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SUBJECT: LTR 1 ENCL 1
RESPONSE TO NRC LTR DTD 12/09/77...FORWARDING INFO RE SUPPRESSION POOL TEMPERATURE TRANSIENT ANALYSES FOR SUBJECT FACILITY.

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NIAGARA MOHAWK POWER CORPORATION/300 ERIE BOULEVARD WEST, SYRACUSE, N.Y. 13202/TELEPHONE (315) 474-1511

May 5, 1978

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. George Lear, Chief
Operating Reactors Branch #3

Re: Nine Mile Point Unit 1
Docket No. 50-220
DPR-63

Gentlemen:

Your letter of December 9, 1977 requested information regarding suppression pool temperature transient analyses for Nine Mile Point Unit 1. The attached addresses each of the requests of Part A of your letter.

The information requested in Part B of your letter have been answered in a letter from E. D. Fuller (General Electric) to Olan D. Parr (NRC) dated September 6, 1977.

In response to item 1 of Part A, the assumptions which we plan to use in performing the suppression pool temperature transient analysis are provided. These assumptions have been developed based upon technical specification requirements, operating procedures and experience. The analyses is planned to begin immediately following concurrence by your staff with the appropriateness of these assumptions. The analysis will require seven (7) months to complete.

Very truly yours,

NIAGARA MOHAWK POWER CORPORATION

D. P. Dise
Vice President-Engineering

Enclosure

A001 S/1

NINE MILE POINT UNIT 1

INFORMATION REGARDING SUPPRESSION POOL TEMPERATURE TRANSIENTS

May, 1978

[illegible]

[illegible]
[illegible]
[illegible]

PART A: Non-Proprietary

Request 1:

Provide figures which depict the reactor pressure, safety/relief valve (SRV) discharge mass flux, and suppression pool bulk temperature versus time for the following events which are based on current Technical Specification limits:

(a) Stuck-open SRV during power operation assuming reactor scram at ten minutes after the suppression pool reaches a bulk pool temperature at 110 F and all RHR system are operable.

(b) Same events as in (a) above with only one RHR train operable.

(c) Stuck-open SRV during hot standby assuming an initial 120 F bulk pool temperature and only one RHR train operable.

(d) Automatic Depressurization System (ADS) activated following a small line break assuming an initial 120 F bulk pool temperature and only one RHR train operable.

(e) Primary system is isolated and depressurized at a rate of 100 F per hour with an initial 120 F bulk pool temperature and only one RHR train operable.

RESPONSE

Appendix A sets forth the assumptions to be used in performing the transient analyses. It will require seven (7) months to complete the analyses once concurrence by your staff is received. Table 1 of attachment A responds to your request 1a and 1b. Tables 2, 3 and 4 of this attachment respond to your request 1c, 1d, and 1e.

Request 2:

Briefly describe the suppression pool temperature monitoring system at your facility and the relative location of the temperature sensors to the SRV discharge points.

RESPONSE

At Nine Mile Point Unit 1, there is one thermocouple which monitors suppression chamber water temperature. Its location is 34.5 degrees azimuth at elevation 205 feet in the suppression chamber. This is 6 feet below normal water level. There exists both a computer alarm and an annunciator alarm for high temperature of 100 F.

Relief valve discharges are located at azimuths 54, 90, 162, 198, 270 and 306 degrees. These discharges are at the bottom of the suppression chamber.

We are in the process of replacing the present thermcouple with a dual RTD located at azimuth 333 degrees and elevation 209 feet or about 2 feet below normal water level. Temperatures will be recorded in the control room and there will be a computer alarm on high temperature at 100 F.

We are presently evaluating a suppression pool bulk temperature monitoring system for Nine Mile Point Unit 1.

APPENDIX A

ASSUMPTIONS TO BE USED IN PERFORMING THE SUPPRESSION POOL TEMPERATURE TRANSIENT ANALYSES (PART A, REQUEST 1)

TABLE 1

EVENT I - STUCK-OPEN RELIEF VALVE FROM POWER OPERATION[1]

Initial Conditions

A. Operation at Technical Specification safety analysis limit steam flow conditions (100 percent NBR steam flow).

B. Maximum service water temperature. (77 F).

C. Technical Specification minimum suppression pool water level (corresponding to the minimum downcomer submergence level of 3 feet).

