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

THREE MILE ISLAND NUCLEAR STATION, UNIT 1

DOCKET NO. 50-289
OPERATING LICENSE NO. DPR-50
TECHNICAL SPECIFICATION CHANGE REQUEST NO. 6

This Technical Specification Change Request is submitted in support of Licensee's request to change Appendix A to Operating License No. DPR-50 for Three Mile Island Nuclear Station, Unit 1. As a part of this request, proposed replacement pages for Appendix A are also included.

METROPOLITAN EDISON COMPANY

ATTEST:

By _____
Vice President-Generation

Sworn and subscribed to me this 13th day of December, 1974.

_____
Notary Public

RITA M. POWERS
Notary Public, Muhlenberg Twp., Berks Co.
My Commission Expires September 30, 1978

1586 306

7911040074

UNITED STATES OF AMERICA

ATOMIC ENERGY COMMISSION

IN THE MATTER OF

DOCKET NO. 50-289
OPERATING LICENSE NO. DPR-50

METROPOLITAN EDISON COMPANY

This is to certify that a copy of Technical Specification Change Request No. 6 to Appendix A of the Operating License for Three Mile Island Nuclear Station, Unit 1, dated December 13, 1974, has this 13th day of December been served on the chief executives of Londonderry Township, Dauphin County, Pennsylvania, and Dauphin County, Pennsylvania by deposit in the United States Mail, addressed as follows:

Dr. Edward O. Swartz, Chairman
Board of Supervisors of
Londonderry Township
R. D. #1, Geyers Church Road
Middletown, Pennsylvania 17057

Mr. Charles P. Hoy, Chairman
Board of County Commissioners of
Dauphin County
Dauphin County Courthouse
P. O. Box 1295
Harrisburg, Pennsylvania 17120

METROPOLITAN EDISON COMPANY

By _____
Vice President-Generation

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

THREE MILE ISLAND NUCLEAR STATION, UNIT 1

DOCKET NO. 50-289
OPERATING LICENSE NO. DPR-50
TECHNICAL SPECIFICATION CHANGE REQUEST NO. 6

This Technical Specification Change Request is submitted in support of Licensee's request to change Appendix A to Operating License No. DPR-50 for Three Mile Island Nuclear Station, Unit 1. As a part of this request, proposed replacement pages for Appendix A are also included.

METROPOLITAN EDISON COMPANY

ATTEST:

By /s/ R. C. Arnold
Vice President-Generation

Sworn and subscribed to me this 13th day of December, 1974.

/s/ Rita M. Powers
Notary Public

1586 308

UNITED STATES OF AMERICA

ATOMIC ENERGY COMMISSION

IN THE MATTER OF

DOCKET NO. 50-289
OPERATING LICENSE NO. DPR-50

METROPOLITAN EDISON COMPANY

This is to certify that a copy of Technical Specification Change Request No. 6 to Appendix A of the Operating License for Three Mile Island Nuclear Station, Unit 1, dated December 13, 1974, has this 13th day of December been served on the chief executives of Londonderry Township, Dauphin County, Pennsylvania, and Dauphin County, Pennsylvania by deposit in the United States Mail, addressed as follows:

Dr. Edward O. Swartz, Chairman
Board of Supervisors of
Londonderry Township
R. D. #1, Geyers Church Road
Middletown, Pennsylvania 17057

Mr. Charles P. Hoy, Chairman
Board of County Commissioners of
Dauphin County
Dauphin County Courthouse
P. O. Box 1295
Harrisburg, Pennsylvania 17120

METROPOLITAN EDISON COMPANY

By /s/ R. C. Arnold
Vice President-Generation

1586 309

THREE MILE ISLAND NUCLEAR STATION UNIT 1
OPERATING LICENSE NO. DPR-50
DOCKET NO. 50-289

Technical Specification Change Request No. 6

Licensee requests that the following changes be made to Appendix A of the Technical Specifications. A copy of proposed changed pages marked "Change Request No. 6" is attached as Enclosure 1.

