thermal megawatt days, which is equivalent to 655 days at 2568 MWt core power. The projected fast neutron exposure to the reactor vessel for the two years is $1.7 \times 10^{18}$ n/cm$^2$ which is based on the $1.7 \times 10^6$ thermal megawatt days and the design value for fast neutron exposure.

The actual shift in NDTT will be established periodically during plant operation by testing vessel material samples which are irradiated cumulatively by securing them near the inside wall of the vessel in the core area. To compensate for the increases in the NDTT caused by irradiation, the limits on the pressure-temperature relationship are periodically changed to stay within the established stress limits during heatup and cooldown.

The NDTT shift and the magnitude of the thermal and pressure stresses are sensitive to integrated reactor power and not to instantaneous power level. Figures 3.1-1 and 3.1-2 are applicable to reactor core thermal ratings up to 2568 MWt.

The pressure limit line on Figure 3.1-1 has been selected such that the reactor vessel stress resulting from internal pressure will not exceed 15 percent yield strength considering the following:

a. A 25 psi error in measured pressure

b. System pressure is measured in either loop

c. Maximum differential pressure between the point of system pressure measurement and reactor vessel inlet for all operating pump combinations

For adequate conservatism, in lieu of portions of the Fracture Toughness Testing Requirements of the proposed Appendix G to 10 CFR 50, a maximum pressure of 550 psig and a maximum heatup rate of 50°F in any one hour has been imposed below 275°F as shown on Figure 3.1-1. 5

The spray temperature difference restriction, based on a stress analysis of the spray line nozzle is imposed to maintain the thermal stresses at the pressurizer spray line nozzle below the design limit. Temperature requirements for the steam generator correspond with the measured NDTT for the shell.

REFERENCES

(1) FSAR, Section 4.1.2.4

(2) ASME Boiler and Pressure Code, Section III, N-415

(3) FSAR, Section 4.3.10.5

(4) FSAR, Section 4.3.3

(5) FSAR, Section 4.4.5

(6) FSAR, Sections 4.1.2.8 and 4.3.3

## 3.1.3 MINIMUM CONDITIONS FOR CRITICALITY

Applicability

Applies to reactor coolant system conditions required prior to criticality.

Objective

a. To limit the magnitude of any power excursions resulting from reactivity insertion due to moderator pressure and moderator temperature coefficients.

b. To assure that the reactor coolant system will not go solid in the event of a rod withdrawal or startup accident.

Specification

3.1.3.1 The reactor coolant temperature shall be above 525 F except for portions of low power physics testing when the requirements of Specification 3.1.9 shall apply.

3.1.3.2 Reactor coolant temperature shall be above DTT +10 F.

3.1.3.3 When the reactor coolant temperature is below the minimum temperature specified in 3.1.3.1 above, except for portions of low power physics testing when the requirements of Specification 3.1.9 shall apply, the reactor shall be subcritical by an amount equal to or greater than the calculated reactivity insertion due to depressurization.

3.1.3.4 The reactor shall be maintained subcritical by at least one percent $\Delta k/k$ until a steam bubble is formed and an indicated water level between 80 and 385 inches is established in the pressurizer.

3.1.3.5 Safety rod groups shall be fully withdrawn prior to any other reduction in shutdown margin by deboration or regulating rod withdrawal during the approach to criticality with the following exceptions:

