

Evaluation of Containment P/T relating Feedwater Flow Rate Analysis following Main Steam Line Break Accident for Nuclear Power Plant

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ABSTRACT

The Feedwater System supplies feedwater to the steam generator at the required pressure, temperature and flow rate during the plant start-up, normal power operation, shutdown. When the Feedwater System is inoperable or unavailable, the Auxiliary Feedwater System supplies emergency feedwater to the steam generator. If main steam line break occurs, the increase of feedwater flow rate to the faulted steam generator due to decrease of the pressure in the faulted steam generator results in adverse effects in aspect of overcooling the Reactor Coolant System and increased containment pressure/temperature. To optimize the containment mass/energy analysis, this paper evaluates the maximum feedwater and auxiliary feedwater flow rate delivered to the faulted steam generator at each stage of pressure decrease in the faulted steam generator after a main steam line break accident. Calculated Feedwater flows are applied to calculate mass and energy release following MSLB accident. Also containment P/T results were compared with the cases which are the current conservative feedwater flow and proposed feedwater flow.

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9 Case

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Design Report FSAR
Isometric Drawing P&ID

Crane Technical Paper No. 410
P&ID

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9 Case

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FSAR 10.4.9 Auxiliary

Feedwater System

Isometric Drawing P&ID

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(Limiting Single Failure) Containment Safeguard

System

(Station Blackout) 2

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Low-Low Level

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가 215 gpm (50 m³/hr)
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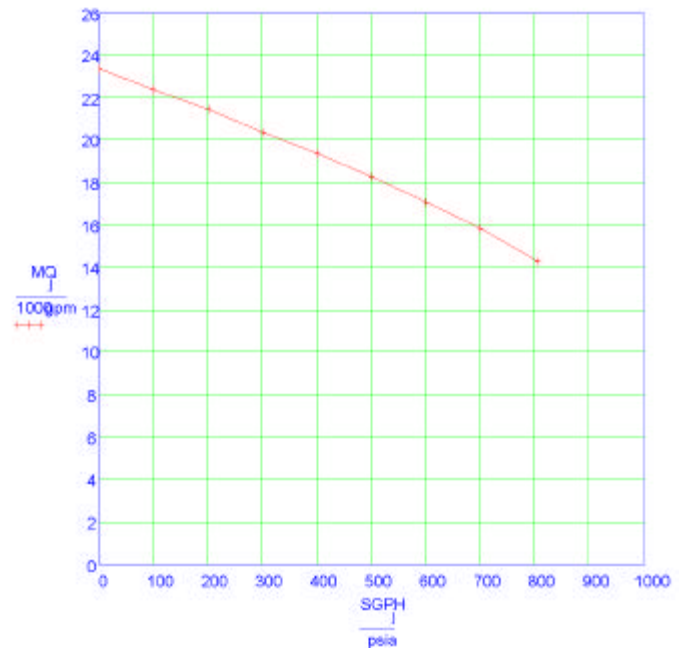
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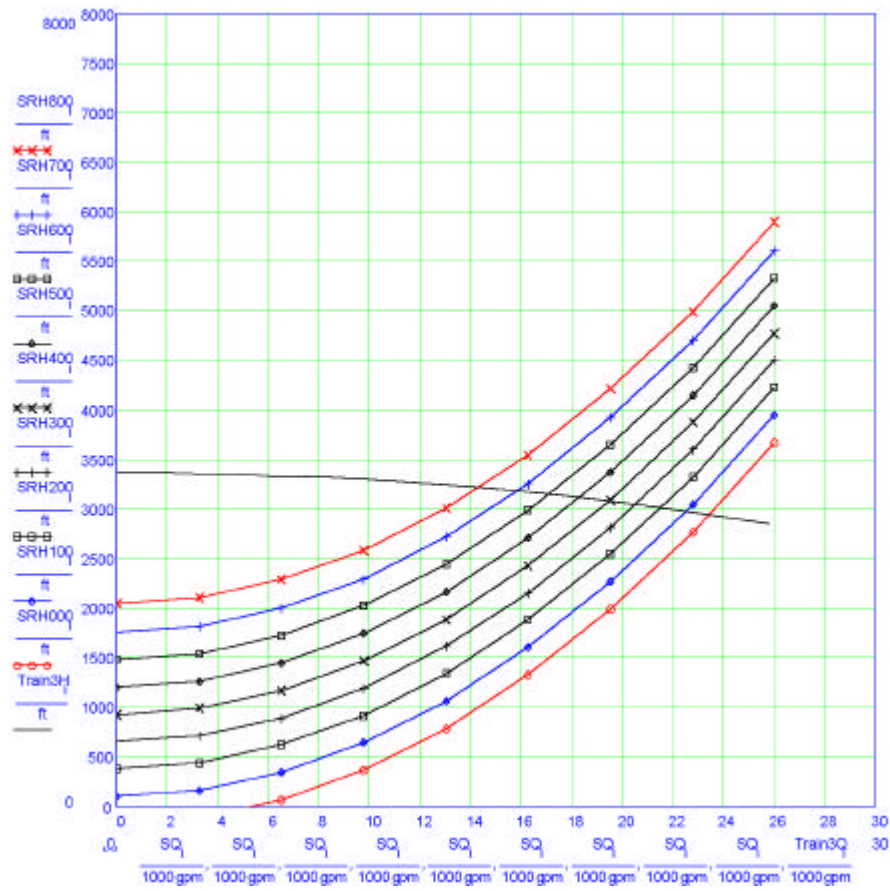
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Operating Condition	S/G Pressure (psia)	Max. Feedwater Flow to Affected S/G (gpm)
Case 1	805	14,314 gpm
Case 2	700	15,872 gpm
Case 3	600	17,083 gpm
Case 4	500	18,293 gpm
Case 5	400	19,442 gpm
Case 6	300	20,407 gpm
Case 7	200	21,493 gpm
Case 8	100	22,417 gpm
Case 9	0	23,421 gpm



