NRC FORM 195 (2-76)

U.S. NUCLEAR REGULATORY COMMISSION

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TO:	FROM:	DATE OF DOCUMENT
Mr. Robert W. Reid	CP&L Raleigh, N. C. 27602 E. E. Utley	12/15/77
		DATE RECEIVED: 12/19/77

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DESCRIPTION

Response to 12/02/77 set of questions concerning Applicant's overpressure protection system submittal of 10/31/77... w/att supporting graphs....

3p + 2p

REACTOR VESSEL OVERPRESSURIZATION
DISTRIBUTION PER G. ZECH 10-21-76

PLANT NAME: H. B. ROBINSON UNIT # 2
jcm 12/21/77

ENCLOSURE

40 ENCL

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NRC FORM 195 (2-76)

CP&L
Carolina Power & Light Company

December 15, 1977

FILE: NG 3514 (R)

SERIAL: NG-77-1426

Office of Nuclear Reactor Regulation
ATTN: Robert W. Reid, Chief
Operating Reactors Branch No. 4
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

RE: H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261
LICENSE NO. DPR-23
RESPONSE TO OVERPRESSURE PROTECTION SYSTEM QUESTIONS

Dear Mr. Reid:

On December 2, 1977, CP&L received a set of questions concerning our overpressure protection system submittal of October 31, 1977. The questions and CP&L's responses are given below.

1. What is the range of PORV setpoints? Show a curve of setpoints (with RCS temperature) on Appendix G curve.

   While the H. B. Robinson system will utilize function generators the nature of the end of life Appendix G curve has caused CP&L to choose a constant setpoint of 400 psig when the overpressure protection system is operable. The end of life (32 EFPY) and 20 Effective Full Power Year (EFPY) curves with the setpoint shown are attached.

2. Have you computed overshoot at the bounding PORV setpoints (HI & LO) so you know there is no Appendix G violation? Have you done this for both the HPSI (or the limiting SI pump) and the RCP startup event?

   Yes, see 4 below.

3. What is the maximum pressure and what is the limiting event?

   The limiting event is the mass input transient and the maximum pressure is 478 psig.

4. Show the calculations you have done and the inputs used. Compare these values with the reference Westinghouse plant values. Include the discharge rate, backpressure, temperatures assumed, and valve opening time.

   a) Mass Input

   Given: HBR2 System Volume = 9343 ft^3
   Physical Maximum SI flow rate = 80.5 lbs/sec
   PORV opening time = 2 seconds
   From Westinghouse report:
   Overshoot = $\Delta P_R * F_V * F_Z * F_S$
   = 110 * 0.76 * 0.733 * 1.27
   Overshoot = 78 psi for Mass input

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b) Heat Input

Given: System Volume = 9343 ft^3
Steam Generator Heat Transfer Area = 43,400 ft^2
ΔT = 50°F f=0.748
Nominal ΔP_{6K} = 98 psi Nominal ΔP_{13K} = 68 psi
μA_{6K} = 0.115 μA_{13K} = 0.184
μ'_{6K} = 0.086 μ'_{13K} = 0.138
Nominal HBR2 ΔP_{6K} = 72 psi Nominal HBR2 ΔP_{13K} = 52 psi

$$\text{Overshoot} = 72 - \frac{9343 - 6000}{13000 - 6000}(72-52)$$

Overshoot = 62.5 psi heat input

c) Backpressure was not specifically accounted for in the analysis, however calculations performed by Westinghouse show a sensitivity of only 5 psi for a two loop plant. This pressure increase should be even less for a larger volume plant. The overshoot values calculated for H. B. Robinson have more than 5 psi margin.

5. The ENABLE alarm (discussed in Item #6, Page #2) appears to be independent of the PORV upstream valve (MOV) position. As we discussed in the 6/20/77 telecon, the ENABLE alarm must also monitor upstream MOV position since its closure disables that train.

The ENABLE alarm will be modified to monitor the upstream MOV position. The details of this revision will be shown on the detailed circuit diagram to be submitted at a later date.

6. You have not discussed overpressure protection system testing techniques and frequency, and should do so.

Details of the proposed surveillance program will be included in our requested Technical Specification changes to be submitted at a later date. The basic surveillance philosophy is to functionally test the system prior to use, with refueling tests of actual valve operating time.

7. You have not proposed any tech specs relevant to the overpressure protection system. Provide schedule within ten days.

Technical Specifications relating to the overpressure protections will be prepared for submittal by 12/23/77.

8. The staff has requested detailed circuit diagrams that permit a review of your mitigating system. These diagrams should supplement the logic diagrams of the October 31, 1977, submittal. Schedule within ten days.

