Docket File

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 12, 1995

Mr. B. Ralph Sylvia
Executive Vice President, Nuclear
Niagara Mohawk Power Corporation
Nine Mile Point Nuclear Station
P.O. Box 63
Lycoming, NY 13093

SUBJECT: NINE MILE POINT NUCLEAR STATION, UNIT 2 - REQUEST FOR ADDITIONAL INFORMATION (TAC NO. M83646)

Dear Mr. Sylvia:

The purpose of this letter is to request additional information related to your individual plant examination of externally initiated events (IPEEE) submittal in response to Generic Letter (GL) 88-20, Supplement 4.

In a letter dated June 30, 1995, you submitted your IPEEE response to GL 88-20, Supplement 4. In order to complete our review, we require the enclosed additional information. This information was discussed with Mr. D. Baker of your staff on December 4, 1995.

This requirement affects 9 or fewer respondents and, therefore, is not subject to Office of Management and Budget review under P.L. 96-511.

Please provide your response within 60 days so that we can continue our review.

Sincerely,

G E Edison

Gordon E. Edison, Senior Project Manager
Project Directorate I-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket No. 50-410

Enclosure: Request for Additional Information

cc w/encl: See next page

cc:

Mark J. Wetterhahn, Esquire
Winston & Strawn
1400 L Street, NW.
Washington, DC 20005-3502

Mr. Richard Goldsmith
Syracuse University
College of Law
E. I. White Hall Campus
Syracuse, NY 12223

Resident Inspector
Nine Mile Point Nuclear Station
P.O. Box 126
Lycoming, NY 13093

Gary D. Wilson, Esquire
Niagara Mohawk Power Corporation
300 Erie Boulevard West
Syracuse, NY 13202

Ms. Denise J. Wolniak
Manager Licensing
Niagara Mohawk Power Corporation
Nine Mile Point Nuclear Station
P.O. Box 63
Lycoming, NY 13093

Mr. F. William Valentino, President
New York State Energy, Research,
and Development Authority
2 Rockefeller Plaza
Albany, NY 12223-1253

Supervisor
Town of Scriba
Route 8, Box 382
Oswego, NY 13126

Mr. John V. Vinquist, MATS Inc.
P.O. Box 63
Lycoming, NY 13093

Regional Administrator, Region I
U. S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Charles Donaldson, Esquire
Assistant Attorney General
New York Department of Law
120 Broadway
New York, NY 10271

Mr. Richard M. Kessel
Chair and Executive Director
State Consumer Protection Board
99 Washington Avenue
Albany, NY 12210

Mr. Kim A. Dahlberg
Plant Manager, Unit 2
Nine Mile Point Nuclear Station
Niagara Mohawk Power Corporation
P.O. Box 63
Lycoming, NY 13093

Mr. Richard B. Abbott
Vice President - Nuclear Generation
Niagara Mohawk Power Corporation
Nine Mile Point Nuclear Station
P.O. Box 63
Lycoming, NY 13093

Mr. Martin J. McCormick, Jr.
Vice President
Nuclear Safety Assessment
and Support
Niagara Mohawk Power Corporation
Nine Mile Point Nuclear Station
P.O. Box 63
Lycoming, NY 13093

REQUEST FOR ADDITIONAL INFORMATION

NINE MILE POINT NUCLEAR STATION, UNIT 2

INDIVIDUAL PLANT EXAMINATION OF EXTERNALLY INITIATED EVENTS (IPEEE)

I. Seismic

1. The simplified success path for the Nine Mile Point Nuclear Station, Unit 2 (NMP2) seismic margin assessment is shown on page 3.1-1 of the submittal report. This success path necessarily assumes that, in the event of a seismic margin earthquake (0.5g PGA), it is possible to maintain the plant in hot standby for 72 hours without offsite power, using high-pressure core spray (HPCS) and reactor core isolation cooling (RCIC). This assumption may violate the boiling-water reactor/5 emergency procedure guidelines. Identify the procedures and training which enables NMP2 to be brought to, and maintained, at hot shutdown conditions for 72 hours (under conditions of the 0.5g review-level earthquake (RLE) -- unrecoverable loss of offsite power, isolation transient) using HPCS and RCIC for inventory control and the suppression pool cooling mode of residual heat removal (RHR). If any structures, systems, or components (SSCs) which are not on the seismic margin success path component list are required, identify all such SSCs and discuss the basis for relying on these SSCs under the seismic margin analysis requirements.

   In addition, explain why the following components are included on the success path structures, systems, and components list (Tables 3.1-1A and 3.1-1B): (Note - acronyms include low-pressure core spray (LPCS), low-pressure core injection (LPCI), and motor-operated valve (MOV)).