1.



Note :

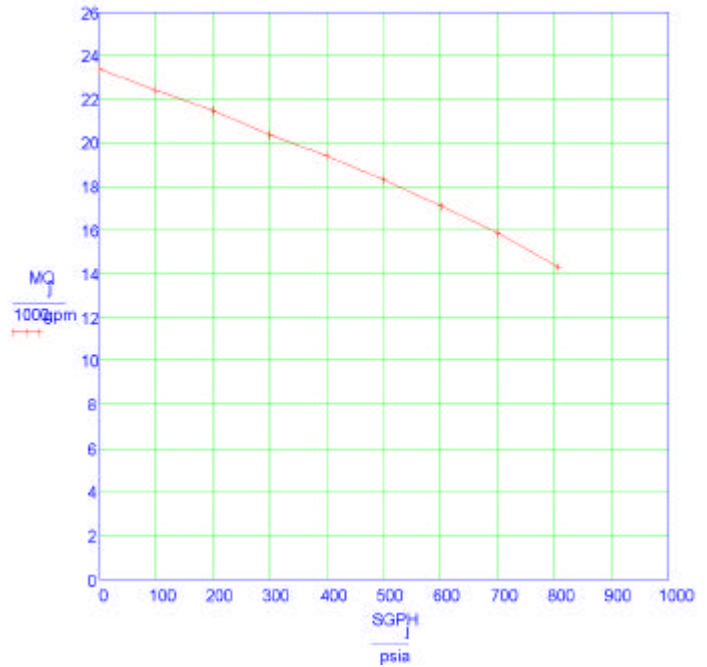
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- : (805 psia)
- : (700 psia)
- : (600 psia)
- : (500 psia)
- : (400 psia)
- : (300 psia)
- : (200 psia)
- : (100 psia)
- : (0 psia)

