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OFFICE OF NUCLEAR REACTOR REGULATION

SUBJECT: IN RESPONSE TO NRC 771212 LTR,PRESENTS SUMMARY OF RESULTS OF SUPPRESSION POOL TEMP TRANSIENT STUDY.

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NORTHERN STATES POWER COMPANY

MINNEAPOLIS, MINNESOTA 55401

May 18, 1979

Director of Nuclear Reactor Regulation
U S Nuclear Regulatory Commission
Washington, DC 20555

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22

Suppression Pool Temperature Transients

In a letter dated December 12, 1977 from Mr D K Davis, Acting Chief, Operating Reactors Branch #2, Division of Operating Reactors, USNRC, we were asked to submit information related to suppression pool temperature transients for certain postulated events at the Monticello Nuclear Generating Plant. In a letter dated January 19, 1978 we provided a schedule for submitting the information listed in Part A of the attachment to Mr Davis's letter and referenced a General Electric report containing the information listed in Part B of the attachment.

To provide the information requested in Part A of the attachment to Mr Davis's letter, we contacted the General Electric Company to analyze the postulated events. While completion of this work was delayed as described in our letter dated January 10, 1979, the analyses are now complete. A summary of the results of these analyses are included as Attachment (1). Attachment (2) is a description of the suppression pool temperature monitoring devices installed at Monticello. A description of these devices was also requested in Part A of the attachment to Mr Davis's letter.

It should be noted that the analysis results in Attachment (1) must now be considered conservative. The installation of T-quenchers was completed on all safety-relief valve discharge lines during the 1978 refueling outage. The local temperature limit for T-quencher operation is at least 200° F compared to 160° F for the original "ramshead" design. We believe the installation of T-quenchers has satisfactorily resolved all concerns about condensation stability expressed in Mr Davis's letter.

Please contact us if you have any questions related to this information.

L O Mayer, PE
Manager of Nuclear Support Services

LOM/DMM/ak

cc: J G Keppler
G Charnoff

Attachments

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Attachment (1)
L O Mayer, NSP, to Director, NRR
May 18, 1979

Monticello Nuclear Generating Plant Torus Temperature Transient Study
Summary of Results

The results of the analysis are summarized in Table 1. These results support the following conclusions:

1. The condensation instability threshold is avoided in Event 1 (SORV during full power operation) by opening two additional SRVs at 10 minutes after the SORV initially sticks open.

2. The condensation instability threshold is avoided in Event 2 (SORV during isolated hot standby) by opening one additional SRV when the pool temperature reaches 120°F. This is in conformance with the current MNGP Technical Specifications, which require that during reactor isolation conditions the RPV shall be depressurized if the pool temperature reaches 120°F.

3. The condensation instability threshold is avoided in Event 3 (Controlled Depressurization from Isolated Hot Standby) when the RPV is depressurized at a cooldown rate of 400°F/hr when two RHR loops are available.

   Furthermore, if the feedwater system is shut-off at 10 minutes after the time of isolation and the high pressure make-up systems (HPCI and RCIC) are used to maintain the water level in the vessel, the cooldown rates required to avoid the condensation instability threshold are reduced to 100°F/hr when both RHR loops are available.

4. the condensation instability threshold is avoided in Event 4 (Small Break Accident with ADS) without any operator action. The ADS system will automtically actuate during this event and depressurize the RPV such that the condensation instability threshold is avoided.

TABLE 1

SUMMARY OF RESULTS

MNGP POOL TEMPERATURE RESPONSE

Event Description	Event No.	No. of SRV'S Manually Opened	No. of RHR Loops	Discharge Mass* Flux (G) at Pool Temp = 150°F#	Maximum Pool Temp (°F)* at G ≥40 lbm/sec-ft^2
Stuck Open Relief Valve at Power	1 (a)	2	2	34	147
	1 (b)	2	1	36	148
Stuck Open Relief Valve From Isolated Hot Standby	2 (a)	1	2	38	149
	2 (b)	1	1**	39	150
Controlled Depressurization From Isolated Hot Standby	3 (a)	VOC @300°F/Hr	2	46	152
		VOC @400°F/Hr	2	41	150
	3 (b)	VOC @500°F/Hr	1**	44	151
		VOC @600°F/Hr	1**	40	150
	3(c)***	VOC @100°F/Hr	2	37	150
	3(d)***	VOC @300°F/Hr	1**	39	149
Liquid SBA w/ADS	4	None	N/A	N/A	139

VOC = Variable Operator Controlled. The operator would intermittently open and close the number of valves required to cooldown at the indicated rate.

* Values Rounded to Nearest Whole Number

** This event does not conform to the plant licensing basis, and is presented for information only. Also, the operator would not go into Hot Shutdown with only one RHR loop available.

*** The feedwater is shut-off 600 seconds after isolation. The HPCI and RCIC systems are used to provide vessel make-up water.

\# The basis for the 10 degree difference between bulk and local pool temperature and the local temperature for instability (160 degrees) is provided in NEDO-10859, April, 1973. Safety-relief valve discharge lines are assumed to be terminated with ramsheads.

Attachment (2)
L O Mayer, NSP, to Director, NRR
May 18, 1979

Monticello Nuclear Generating Plant Torus Water Temperature Instruments

Installed Temperature Sensors

Torus water temperature sensors were provided in the original plant design. Two sensors, extending a short distance through the torus shell, were provided at the following locations:

Elevation	Azimuth (0° is plant South)
906' 9"	135°
906' 9"	225°

Nominal torus water level is 910' 0". Water level may vary from four inches below to ten inches above this nominal level.

The sensors are read out on a temperature recorder in the Control Room. An alarm is provided prior to reaching the 90°F Technical Specification temperature limit.

Additional Thermowells

During the 1975 autumn refueling outage, 16 additional thermowells were installed in the torus shell for future RTD's. One thermowell was installed at the center of each of the 16 bays (at 0° and at 22-1/2° increments) at elevation 908' 10".

None of these additional sensor locations is currently used.

Location of T-Quenchers Relative to Temperature Instrumentation

T-quenchers are provided at the termination of each of the eight safety-relieve valve discharge lines. The quenchers are mounted approximately 5-1/2' above the bottom of the torus at elevation 904' 6". The quenchers are located in alternate bays (at 22-1/2° and at each 45° increment). Each quencher occupies about 3/4 of the length of the bay.