D. Suppression pool temperature (81 F) corresponding to minimum technical specification primary containment pressure and minimum downcomer submergence (Figure 3.3.2.c).[2]

Event Sequence

Time	Temp	Event Description
t_a= 0.0[3]	T_{op}	Relief valve fails open.[4] Initiate actions to turn containment spray loop(s)[1] on for pool cooling.
t_a+ 3 minutes[5]		Containment spray loop(s)[1] on for pool cooling.
t_s	T_s	Reactor Scram[6] (T_s= 110 F).
t_s+ 10.5 seconds		Isolation (assuming mechanistic isolation on low-low reactor water level)
t_s+ 1 minute		Manually initiate both emergency condensers.
t_s+ 10 minutes		2-3 additional relief valves manually actuated as necessary

Time t_s and the number of relief valves to be manually actuated by the operator to be determined by analysis.

Assumptions for Event I

1. Maximum operating condensate storage water temperature.
2. Single containment spray loop available for pool cooling.[1]
3. Vessel liquid mass adjusted to account for subcooled liquid in the RPV and piping.
4. Metal mass adjusted to account for lower temperature of some metal components.
5. Effect of steam void collapse included.
6. Duty of containment spray heat exchangers based on 40 years of crud.
7. Control rod drive flow maintained constant.
8. Relief valve capacities at nameplate.
9. Licensed decay heat curve for containment analysis (adjusted to account for delay between scram and isolation).
10. Both motor driven feedwater pumps on continuously. Shaft-driven feedwater pump supplies feedwater for 20 seconds after isolation.
11. Event terminates in cold shutdown.

EVENT I - FOOTNOTES

1. Corresponds to non-proprietary Question 1(a) if two containment spray loops available and to 1(b) if one containment spray loop available.

2. Pool initial conditions of 93 F and 5 feet downcomer submergence (Technical Specification Figure 3.3.2.a) will also be examined.

3. The bulk suppression pool temperature is asssumed to be 81 F with 3 foot downcomer submergence when a relief valve inadvertently fails open because Section 3.3.2.b in the Nine Mile Point Unit Technical Specifications specifies that pool cooling shall be initiated immediately if a pool temperature of 81 F is exceeded. Also, a pool temperature alarm is set at 100 F. In addition, Section 3.3.2.e specifies that the reactor shall be scrammed from any operating condition when the suppression pool temperature reaches 110 F.