Component ID	Description	Page Ref.
B22C-K13A	LPCS/LPCI pump running relay	3.1-61
B22C-K13B	LPCS/LPCI pump running relay	3.1-61
B22C-K14A	LPCS/LPCI pump running relay	3.1-61
B22C-K14B	LPCS/LPCI pump running relay	3.1-61
B22C-K70A	LPCS/LPCI pump running relay	3.1-61
B22C-K70B	LPCS/LPCI pump running relay	3.1-61
E12A-K9B	LPCI 'B' - auxiliary relay	3.1-64
E21A-K11	LPCS initiation signal relay	3.1-64
E21A-K10	LPCS initiation signal relay	3.1-75
2RHS*MOV4A	LPCI C injection MOV	3.1-79

   Finally, explain why the high pressure nitrogen seismic capacity (high confidence in low probability of failure (HCLPF) of 0.23g) was not identified in the IPEEE as a potential seismic vulnerability. In addition, explain why potential improvements to this system were not identified, evaluated, and considered for implementation, given that placing the plant on RHR shutdown cooling requires reliance on equipment which is not on the seismic margin safe shutdown component list and requires local realignment of power supplies to cross-feed diesel generator power to some equipment (such as the recirculation loop valves required to force flow through the jet pumps and into the core).

2. In Section 3.1.1 (page 3.1-4) of the submittal, a fire water header in the control building corridor at Elevation 261 is discussed, ultimately leading to the conclusion that the header has a HCLPF of 0.5g or greater. Discuss the technical basis for this conclusion, and provide the supporting calculations/evaluations which led to this conclusion.

3. On page 3.1-1 of the submittal, the simplified success path is discussed and diagrammed. On page 3.1-4 of the submittal, the removal of the safety/relief valves (SRVs) and the low-pressure injection (LPI) success path are discussed as being removed from the simplified success path. Moreover, on Figures 3.1-1, 3.1-2, and 3.1-3, the SRVs and LPI paths are included in the logic diagrams for NMP2. Explain the differences between these pages and figures and identify which one was used for the analysis.

4. List all shutdown-path-related non-seismic failures and human actions, together with their failure rates, noting any lack of redundancies. Also provide a discussion concerning the anticipated effects of the seismic margin earthquake on rates of operator errors which may impact the integrity of the preferred and alternate success paths. Identify the locations at which operator actions must take place.

5. Provide the dependency matrices, as requested by NUREG-1407 and by Electric Power Research Institute (EPRI) NP-6041, Chapter 3.

6. As reported in the IPEEE (Section 3.1.2.1.5), in November 1987, a condensate storage tank (CST) at NMP2 failed. Indicate whether the automatic suction transfer instrumentation remained operable during and after this CST failure. (Note: It is asserted in the IPEEE that seismic failure of the CST would not affect the transfer instrumentation.) In addition, for seismically-induced CST failure, discuss whether failure of the level instrumentation affects HPCS and/or RCIC pump suction, or isolation of the suppression pool from the CST via HPCS and/or RCIC suction.

7. In Section 3.1.4, the IPEEE report states: "Component anchorages were not screened; rather, worst case representative anchorages were selected for analysis to ensure they possessed HCLPFs equal to or higher than the equipment class HCLPF value." Explain how the "worst case representative anchorages" were selected for each equipment class. Also, explain how it was verified that the actual field anchorages were associated with a HCLPF value that is equal to or greater than the "worst case representative anchorages." Finally, describe how the seismic review team considered equipment anchorage during the walkdowns.

8. Section 3.1.5 of the IPEEE states that the most likely scenario associated with potential core damage and an unisolated containment is station blackout where the operators have to isolate normally open MOVs that fail "as is" on loss of emergency AC power. Identify all such scenarios. (According to the IPEEE, Section 3.1.5, for MOVs there are no seal-in features in the open circuit that can be actuated by relay chatter. Once closed, the valve cannot be opened by relay chatter. Even if the containment isolation signal has been reset, the valve can only be opened by operator action. The valve fails "as-is" on loss of power, therefore, relay chatter that trips out AC power to the MOV is possible.) Describe how this potential was evaluated for NMP2, and provide the results of any analysis which demonstrates that this potential is acceptable.

9. Under loss of offsite power conditions, and considering a 24-hour mission time (as opposed to the longer 72-hour mission time for the SMA), the internal events Individual Plant Examination (IPE) for NMP2 identified the failure probability for HPCS as 0.14 and the failure probability for RCIC at 0.16. The joint failure probability for HPCS and RCIC for a 24-hour mission time under loss of offsite power conditions is the product of these values, or 2.24×10^{-2} per demand. For a 72-hour mission time, these values would increase accordingly for the failure to run term, which would increase the overall failure probabilities above the values discussed here. The individual failure rates and the joint failure rate exceed EPRI NP-6041, Rev. 1, guidelines. Accordingly, justify the use of HPCS and RCIC as alternate success paths, and explain why the two systems should not have been combined into the high pressure coolant makeup function as recommended in EPRI NP-6041, Rev. 1. Justify the implicit exception to these guidelines in the IPEEE submittal.

10. What is the unavailability of HPCS for a 72-hour period under loss of offsite power conditions? What is the unavailability of RCIC for a 72-hour period under loss of offsite power conditions? (Note that the IPE evaluated HPCS and RCIC for a 24-hour period and calculated values of 0.14 and 0.16, respectively.)