Page 3-3, Specification 3.1.2.3: Change "100 F/h" to "100°F in any one hour".

Page 3-4, Para. 1, Sent. 3" Change "100 F per hour" to "100°F in any one hour".

Page 3-4, add following paragraph between end of first and beginning of second "Bases" paragraphs:

> The heatup and cooldown rate 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, or sub-interval thereof, in which a temperature change greater than the limit takes place.

Page 3-5, Para. 2: Change "50 F/hr" to "50°F in any one hour".

Figure 3.1-1: Change "°F/hr" on abscissa of graph to "°F in any one hour".

Figure 3.1-2: Change "°F/hr" on abscissa of graph to "°F in any one hour".

Reasons for Proposed Change

This change is being proposed to eliminate any ambiguity that may exist in interpreting the Technical Specification primary system maximum allowable heat-up and cooldown rates.

It should be noted that this proposed change was requested by the Commission's Mr. George Lear in his letter to the licensee dated November 12, 1974.

Safety Analysis Justifying Change

The Technical Specifications as they presently read, are ambiguous in that the heat-up and cooldown rate limits could be interpreted either as instantaneous rate limits or as derived-equivalent rate limits to be applied over a specified period of time eg. 100°F per hour could be

interpreted either as an instantaneous rate limit--which is the most restrictive interpretation--or an equivalent rate limit such as 110°F over a period of 6 minutes.

With the proposed change, however, a heat-up rate limit of "100°F in any one hour" would be interpreted to mean that temperature increases could take place at any instantaneous rate, provided there exists no one hour interval, or sub-interval thereof, in which greater than a 100°F temperature increase takes place. Examples which serve to illustrate what this later statement means are provided in Enclosure (2).

The propsed change as stated and interpreted herein has been reviewed and has been found to be consistent with B & W's position regarding how the FSAR stated heat-up and cooldown rate limits are to be applied to TMI-1 (ref. B & W letter dated December 11, 1974, (Enclosure 3)); and no unreviewed safety questions are involved.

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 1.7×10^6 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 115 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 rates 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.

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 AEC.

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 rate 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, or sub-interval thereof, 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 3.0×10^{10} n/cm^2 sec at the reference design power of 2568 MWt and an integrated exposure of 3.0×10^{19} n/cm^2 for 40 years operation.(6) The calculated maximum values are 2.2×10^{10} n/cm^2 sec and 2.2×10^{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 1.7×10^6 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 1.7×10^{18} n/cm^2 which is based on the 1.7×10^6 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.

1586 313

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.

