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 VASSALLO, D.B. Operating Reactors Branch 2

SUBJECT: Forwards addl info re masonry wall reanalysis & results of masonry wall test program, per IE Bulletin 80-11.

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June 21, 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:

As requested by members of your staff, find attached additional information regarding our masonry wall reanalysis and the results of our masonry wall test program.

Sincerely,

NIAGARA MOHAWK POWER CORPORATION



T. E. Lempges
Vice President
Nuclear Generation

PBG/jab
Attachment

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1. Introduction

The purpose of this study is to investigate the effects of various factors on the performance of a system. The study is divided into two main parts: a theoretical analysis and an experimental investigation. The theoretical part focuses on the development of a model that describes the system's behavior under different conditions. The experimental part involves the design and execution of tests to validate the model and to determine the influence of specific parameters on the system's output.

The following sections describe the methodology used in this study, including the design of the experiments and the analysis of the results. The results are presented in a series of tables and graphs, which illustrate the relationship between the input variables and the system's performance. The study concludes with a discussion of the findings and their implications for the design and optimization of similar systems.

2. Methodology

The methodology employed in this study is based on a combination of theoretical and experimental approaches. The theoretical analysis is conducted using a set of mathematical models that describe the system's dynamics. These models are derived from first principles and are used to predict the system's behavior under various conditions. The experimental investigation is designed to test the predictions of the theoretical models and to determine the accuracy of the models. The experiments are conducted using a series of controlled tests, in which the input variables are varied systematically and the resulting system performance is measured.

The results of the experiments are analyzed using a series of statistical methods, which allow for the identification of trends and the quantification of the uncertainty in the data. The findings of the study are presented in a series of tables and graphs, which provide a clear and concise summary of the results. The study concludes with a discussion of the findings and their implications for the design and optimization of similar systems.

3. Results and Discussion

4. Conclusion

ADDITIONAL INFORMATION
MASONRY WALL PROGRAM

DUROWAL

In response to Nuclear Regulatory Commission Inspection and Enforcement Bulletin 80-11, safety related masonry walls at Nine Mile Point Unit 1 were analyzed to ensure their structural integrity. In this original analysis, Durowal was utilized as a structural resisting element. Subsequent to that analysis, the Nuclear Regulatory Commission established a technical position on the use of Durowal as horizontal reinforcement which differed from the methodology used in the original analysis. As a result, Niagara Mohawk reanalyzed the safety related masonry walls, where necessary, neglecting the presence of Durowal. This reanalysis utilized the criteria outlined in Niagara Mohawk's 1983 document entitled, "Design Criteria for Reanalysis of Safety Related Masonry Walls, Nine Mile Point Unit 1".

In this reanalysis, internal forces developed as a result of the applied loads were resisted by vertical reinforcing (where applicable), mortar, grout, and block. The actual stresses calculated were compared with the allowable values. This resulted in the need to structurally modify three masonry walls to ensure compliance with the design criteria. One modification added structural angles at the top of the masonry wall to ensure a pin connection. The other two modifications added beam and column supports at the masonry walls to reduce the span length. The masonry walls were then reanalyzed with the modifications in place to verify that the resultant stresses were in conformance with the design criteria. These modifications were completed during the 1984 refueling and maintenance outage at Nine Mile Point Unit 1.

MASONRY WALL TEST PROGRAM

A testing program was performed as outlined in the above referenced document to determine prism and mortar strengths. The results of this program were incorporated in the reanalysis. The following is a summary of the results:

	<u>Minimum</u>	<u>Maximum</u>	<u>Average</u>
Net Compressive Strength of Block (psi)	2560	3350	2920
Prism Strength Based on Net Mortar Area (fm),(psi)	1660	2290	2060
Deduced Mortar Strength (mo) 1800 psi			

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SEISMIC CALCULATIONS

The reanalysis was performed in accordance with the Final Safety Analysis Report for Nine Mile Point Unit 1. The acceleration values used in this reanalysis are noted in the above referenced document. The Final Safety Analysis Report for Nine Mile Point Unit 1 does not address frequency calculations for masonry walls. However, sample frequency calculations have been performed. These are summarized below:

NATURAL FREQUENCY CALCULATIONS SUMMARY

<u>EXAMPLE</u>	<u>WALL HEIGHT (FT)</u>	<u>WALL WIDTH (FT)</u>	<u>NOMINAL THICKNESS (IN)</u>	<u>BOUNDARY CONDITIONS</u>	<u>NATURAL FREQUENCY (HZ)</u>
1	20	13	8	4 sides pinned	27.3
2	20	13	8	3 sides pinned 1 side fixed	29.8
3	20	13	12	4 sides pinned	40.7
4	20	13	12	3 sides pinned 1 side fixed	44.4

The first part of the document discusses the importance of maintaining accurate records. It emphasizes that proper record-keeping is essential for ensuring the integrity and reliability of the data collected. This section also outlines the various methods used to collect and analyze the data, highlighting the challenges faced during the process.

In the second part, the focus is on the results of the study. The data shows a clear trend of increasing values over time, which is consistent with the theoretical model proposed. The analysis also identifies several key factors that influence the outcome, providing valuable insights into the underlying mechanisms.

The third part of the document discusses the implications of the findings. The results suggest that the proposed model is a good approximation of the real-world system. This has significant implications for the design and optimization of similar systems, as it provides a clear understanding of the factors that affect performance.

Finally, the document concludes with a summary of the key findings and a list of references. The overall conclusion is that the study has provided a comprehensive analysis of the system under investigation, and the results are highly significant. The references cited provide further context and support for the findings.