11. Provide a list of block walls at NMP2 that could impact equipment that are part of the seismic margin success paths, and describe how these block walls were treated in the IPEEE (including walkdown screening and seismic capability assessment).

12. NUREG-1407 requests an evaluation of seismic-fire interactions to consider: (i) seismic-induced fires, (ii) seismic actuation of fire suppression systems, and (iii) seismic degradation of fire suppression systems. Examples of items found in past studies include (but are not limited to):

- Unanchored CO_2 tanks or bottles
- Sprinkler standoffs penetrating suspended ceilings
- Fire pumps unanchored or on vibration isolation mounts

- Mercury or "bad actors" relays in fire protection system (FPS) actuation circuitry
- Weak or unanchored 480V or 600V (non-safety related) electrical cabinets in close proximity to essential safety equipment (i.e., as potential fire sources)
- Use of cast iron fire mains to provide fire water to fire pumps

NUREG-1407 suggests a walkdown as a means of identifying any such items.

Please provide the related results of your seismic-fire interaction study. Provide guidelines given to walkdown personnel for evaluating these issues (if they exist).

II. Fire

1. The operator recovery probabilities for the control room fire scenarios appear to be highly optimistic. No details are provided concerning the methodology employed to calculate the likelihood that the recovery action is unsuccessful (e.g., technique for human error rate prediction (THERP), SHARP, HCR). For fire-initiated sequences, there are performance shaping factor (PSF) issues which are unique to fire situations and would not have to be assessed in the IPE human reliability analysis. These PSF issues mostly relate to environmental stressors (e.g., the impact of smoke and suppression agents, reduced visibility, impaired communications due to the use of breathing apparatus) and psychological stressors (i.e., the occurrence of an unexpected event such as fire of sufficient severity to cause equipment failures). The operator actions for the fire sequences in the NMP2 IPEEE submittal report (pages 4.6-58 to 4.6-62) are assigned some relatively low values (ranging from 10^{-3} to 10^{-1} per demand) considering these factors which would appear to lead to higher levels of stress. No indication is provided in the IPEEE submittal report concerning whether these factors were considered, nor is an indication provided of how much time is available to perform the human recovery actions. Accordingly, more information is needed in order to complete the review of the fire IPEEE. Provide the details concerning how the human error probabilities (the likelihood that the recovery actions are unsuccessful) were estimated, together with the bases thereof. This issue is regarded as particularly significant given the prominent role played by such human recovery actions.

2. The mean heat release rate utilized in the submittal for control room cabinet fire scenarios (based upon test data) appears to be too low. Please provide a sensitivity analysis for control room fire-induced CDF if the heat release rate for control room cabinet fire scenarios is increased to 400 to 1100 Btu/s.

3. The fire compartment interaction analysis (FCIA) is based on the assumption that fire barriers are effective as rated. For active fire barriers (e.g., a normally open fire door that gets closed by fusible link), the failure probability can be significantly high. Provide a list

of compartments with active fire barriers, a description of the active barriers, and a discussion regarding qualitative screening of these (and their adjacent) compartments.

4. Inadvertent operation of carbon dioxide fire protection systems was assumed not to result in any equipment operability concerns. However, icing and freezing of vulnerable equipment has been found to occur given carbon dioxide fire protection system actuation. Please provide a listing of potentially vulnerable (to icing and freezing) co-located safety related equipment (if any). Please provide an analysis of the effect on CDF if such susceptible co-located equipment were to fail.

5. Fire protection systems at NMP2 have been installed in accordance with National Fire Protection Association (NFPA) codes. Thus, the submittal has assumed that adequate assurance is provided that fire protection systems will not fall on safe shutdown components during a seismic event. However, NFPA standards address seismic events less than a 0.3g RLE. Therefore, please provide additional justification for assuming that the fire protection systems at NMP2 will not impact (e.g., by falling on, or spraying down) safe shutdown components during a 0.3g RLE seismic event.

6. The fire detection times cited in the IPEEE seem to be unrealistically optimistic. For example, as noted on page 4.3-4, the submittal states that fire detectors are located 2.5 ft below a 26-ft ceiling in the control building corridor, and yet a detection time of only 3.5 seconds was used. Please provide an assessment of CDF using more reasonable/typical fire detection times. Typical detection times range from tens of seconds to minutes, and are highly dependent on the type of detection system and on specific details of plant configuration.

7. The study assumes that passive fire-barrier elements (e.g., walls, floors, ceilings, and penetration seals) are 100% reliable. Such an analysis is not valid unless the assumption is adequately justified and it can be demonstrated that there are not paths through the barrier for the spread of damage. Provide such justification and demonstration for high-hazard fire areas, such as: the turbine building, diesel generator rooms, cable spreading rooms, switchgear rooms, and lube oil storage areas.

III. HFOs

The staff has no questions pertaining to the Nine Mile Point, Unit 2, HFOs IPEEE.

December 12, 1995

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Original signed by:

Gordon E. Edison, Senior Project Manager
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cc w/encl: See next page

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