

Docket No. 50-213

Attachment 1

Haddam Neck Plant

Proposed Revision to Technical Specifications

Figures 3.4-1, 3.4-6, and 3.4-7  
Pages 3-5 and 3-6

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### 3.4 COMBINED HEATUP, COOLDOWN AND PRESSURE LIMITATIONS

**Applicability:** Applies to pressure and temperature conditions during heatup, cooldown, hydrostatic and leak testing of the reactor coolant system.

**Objective:** To maintain operational limits within allowable design limits of the reactor coolant system.

**Specifications:**

#### A. REACTOR VESSEL

1. The reactor coolant system pressure and temperature relationship to be applied for hydrostatic and leak testing shall be maintained within limits as shown in Figure 3.4-1.
2. The reactor coolant system temperature, pressure and system heatup and cooldown rates shall be maintained within limits as shown in Figures 3.4-2 through 3.4-9 for the specified service period.
3. The average rate of reactor coolant temperature change during normal heatup or cooldown shall not exceed 100°F/hr when averaged over a one-hour period.
4. Allowable combinations of pressure and temperature for specific temperature change rates are below and to the right of the limit curves (labelled operating zone) as shown in Figures 3.4-2 through 3.4-9.

#### B. PRESSURIZER

1. The pressurizer shall not be pressurized above 500 psig unless the temperature of the pressurizer is above 70°F.
2. The pressurizer heatup rate shall not exceed 100°F/hr.
3. The pressurizer cooldown rate shall not exceed 200°F/hr.
4. The temperature difference between the pressurizer and the reactor coolant system shall not exceed 200°F.

#### C. STEAM GENERATORS

1. The primary side of the steam generators shall not be pressurized above 500 psig unless the temperature of the reactor coolant system is above 70°F.
2. The maximum heatup and cooldown rate for the steam generators shall not exceed 100°F/hr.
3. The temperature difference across the tube sheet shall not exceed 100°F.
4. The secondary side of the steam generators must not be pressurized above 200 psig if the temperature of the vessel is below 70°F.

Basis: The allowable pressure-temperature relationships for the specified heatup and cooldown rates of the reactor coolant system were calculated in accordance with Appendix G in Section III of the ASME Boiler and Pressure Vessel Code. The minimum full pressurization limits to be applied during hydrostatic and leak testing of the reactor coolant system were derived in accordance with Appendix G to ASME III.

The system leakage test and system hydrostatic test pressure limitations are based on paragraph IS-522 of the Winter 1972 Addenda to ASME Section XI.

The total stress of a component in the reactor coolant system is the combined stress caused by internal pressure and by thermal gradients. The Appendix G approach specifies that the allowable total stress intensity factor ( $K_1$ ) at any time during heatup and cooldown cannot be greater than that shown on the  $K_{IR}$  curve (Reference 1) for the metal temperature at that time. The derived operating limit curves (Figures 3.4-2, through 3.4-9)

contain explicit safety factors of 2.0 and 1.25 (additional conservatism above code requirements) on stress intensity factors induced by pressure and temperature gradients, respectively.

Allowable pressure temperature relationships for both steady-state and finite heatup and cooldown rates were generated assuming the presence of code reference 1/4 T deep flaw at either the ID or OD of the reactor vessel. Finally, a composite curve was constructed based on a point-by-point comparison of the steady state and finite heatup and cooldown data. At any given temperature, the allowable pressure is taken to be the lesser of the two values taken from the curves under consideration. The composite curve was then adjusted to allow for possible errors in the pressure and temperature sensing instruments.

The criticality limit is defined as the minimum full pressurization temperature plus 40°F when reactor is critical.

The heatup, cooldown and hydrostatic and leak testing operating limits were based on the adjusted trend curve (Reference 2), derived from surveillance Capsule A and F results. The projected  $RT_{NDT}$  shift will be verified periodically by the reactor vessel surveillance program.

The heatup and cooldown rates of 200°F/hr of the pressurizer and 100°F/hr for heatup and cooldown of the steam generators are specified since they are both design limits to maintain stresses in these vessels within acceptable design limits.

A temperature difference of 200°F between the pressurizer and reactor coolant system is specified to maintain thermal stresses within the surge line below design limits.

Temperature requirements for pressurization of the pressurizer and steam generators correspond with DTT measured for each material of each component.