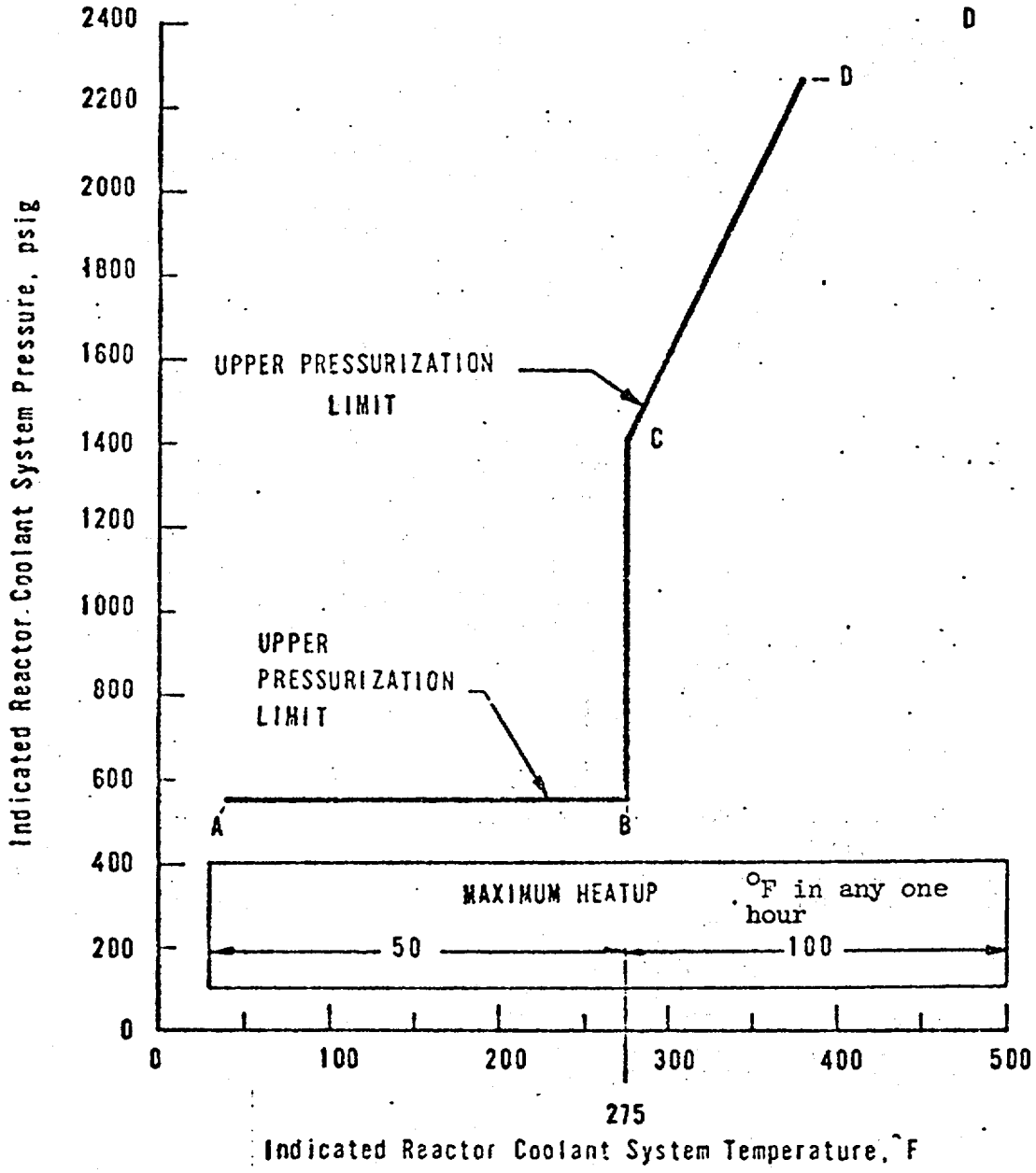
(a) Inoperable rod per 3.5.2.2.

(b) Physics testing per 3.1.9.

(c) Shutdown margin may not be reduced below 1% $\Delta k/k$ per 3.5.2.1.

