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SUBJECT: Forwards summary of analyses based on structural mods to torus & revs to original computer program used to determine thrust loads on relief valve discharge line. Low-low setpoint not required.

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May 2, 1984

Director of Nuclear Reactor Regulation
Attention: Mr. Domenic B. Vassallo, Chief
Operating Reactors Branch No. 2
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

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

Dear Mr. Vassallo:

Our November 10, 1983 letter provided a copy of the "Plant-Unique Analysis Report of the Torus Suppression Chamber for Nine Mile Point Unit 1 Nuclear Generating Station." This report indicated Niagara Mohawk's intention to install a Low-Low Set Point Logic System. This system would extend the electromatic relief valve blowdown after a high pressure actuation.

Recent analyses, based on structural modifications to the torus and revisions to the original computer program used to determine thrust loads on the relief valve discharge line, have concluded that the Low-Low Set Point Logic System is not required. The attached information summarizes these analyses. Therefore, Niagara Mohawk will not install a Low-Low Set Point Logic system at Nine Mile Point Unit 1.

Very truly yours,

C. V. Mangan
Vice President
Nuclear Engineering & Licensing

CVM/MTG:ja
Attachment

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NIAGARA MOHAWK POWER CORPORATION
DOCKET NO. 50-220

TECHNICAL EVALUATION OF THE NEED FOR A LOW-LOW SET POINT LOGIC SYSTEM AT NINE MILE POINT UNIT 1

The Mark I Containment Program provides guidelines for performing a complete reassessment of the suppression chamber (torus) design, including suppression pool hydrodynamic loads. One of the loads evaluated was the water clearing thrust load on the relief valve discharge line.

Relief valves are provided for overpressure protection of the reactor vessel. If the reactor vessel should pressurize significantly above normal, the relief valves will open to reduce vessel pressure. Steam discharged through the relief valves is directed into the torus via the relief valve discharge lines. This discharge of steam generates thrust loads on the relief valve discharge lines and the torus. Once vessel pressure has been reduced, the relief valves close. Rapid condensation of the steam in the relief valve discharge line creates a vacuum, which draws water from the torus into the leg of the relief valve discharge lines. To control this reflood, vacuum breakers on the relief valve discharge line will open. The vacuum breakers equalize pressure by allowing nitrogen from the drywell to enter the relief valve discharge lines. As pressure is equalized, the vacuum breakers close and the elevated water leg returns to normal. Any steam remaining in the relief valve discharge would condense and the above process would be repeated. This process would continue, with the resulting reflood heights decreasing, until the pressure between the drywell and relief valve discharge lines is finally equalized.

However, under the conditions that would be present in the drywell following a small break loss-of-coolant-accident, the effect on the operation of the vacuum breakers to equalize pressure may be impaired. The effect of the steam in the drywell causes an increase in the amount of time that the vacuum is maintained in the relief valve discharge lines. This results in a greater amount of water being drawn from the torus into the legs of the relief valve discharge lines. If it is assumed that only steam is present in the drywell, the highest possible water leg would be formed. Should the relief valves actuate with these higher water legs present, large water clearing thrust loads would occur on the relief valve discharge lines.

Structural modifications to the torus during previous outages included the addition of two 10 inch vacuum breakers on each relief valve discharge line. These large vacuum breakers were provided for the relief valve discharge lines to minimize the clearing times for the higher water legs.

In addition, it was the original intention of Niagara Mohawk to install a Low-Low Set Point Logic System at Nine Mile Point Unit 1. The Low-Low Set Point Logic would extend the relief valve blowdown after a high pressure actuation. This would extend the time for the higher water legs to return to a normal level before a subsequent high pressure actuation of the relief valves.

Recently, General Electric revised the load generating program used to determine gas and water clearing thrust loads in the relief valve discharge lines. Analysis performed by General Electric showed that the previous version of the program overpredicted the thrust loads in water filled segments of the relief valve discharge lines. The recent revisions to the program have reduced the relief valve discharge line water clearing thrust loads. Analysis with the revised program however, still exhibit an overstressed condition on the discharge line, if a relief valve should actuate with the initial water leg present. The issue to be resolved was whether the current system response allows sufficient time for this initial water leg to clear or if the additional time provided by a Low-Low Set Point Logic System is required.

