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Mr. Thierry Ross, Project Manager
PWR Project Directorate #6
Division of PWR Licensing-B
US Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Ross:

Three Mile Island Nuclear Station, Unit 1 (TMI-1)
Operating License No. DPR-50
Docket No. 50-289
Calculations Related to TSCR 162 Concerning
TMI-1 Main Steam Safety Valve

Enclosed please find a calculation for Technical Specification Change Request No. 162 concerning TMI-1 Main Steam Safety Valve change for testing. If you have additional questions, please call Joseph Randazzo, TMI-1 Licensing Engineer, at (717) 948-8553.

Sincerely,

H. D. Hukill
Vice President & Director, TMI-1

HDH/JAR/spb

Attachments

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I. Assumptions

1. Steam conditions are dry, saturated.
2. Atmospheric Dump Valves (MS-V-4A/B) remain closed.
3. The plant has been subcritical for at least one hour.
4. Multiply ANS decay heat value by 1.2 to conservatively bound all projected fuel cycle schemes for TMI-1.

II. Calculations

The total heat load is made up of the core decay heat and heat from the RC Pumps. The core decay heat is found by assuming that the plant has been subcritical for at least one hour.

$$Q_{\text{decay heat}} = 34 (1.2) = 40.8 \text{ MWt}$$

100% power
time = 0

$$Q_{\text{RCP heat}} = 16 \text{ MWt}$$

$$Q_{\text{Total}} = Q_{\text{decay heat}} + Q_{\text{RCP heat}}$$

$$Q_{\text{Total}} = 40.8 \text{ MWt} + 16 \text{ MWt} = 56.8 \text{ MWt}$$

$$Q_{\text{Total}} = (56.8 \times 10^6 \text{ Wt}) \left(\frac{.05686 \text{ BTU/min}}{\text{Wt}} \right) (60 \text{ min/hr}) = 193, 778, 880 \frac{\text{BTU}}{\text{Hr}}$$

$$Q_{\text{Total}} \approx 193.8 \times 10^6 \text{ BTU/hr.}$$

Main Steam Safety Valves Specifications

	<u>Set Point (psig)</u>	<u>Capacity (lbs/hr) at 3% Accumulation</u>
MS-V-17A/D	1050	792,610
MS-V-20A,D	1050	792,610
MS-V-18A/D	1060	799,990
MS-V-19A/D	1080	814,955
MS-V-20B,C	1092.5	824,265
MS-V-21A,B	1040	194,900

The comparison of the heat load to the MSSV capacities must be done using the smallest MSSV, MS-V-21 A/B. The setpoint of this valve is at 1040 psig. It is fully open at 3% accumulation.

$$P_1 = (1040 \text{ psig} + 14.7 \text{ psi}) (1.03) = 1086.3 \text{ psia}$$

$$h_g = 1189.6 \text{ BTU/lb}$$

$$\dot{Q}_{\text{Valve}} = (m) (h_g)$$

$$\dot{Q}_{\text{Valve}} = (194,900 \text{ lbs/hr}) (1,189.6 \text{ BTU/lb})$$

$$\dot{Q}_{\text{Valve}} = 231,853,040 \text{ BTU/hr} \approx 231.9 \times 10^6 \text{ BTU/hr}$$

The heat load may now be compared to the heat load for the valve.

$$\dot{Q}_{\text{Total}} = 193.8 \times 10^6 \text{ BTU/hr}$$

$$\dot{Q}_{\text{Valve}} = 231.9 \times 10^6 \text{ BTU/hr}$$

$$\dot{Q}_{\text{Total}} < \dot{Q}_{\text{Valve}}$$

This shows that one MSSV is more than sufficient to relieve the hot standby heat. However, two MSSVs should be operable, one on each OTSG.

III. Conclusion

Two MSSVs are required to relieve the hot standby heat with one on each OTSG.