(d) Exercising rods per 4.1.2.

| POINT | TEMP. | PRESS. |
|---|---|---|
| A | 40 | 550 |
| B | 275 | 550 |
| C | 275 | 1400 |
| D | 380 | 2275 |




REACTOR COOLANT SYSTEM HEATUP LIMITATIONS
(APPLICABLE UP TO AN INTEGRATED EXPOSURE OF
$1.7 \times 10^{18}$ N/CM$^2$ OR DTT = 154F)
THREE MILE ISLAND NUCLEAR STATION UNIT 1

FIGURE 3.1-1

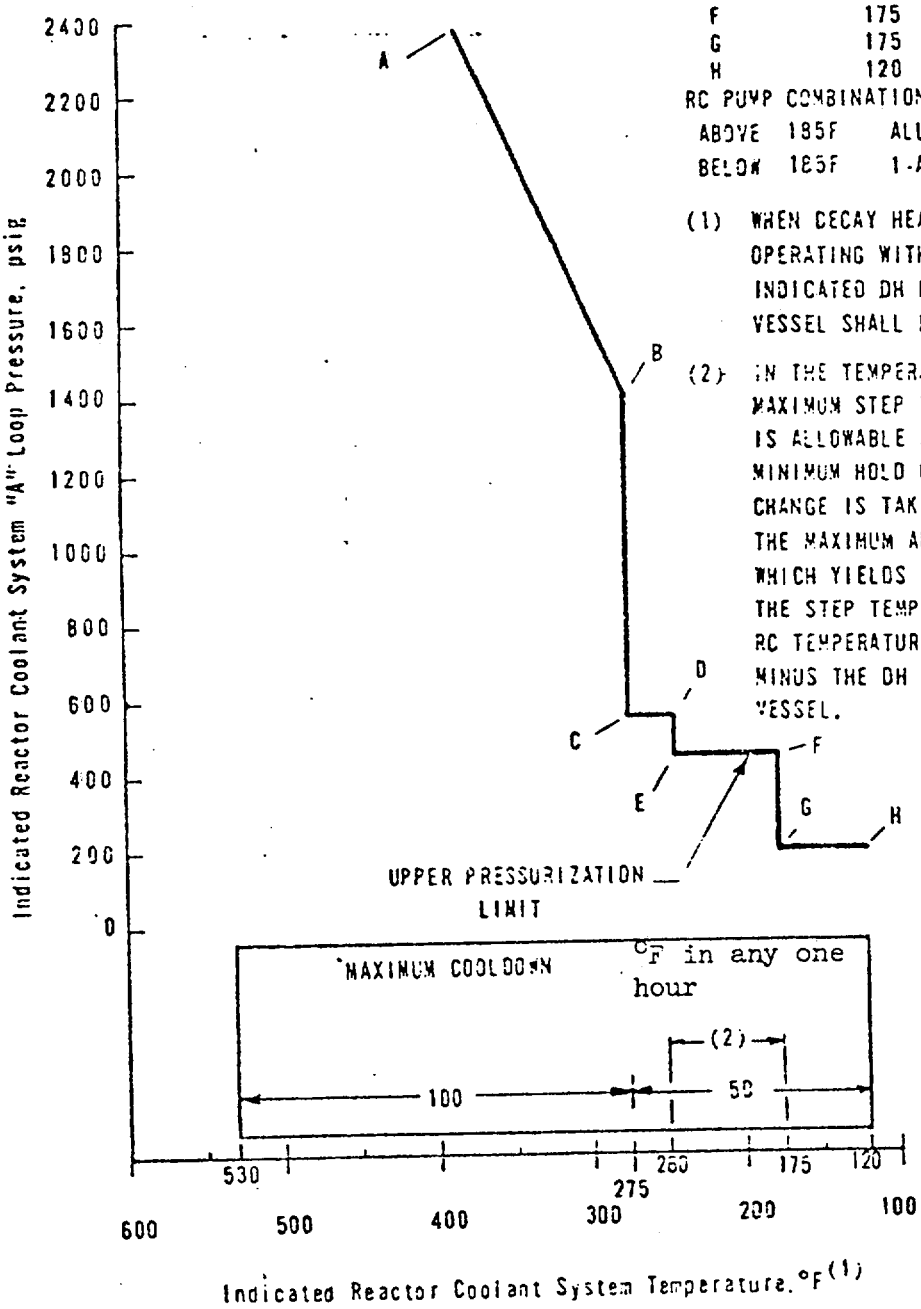
| POINT | TEMP | PRESS |
|---|---|---|
| A | 380 | 2275 |
| B | 275 | 1400 |
| C | 275 | 550 |
| D | 250 | 550 |
| E | 250 | 450 |
| F | 175 | 450 |
| G | 175 | 200 |
| H | 120 | 200 |