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

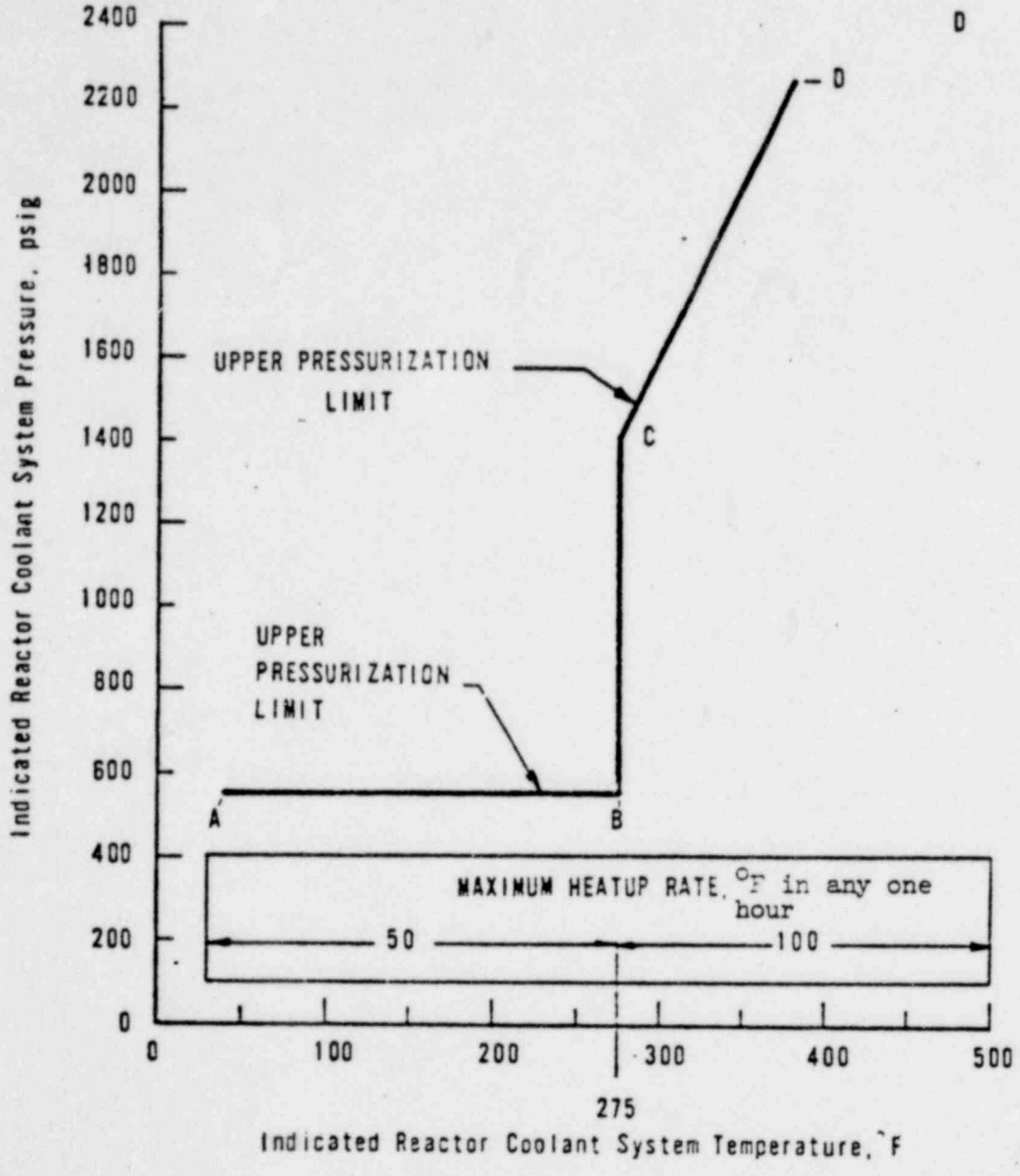
(3) FSAR, Section 4.3.10.5

(4) FSAR, Section 4.3.3

(5) FSAR, Section 4.4.5

(6) FSAR, Sections 4.1.2.8 and 4.3.3

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
1.7×10^{18} N/CM^2 OR DTT = 154 F)
THREE MILE ISLAND NUCLEAR STATION UNIT 1