4. Nine Mile Point Unit 1 has six Electromatic relief valves.

5. The operator can complete the actions necessary to turn the containment spray loop(s) on within three minutes.

6. Mode switch in Shutdown.

7. The operator can determine which valve is stuck open within ten minutes.

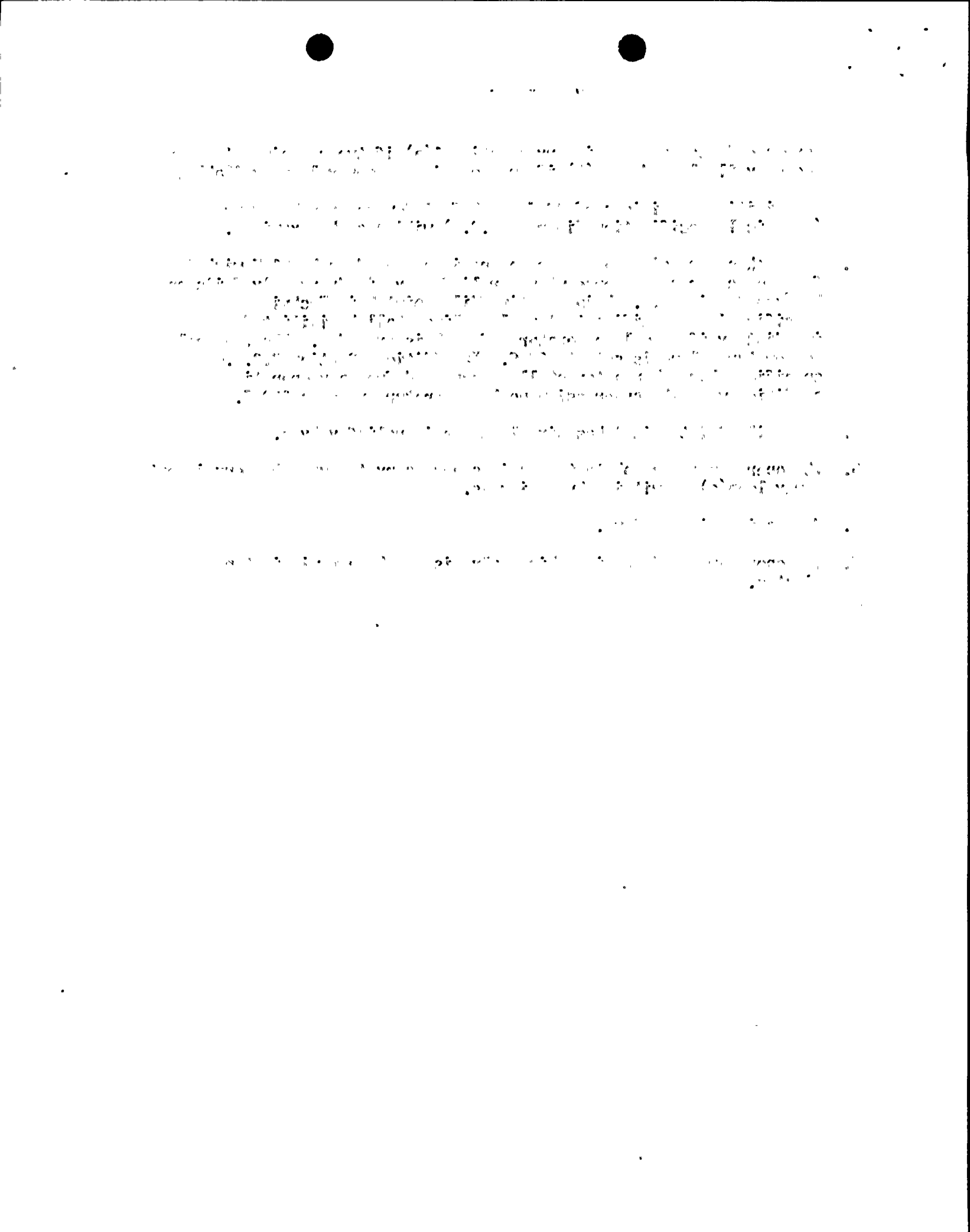

Table 2

EVENT II STUCK-OPEN RELIEF VALVE FROM ISOLATED HOT STANDBY[1]

Initial Conditions

A. Operation at Technical Specification safety analysis limit steam flow conditions before isolation. (100 percent NBR steam flow).

B. Maximum service water temperature (77 F).

C. Technical Specification minimum suppression pool water level (corresponding to the minimum downcomer submergence level of 3 feet).

D. Suppression pool temperature (81 F) corresponding to minimum technical specifications primary containment pressure and minimum downcomer submergence (Figure 3.3.2.c).

E. Reactor pressure when isolated is 920 psig.

Event Sequence

Time (Min.)	Event Description
$t_a = t_s = 0.0$	An abnormal operational transient has occurred, which resulted in reactor scram and isolation. The suppression pool temperature is T_{op}(Initial Condition D). The operator initiates actions to turn the containment spray loop on for pool cooling.
t_a + 3 minutes[2]	Containment spray loop on for pool cooling.
$0<t<30$[3]	Reactor pressure maintained using both emergency condensers.
t_o[4]	Single relief valve fails open at 81 F.

No additional relief valves need to be manually actuated by the operator. The suppression pool temperature limit is not challenged. Therefore, this event should not be analyzed.

Assumptions For Event II

1. Maximum operating condensate storage water temperature.
2. Single containment spray loop available for pool cooling.
3. Vessel liquid mass adjusted to account for subcooled liquid in the reactor pressure vessel and piping.
4. Metal mass adjusted to account for lower temperature of some metal components.
5. Effect of steam void collapse included.
6. Duty of containment spray heat exchangers based on 40 years of crud.
7. Control rod drive flow maintained constant.
8. Relief valve capacities at nameplate.
9. Licensed decay heat curve for containment analysis (adjusted to account for delay between scram and isolation).
10. Both motor driven feedwater pumps on continuously. Shaft-driven feedwater pump supplies feedwater for 20 seconds after isolation.
11. Both emergency condensers available to depressurize the reactor.
12. Event terminates in cold shutdown.