RC PUMP COMBINATIONS ALLOWABLE:

| | | |
|---|---|---|
| ABOVE | 185F | ALL |
| BELOW | 185F | 1-A,1-B;0-A,2-B;1-A,0-B;0-A,1-B |

(1) WHEN DECAY HEAT REMOVAL SYSTEM (DH) IS OPERATING WITHOUT ANY RC PUMPS OPERATING, INDICATED DH RETURN TEMP. TO THE REACTOR VESSEL SHALL BE USED.

(2) IN THE TEMPERATURE RANGE 260F TO 175F, A MAXIMUM STEP TEMPERATURE CHANGE OF 75F IS ALLOWABLE FOLLOWED BY A ONE HOUR MINIMUM HOLD ON TEMPERATURE. IF THE STEP CHANGE IS TAKEN BELOW 250F RC TEMPERATURE, THE MAXIMUM ALLOWABLE STEP SHALL BE THAT WHICH YIELDS A FINAL TEMPERATURE OF 175F. THE STEP TEMPERATURE CHANGE IS DEFINED AS RC TEMPERATURE(BEFORE STOPPING ALL RC PUMPS) MINUS THE DH RETURN TEMPERATURE TO THE REACTOR VESSEL.

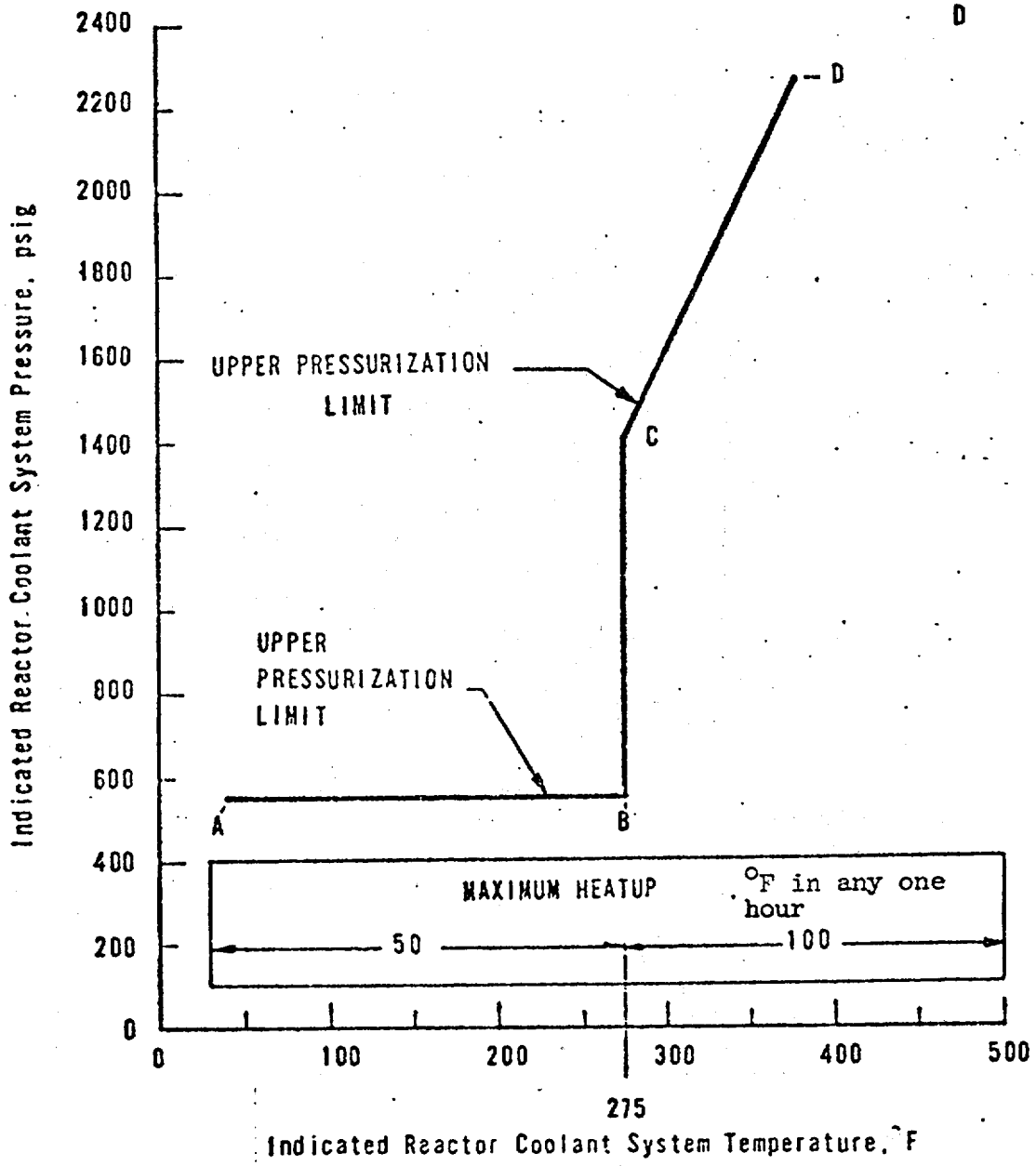



REACTOR COOLANT SYSTEM COOLDOWN LIMITATIONS
(APPLICABLE UP TO DTT = 135F)

THREE MILE ISLAND NUCLEAR STATION UNIT 1

FIGURE 3.1-2

| POINT | TEMP. | PRESS. |
|---|---|---|
| A | 40 | 550 |
| B | 275 | 550 |
| C | 275 | 1400 |
| D | 380 | 2275 |




REACTOR COOLANT SYSTEM HEATUP LIMITATIONS
(APPLICABLE UP TO AN INTEGRATED EXPOSURE OF
$1.7 \times 10^{18}$ N/CM$^2$ OR DTT = 154F)
THREE MILE ISLAND NUCLEAR STATION UNIT 1

FIGURE 3.1-1

| POINT | TEMP | PRESS |
|---|---|---|
| A | 380 | 2275 |
| B | 275 | 1400 |
| C | 275 | 550 |
| D | 250 | 550 |
| E | 250 | 450 |
| F | 175 | 450 |
| G | 175 | 200 |
| H | 120 | 200 |