A detailed circuit diagram will be prepared for submittal by 12/23/77.

9. Since your PORV low pressure setpoint is dependent on the RCS temperature (auctioneered), a heat input transient may result in an increasing pressure setpoint. Have you investigated this effect? What sensitivity studies have you done to show the effect of a rapid loop heatup (as in an RCP startup transient) on the PORV setpoint?

   Application of the generic analyses to the H. B. Robinson Appendix G curves has resulted in a setpoint which is constant with temperature.

10. Have you programmed the setpoint of the PORV based on a varying pressure overshoot (as a function of PORV setpoint)?

    The setpoint is a constant.

Yours very truly,

E. E. Utley
Senior Vice President
Power Supply

CSB/gsm

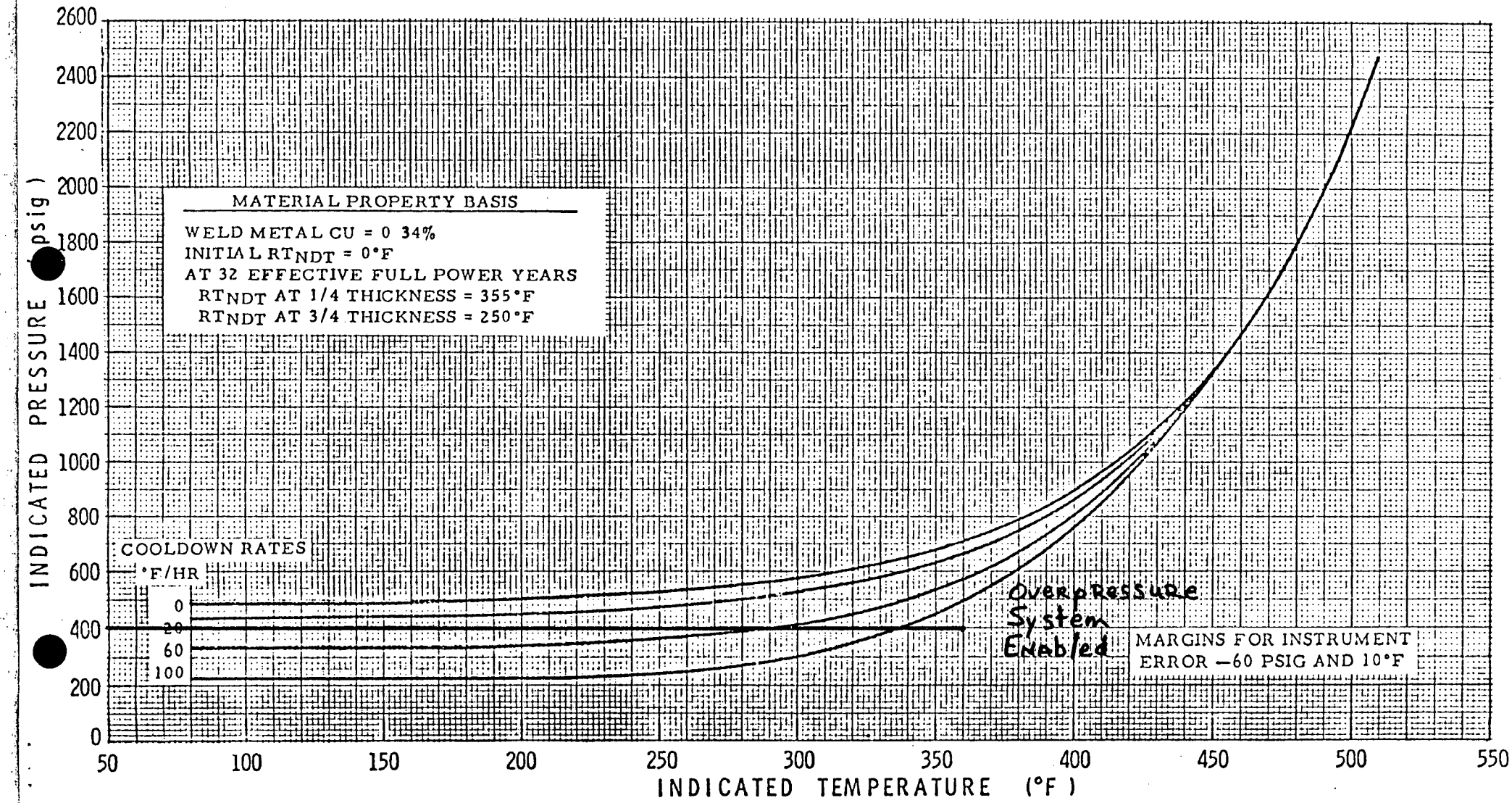

FIGURE 13. H.B. ROBINSON UNIT NO. 2 REACTOR COOLANT COOLDOWN LIMITATIONS APPLICABLE FROM 20 UP TO 32 EFFECTIVE FULL POWER YEARS