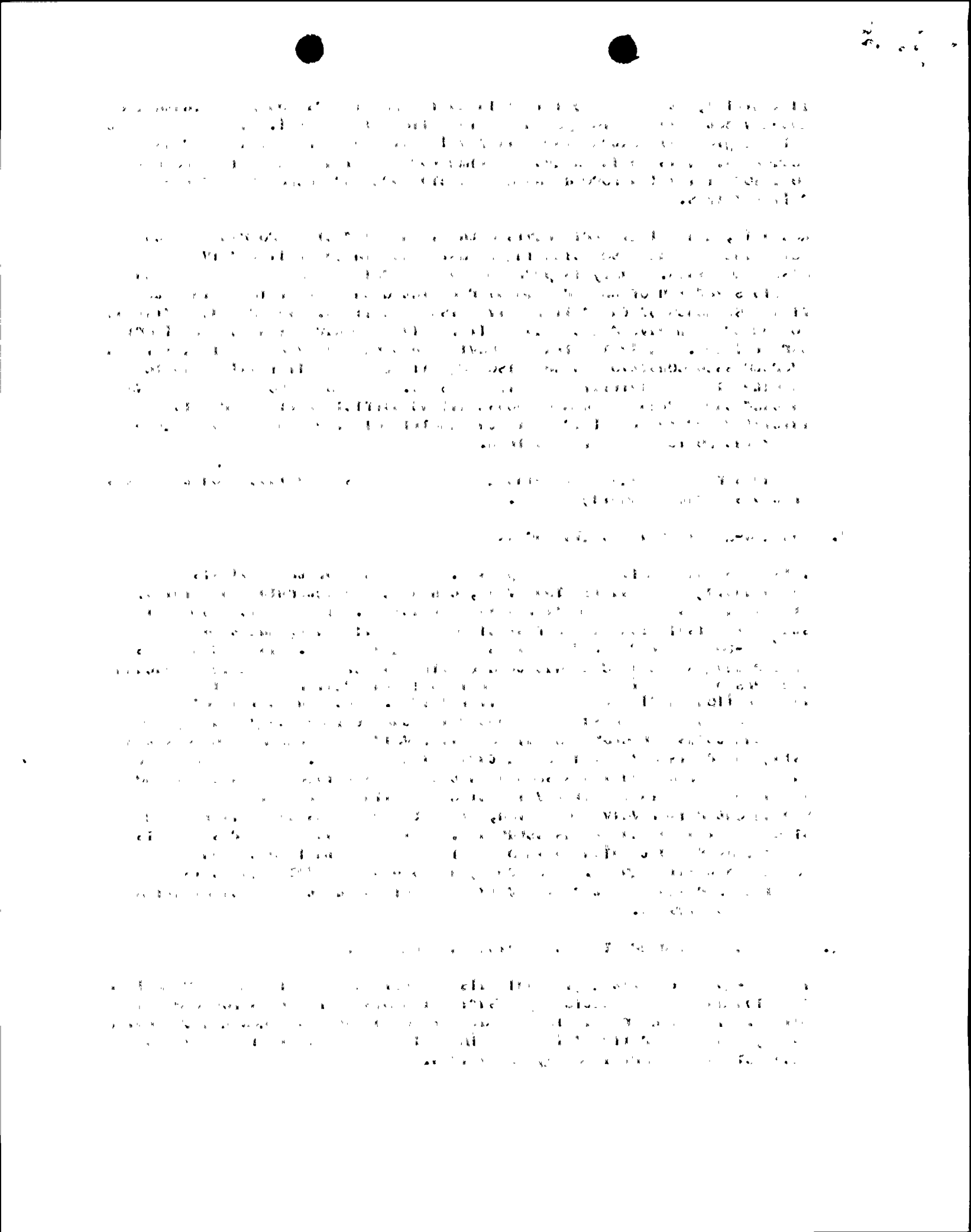
The need for a Low-Low Set Point Logic System was reevaluated on the basis of two separate bounding events.

I. Low/Low-Low Instrument Line Break

This event was analyzed in two phases. One phase of the analysis was of the bounding repressurization event, conducted to determine the minimum time between subsequent relief valve actuations. This event was a main steam line isolation valves fast closure at full power, due to a Low/Low-Low Reactor Water Level Instrument Line break. The second phase of the analysis conducted was to determine the effect of the large vacuum breakers on the height of the water legs in the relief valve discharge lines following closure of the relief valves. Once the height of the water legs were determined, the potential thrust loads they would place upon the torus structure, should a relief valve actuate, were calculated using the revised version of the thrust load program. The results of the two phases of the analysis showed that the thrust load generated by the amount of water in a relief valve discharge line at the time of a subsequent relief valve actuation, did not overstress the relief valve discharge line or the torus structure. This current system response is equivalent to that which would be achieved by the implementation of a Low-Low Set Point Logic. Therefore, no Low-Low Set Point Logic is required for subsequent relief valve actuations due to repressurization of the reactor vessel.

II. Emergency Condenser High Steam Flow Instrument Line Break

The Low-Low Set Point Logic would also coordinate the high pressure relief function and the Automatic Depressurization System function for the relief valves. This feature was incorporated into the proposed Low-Low Set Point Logic, since the relief valves at Nine Mile Point Unit 1 also serve as the Automatic Depressurization System valves.



II. Emergency Condenser High Steam Flow Instrument Line Break (Continued)

The bounding event for the coordination between the two functions of the relief valves is an Emergency Condenser High Steam Flow Instrument Line break. This was assumed to result in isolation of the affected loop. If it is also assumed that the redundant emergency condenser loop is inoperable and no high pressure make-up systems are available, the pressure inside the vessel would increase, as level decreases. However, due to the size of the break necessary to cause repressurization of the vessel, it would take a substantial amount of time to reach low-low-low reactor water level. Low-low-low reactor water level is one of the parameters necessary to activate the Automatic Depressurization System logic. During this time interval, the operators would be able to respond to the situation. Procedures will be modified such that if a low-low-low reactor water level condition is reached, a relief valve will be manually opened. This valve will remain open until the vessel water is restored above the low-low-low water reactor setpoint and the Automatic Depressurization System logic is reset. This action will eliminate the possibility of a high vessel pressure condition from being coincidental with initiation of the Automatic Depressurization System. This manual action provides equivalent system response as would be achieved by the implementation of a Low-Low Set Point Logic System and is consistent with the current staff position on equivalent manual actions as addressed in your letter of April 4, 1984, regarding "NUREG 0737, Item II.K.3.16." Therefore, no Low-Low Set Point Logic is required for subsequent relief valve actuations at the time of initiation of the Automatic Depressurization System.

In conclusion, the structural modifications to the torus, the recent revisions to the computer program by General Electric and the use of manual actions demonstrate that Nine Mile Point Unit 1 currently has an equivalent system response as would be provided by a Low-Low Set Point Logic System. Therefore, a Low-Low Set Point Logic System will not be implemented at Nine Mile Point Unit 1.