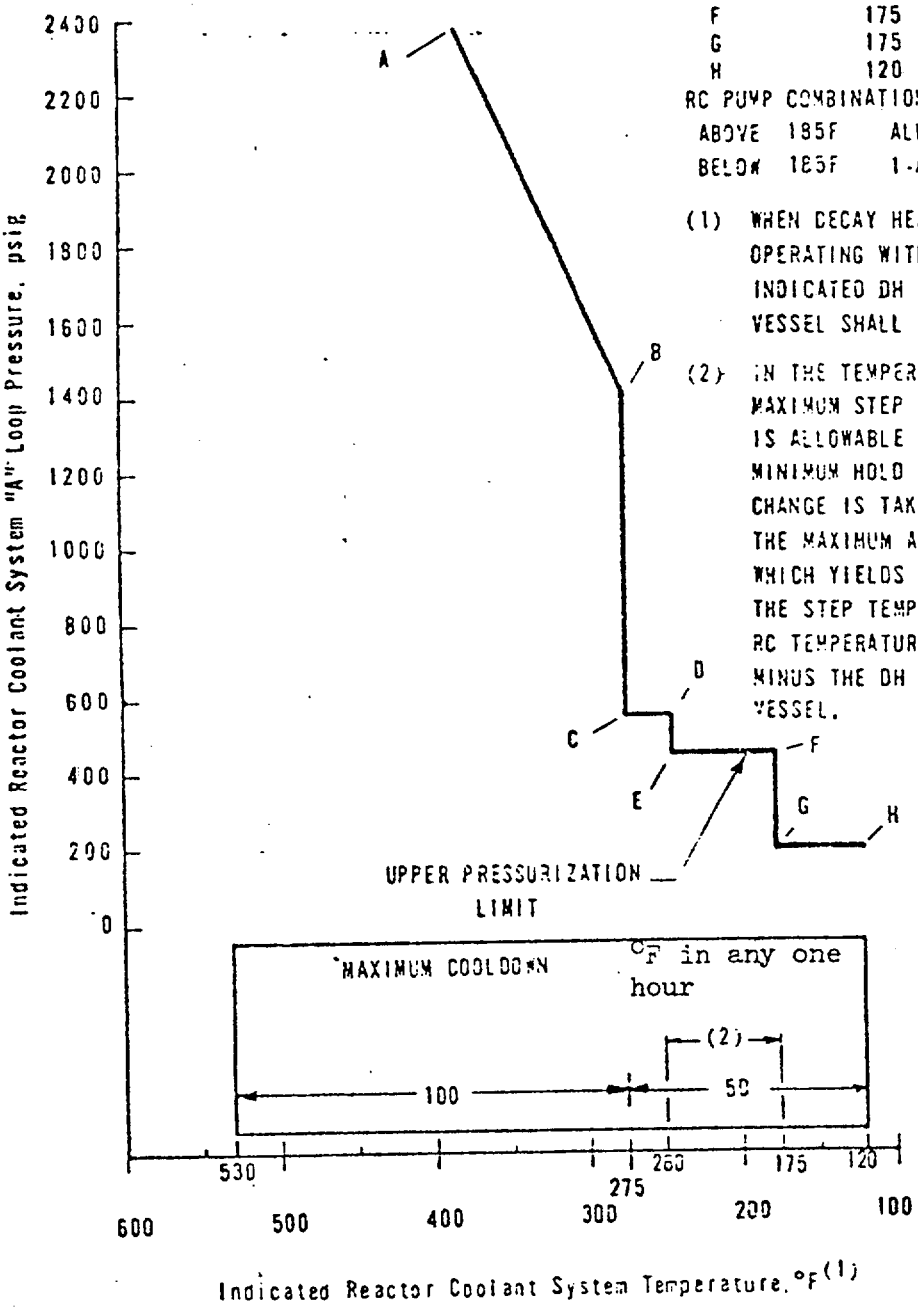
RC PUMP COMBINATIONS ALLOWABLE:

ABOVE 185F ALL

BELOW 185F 1-A,1-B;0-A,2-B;1-A,0-B;0-A,1-B

(1) WHEN DECAY HEAT REMOVAL SYSTEM (DH) IS OPERATING WITHOUT ANY RC PUMPS OPERATING, INDICATED DH RETURN TEMP. TO THE REACTOR VESSEL SHALL BE USED.

(2) IN THE TEMPERATURE RANGE 260F TO 175F, A MAXIMUM STEP TEMPERATURE CHANGE OF 75F IS ALLOWABLE FOLLOWED BY A ONE HOUR MINIMUM HOLD ON TEMPERATURE. IF THE STEP CHANGE IS TAKEN BELOW 250F RC TEMPERATURE, THE MAXIMUM ALLOWABLE STEP SHALL BE THAT WHICH YIELDS A FINAL TEMPERATURE OF 175F. THE STEP TEMPERATURE CHANGE IS DEFINED AS RC TEMPERATURE(BEFORE STOPPING ALL RC PUMPS) MINUS THE DH RETURN TEMPERATURE TO THE REACTOR VESSEL.




REACTOR COOLANT SYSTEM COOLDOWN LIMITATIONS
(APPLICABLE UP TO DTT = 135F)

THREE MILE ISLAND NUCLEAR STATION UNIT 1

FIGURE 3.1-2