FIGURE 3.1-1

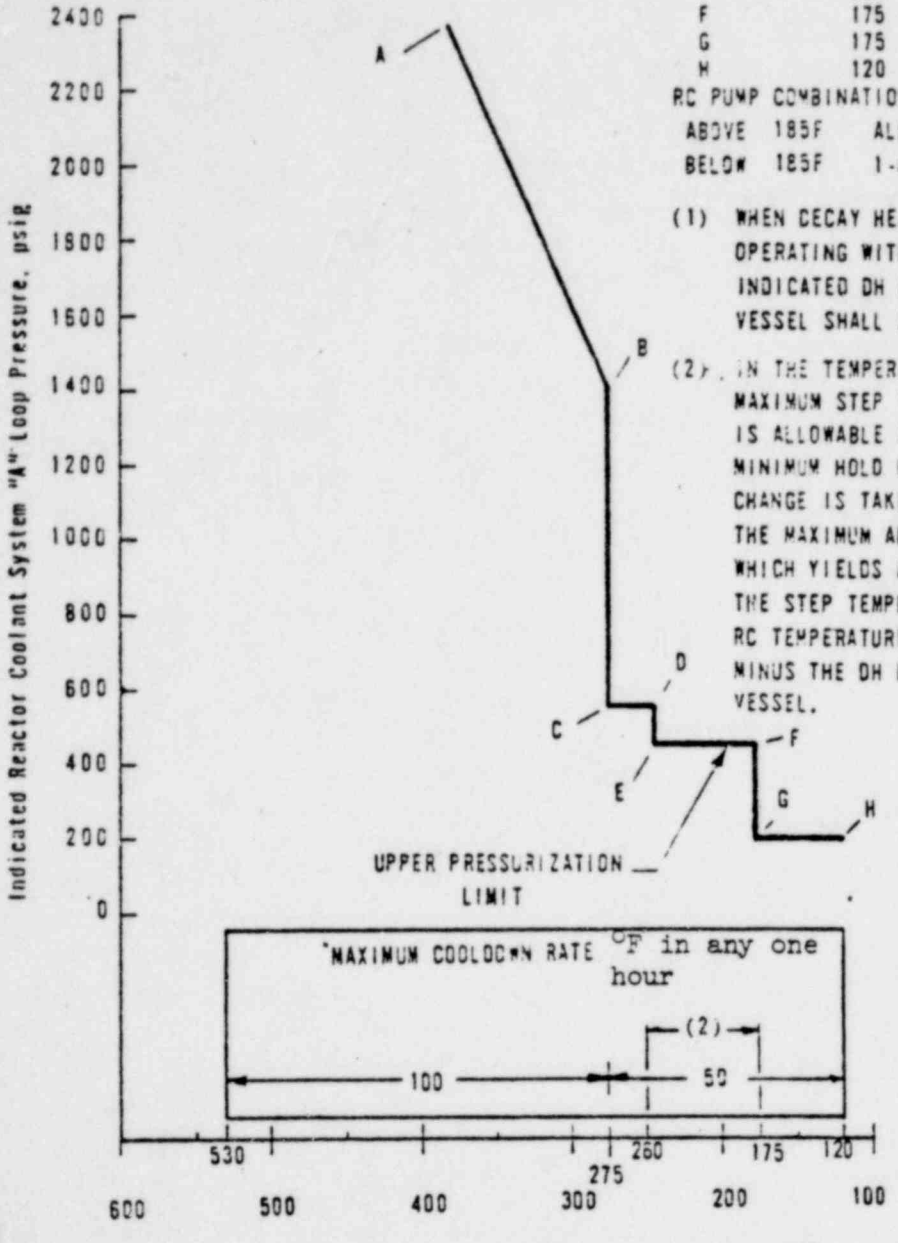
POINT	TEMP	PRESS
A	380	2275
B	275	1400
C	275	550
D	250	550
E	250	450
F	175	450
G	175	200
H	120	200