CONNECTICUT YANKEE LIMIT CURVE FOR HYDROSTATIC AND LEAK TESTING  
 APPLICABLE FOR 22.0 EFFECTIVE FULL POWER YEARS.

( $T_{\text{ERROR}} = 10^{\circ}\text{F}$ ,  $P_{\text{ERROR}} = 60 \text{ PSIG}$ )

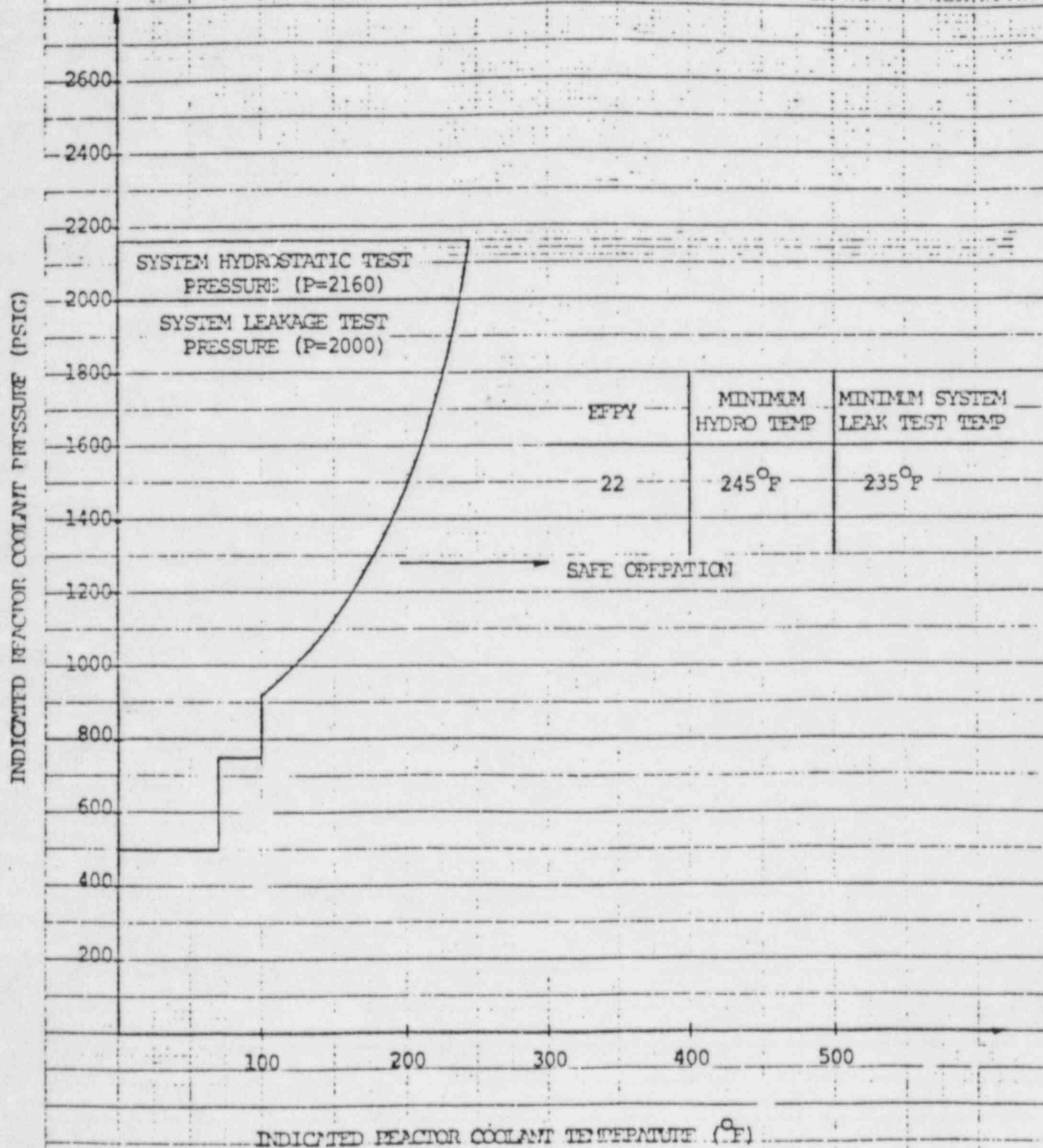


Figure 3.4-1



CONNECTICUT YANKEE REACTOR COOLANT SYSTEM HEATUP  
LIMITATIONS FOR 22.0 EFFECTIVE FULL POWER YEARS.