2. System Resistance Curves vs. Combined Feedwater Pump Curve

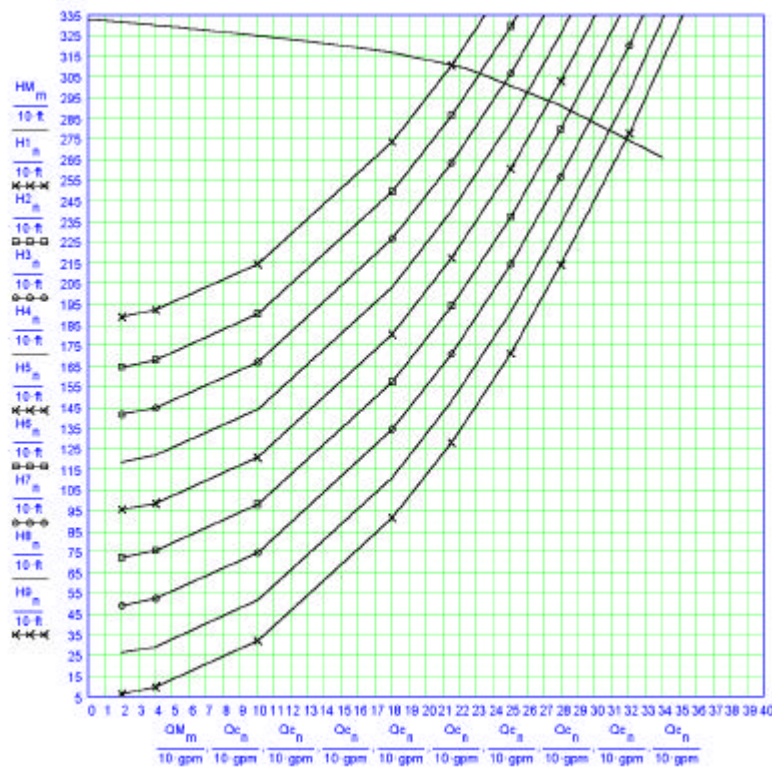
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Operating Condition	S/G Pressure (psia)	Max. Auxiliary Feedwater Flow to Affected S/G (gpm)
Case 1	805	215 gpm
Case 2	700	232 gpm
Case 3	600	247 gpm
Case 4	500	260 gpm
Case 5	400	275 gpm
Case 6	300	286 gpm
Case 7	200	298 gpm
Case 8	100	309 gpm
Case 9	0	318 gpm



3.



Note :

- : (805 psia)
- : (700 psia)
- : (600 psia)
- : (500 psia)
- : (400 psia)
- : (300 psia)
- : (200 psia)
- : (100 psia)
- : (0 psia)

4 System Resistance Curves vs. Auxiliary Feedwater Pump Curve

5.

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Peak Pressure

102% Power Level, : 2400ppm,

Case : 1.4ft² Double Ended Break, : CSS (Containment Safeguard System) Failure

3. P/T

	Peak Pressure		Peak Temperature	
	Pr. (psi)	(second)	Temp ()	(second)
	60.22	292	338.0	117
	54.67	206	339.8	119

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LOFTRAN Code

P/T

CONTEMPT L/T - 28 Code

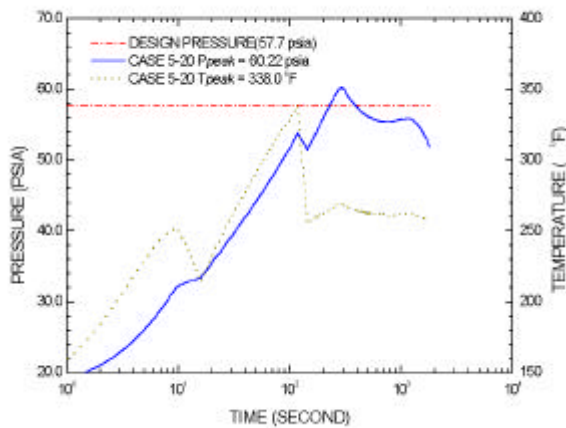
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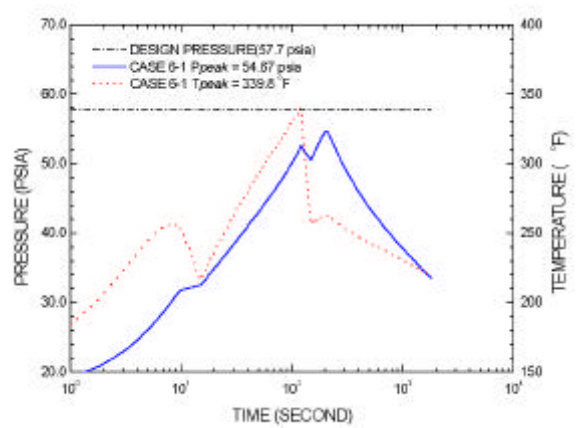
60.22psi 54.67 psi 9.2%

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5.

P/T



6. S/G

P/T

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9.2%

Peak Pressure

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1. Design Report of Feedwater System for KORI Nuclear Power Plant Unit 1
2. FASR 10.4.9 of Auxiliary Feedwater System for KORI Nuclear Power Plant Unit 1
3. Piping & Instrumentation Diagram of Feedwater /Auxiliary Feedwater System for KORI Nuclear Power Plant Unit 1
4. Isometric Drawing of Feedwater/Auxiliary Feedwater System for KORI Nuclear Power Plant Unit 1
5. Crane Tech. Paper No. 410