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

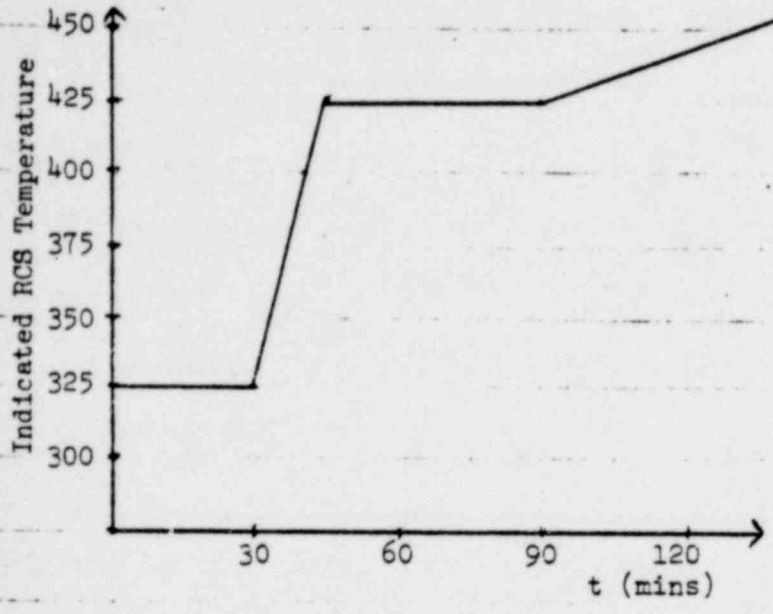
FIGURE 3.1-2

Examples on Meaning of Proposed Change

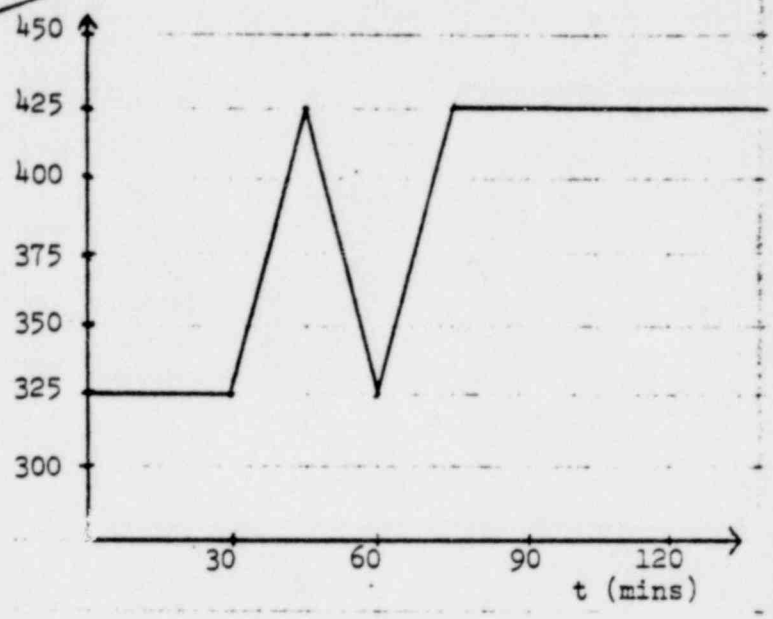
From proposed Figure 3.1-1, when Reactor Coolant System (RCS) temperature exceeds 300°F, the maximum heat-up rate limit will be 100°F in any one hour. The following examples serve to illustrate what is and what is not acceptable for this condition.