( $T_{\text{ERROR}} = 10^{\circ}\text{F}$ ,  $P_{\text{ERROR}} = 60 \text{ PSIG}$ )

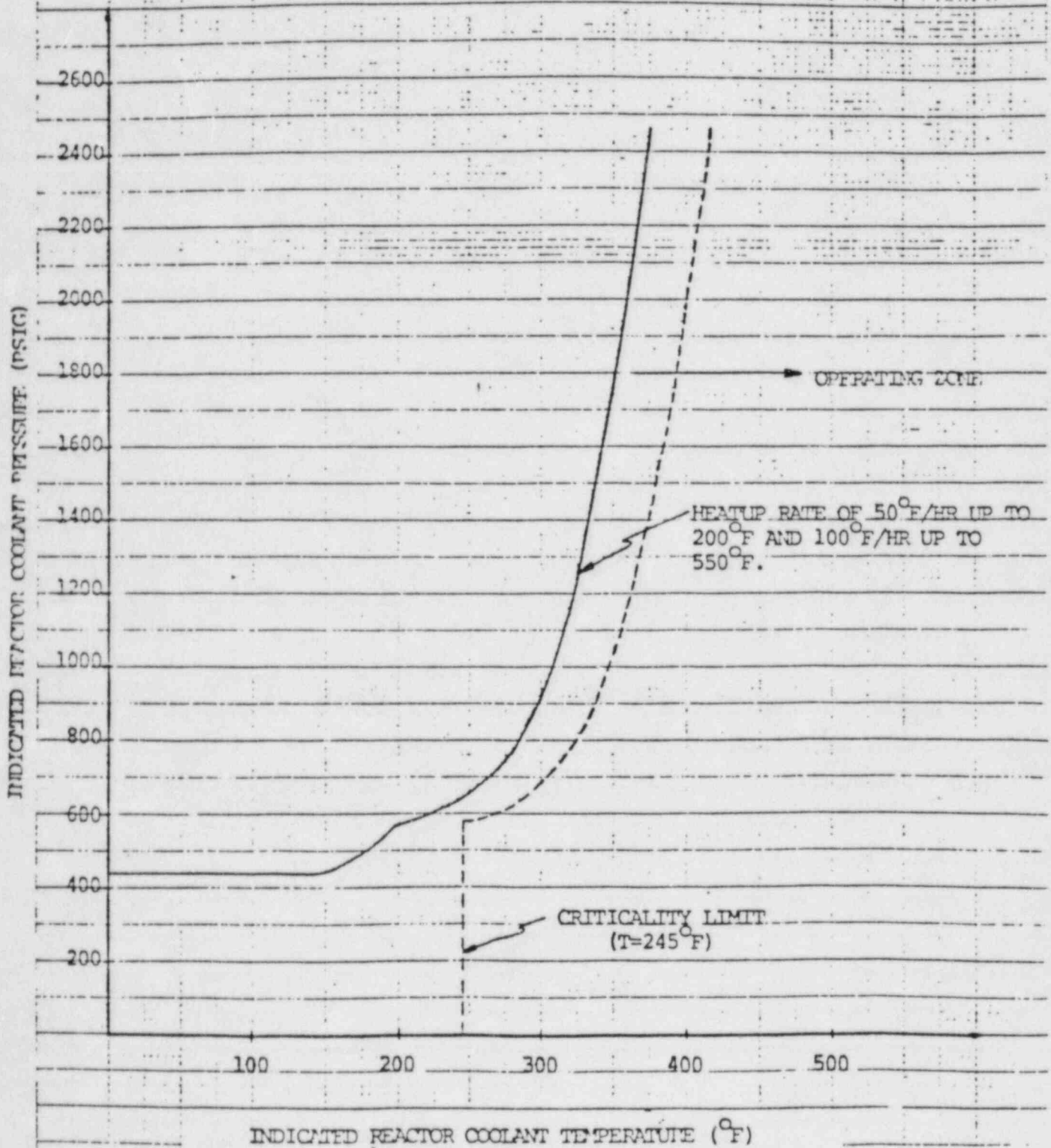


Figure 3.4-8

CONNECTICUT YANKEE REACTOR COOLANT SYSTEM COOLDOWN  
LIMITATIONS FOR 22.0 EFFECTIVE FULL POWER YEARS.