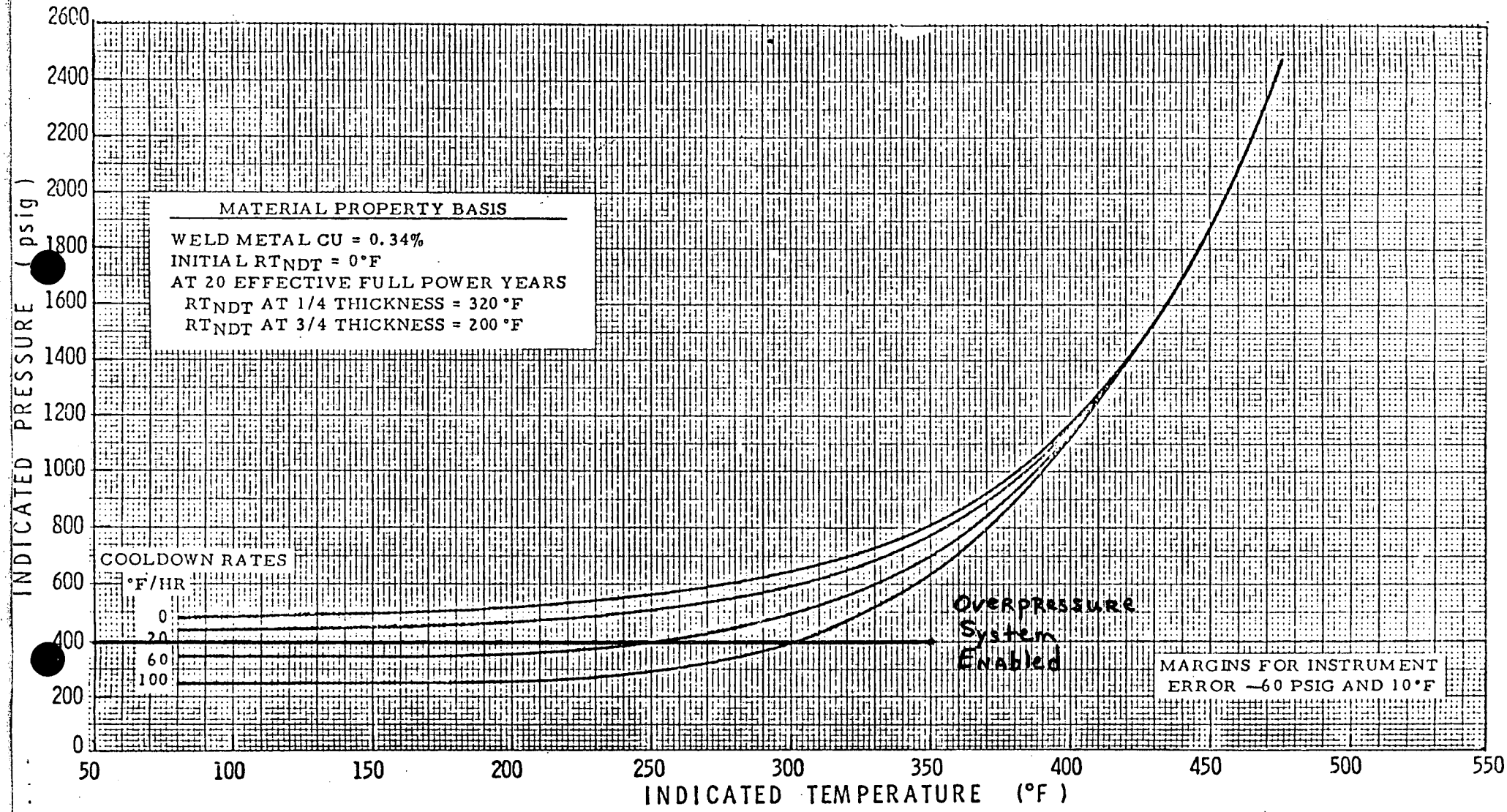

FIGURE 11. H. B. ROBINSON UNIT NO. 2 REACTOR COOLANT COOLDOWN LIMITATIONS APPLICABLE FOR PERIODS UP TO 20 EFFECTIVE FULL POWER YEARS