EVENT II - FOOTNOTES

1. Corresponds to non-proprietary Question 1(c). This event does not conform to the plant licensing basis because it requires a transient plus a single failure. In addition, due to the emergency condensers, relief valves are not used for cooldown in an isolated hot standby condition. Therefore, this event should not be analyzed.

2. The operator can complete the actions necessary to turn the containment spray loop on within three minutes.

3. The operator can determine which valve is stuck open within ten minutes.

4. Since no relief valves are actuated by the operator, this event assumes that one relief valve inadvertently fails open from a closed position. This event is highly improbable, due to the external pressure switch arrangement on the Electromatic relief valves.

Table 3

EVENT III SMALL BREAK ACCIDENT WITH AUTOMATIC DEPRESSURIZATION SYSTEM[1]

Initial Conditions

1. Operation at Technical Specification safety analysis limit steam flow conditions (100 percent NBR steam flow).
2. Maximum service water temperature (77 F).
3. Technical Specification minimum suppression pool water level (corresponding to the minimum downcomer submergence level of 3 ft.)
4. Suppression pool temperature (81 F) corresponding to minimum technical specification primary containment pressure and minimum downcomer submergence (Figure 3.3.2.c).

Event Sequence

Time (Min.)	Event Description
0.0	Small break accident occurs during normal power operation[2]
	Automatic Depressurization blows down the plant.

No operator actions assumed, event runs to completion.

The suppression pool temperature versus discharge mass flux is determined by the analysis.

Assumptions For Event III

1. Maximum operating condensate storage water temperature.
2. Both containment spray loops available for pool cooling.
3. Vessel liquid mass adjusted to account for subcooled liquid in the reactor pressure vessel and piping.
4. Metal mass adjusted to account for lower temperature of some metal components.
5. Effect of steam void collapse included.
6. Duty of containment spray heat exchangers based on 40 years of crud.
7. No offsite power.
8. Shaft-driven feedwater pump supplies feedwater for 20 seconds after the accident begins.
9. Relief valve capacities at nameplate.
10. Licensed decay heat curve for containment analysis (adjusted to account for delay between scram and isolation).
11. Event terminates in cold shutdown.
12. Containment spray/core spray and Automatic Depressurization System available.
13. Limiting small line break.
14. No Automatic Depressurization System valves out of service (Technical Specifications).

EVENT III - FOOTNOTES

1. Corresponds to non-proprietary Question 1(d).

2. The bulk suppression pool temperature is assumed to be 81 F rather than 120 F when the SBA occurs because Section 3.3.2.b in the Nine Mile Point Unit 1 technical specifications specifies that pool cooling shall be initiated immediately if a pool temperature of 81 F with 3 foot downcomer submergence is exceeded. Also, a pool temperature alarm is set at 100 F. In addition, Section 3.3.2.e specifies that the reactor shall be scrammed from any operating condition when the suppression pool temperature reaches 110 F.

Table 4

EVENT IV ISOLATION AND REACTOR DEPRESSURIZATION[1]

Initial Conditions

1. Operation at Technical Specification safety analysis limit steam flow conditions (100 percent NBR steam flow).

2. Maximum service water temperature (77 F).

3. Technical Specification minimum suppression pool water level (corresponding to the minimum downcomer submergence level of 3 feet.).

4. Suppression pool temperature (81 F) corresponding to minimum technical specification primary containment pressure and minimum downcomer submergence (Figure 3.3.2.c)

Event Sequence

Nine Mile Point Unit 1 is depressurized from an isolated condition using the emergency condensers. If a relief valve inadvertently failed open, the event sequence would be the same as that for Event II. Otherwise, Nine Mile Point Unit 1 does not use relief valves for cooldown, and this event would not occur.

Assumptions for Event IV

None

Event IV - Footnotes

1. Corresponds to non-proprietary question 1(e).