( $T_{\text{ERROR}} = 10^{\circ}\text{F}$ ,  $P_{\text{ERROR}} = 60 \text{ PSIG}$ )

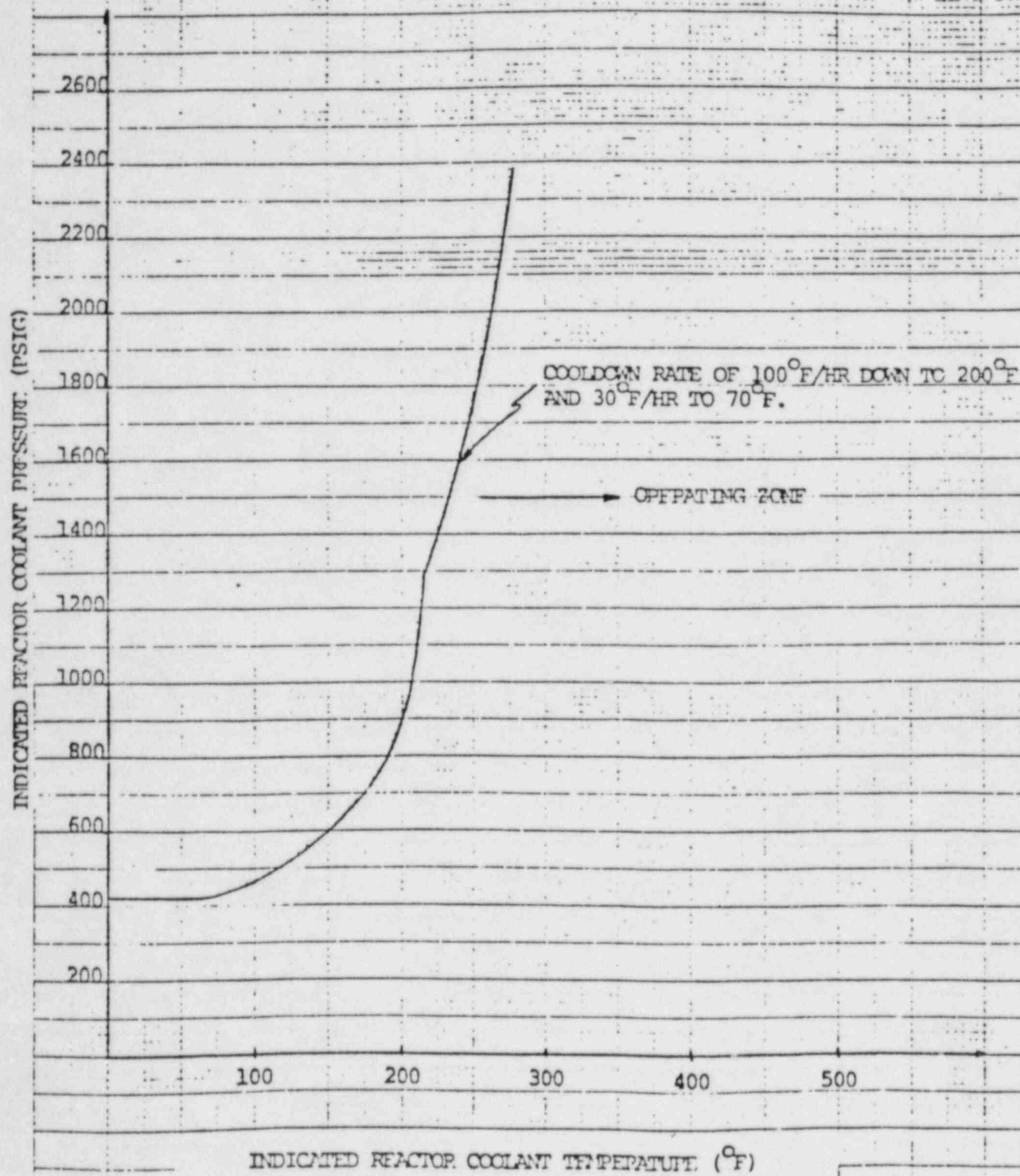


Figure 3.4-9