Acceptable Temperature Transients

Case A



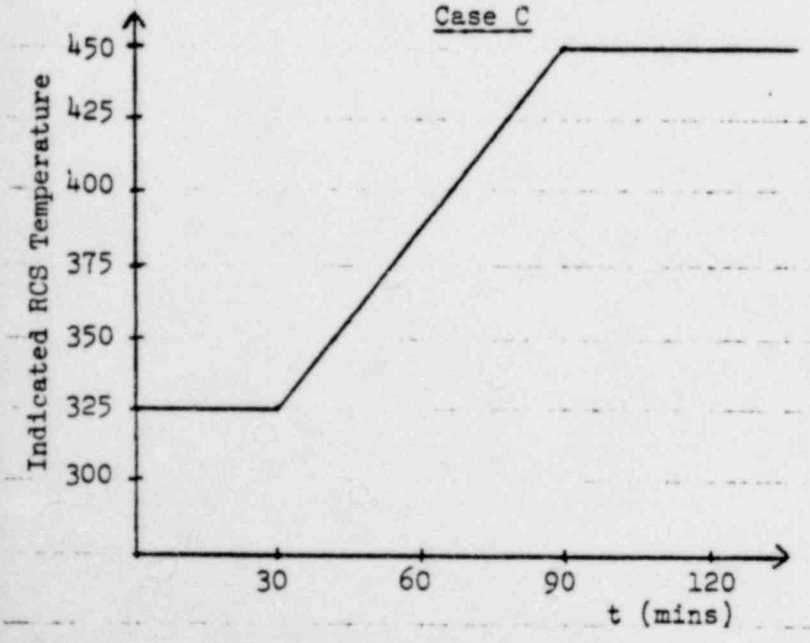
Case B



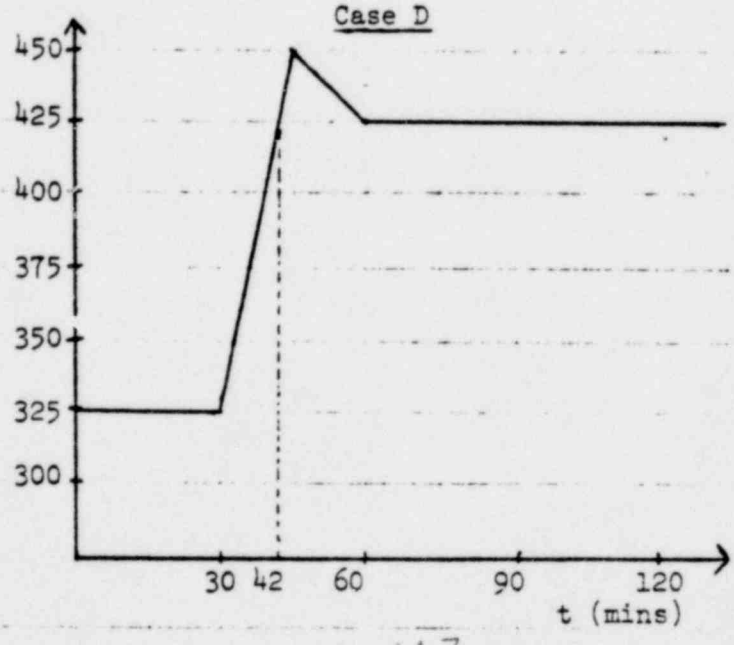
Both cases A and B are acceptable in that there exists no one hour interval, or sub-interval thereof, in which greater than a 100°F temperature increase takes place.

Non-acceptable Temperature Transients

Case C



Case D



Case C is unacceptable in that over the time period from 30 to 90 minutes, greater than a 100°F temperature change takes place.

Case D is unacceptable in that there exists one hour intervals that contain sub-intervals in which the temperature change is greater than 100°F (e.g., the 30 to 90 minute interval contains many sub-intervals during which the temperature increase is greater than 100°F; i.e., 30 minutes to any time t such that 42<t<60 minutes constitute one set of such sub-intervals).

Enclosure 3

Babcock & Wilcox

Power Generation Group
P.O. Box 1260, Lynchburg, Va. 24505
Telephone: (804) 384-5111

December 10, 1974

RE4-I-31

Mr. J. G. Herbein
Metropolitan Edison Company
Post Office Box 480
Middletown, PA 17057

Subject: Clarification to Tech. Spec. 3.1.2

Dear Mr. Herbein:

In response to the question posed to Met. Ed. by the AEC on the interpretation of heatup and cooldown rate limits, B&W has the following position. A heatup or cooldown rate limit is interpreted as the maximum change in temperature in one direction during a one hour period. Thus, a 50°F change in a short time period is acceptable (relative to a 50°F/hr limit) if a hold in temperature change is observed for the remainder of the hour. However, a 50°F decrease and a subsequent 10°F increase (thus, a net 50°F decrease) is not acceptable in assessing compliance with the Tech. Specs. Recovery from overheating or overcooling is not considered, but rather the maximum difference in temperature during a one hour period.

It is suggested that a statement clarifying this position be added to the end of the bases to Tech. Spec. 3.1.2. Such a statement that is acceptable to B&W is as follows:

> The heatup and cooldown rates stated in this specification are intended as the maximum changes in temperature in one direction in a one hour period. The actual temperature linear ramp rates may exceed the stated limits for a time period provided that the maximum total temperature difference does not exceed the limit and that a temperature hold is observed to prevent the total temperature difference from exceeding the limit for this one hour period.

If you have any questions, please do not hesitate to call.

Very truly yours,

for L. C. Rogers
Resident Engineer Manager

1586 319

LCR/WJB/cam

cc: J. F. O'Hanlon J. D. Phinney K. S. Schmidt D. B. Tuladziewski