

Docket No. 50-220

May 24, 1984

Mr. G. K. Rhode  
Senior Vice President  
Niagara Mohawk Power Corporation  
300 Erie Boulevard West  
Syracuse, New York 13202

Dear Mr. Rhode:

A copy of the Safety Evaluation is also enclosed.

The Commission has issued the enclosed Amendment No. 62 to Facility Operating License No. DPR-63 for the Nine Mile Point Nuclear Station, Unit No. 1. The amendment consists of changes to the Technical Specifications in response to your request dated January 13, 1984.

The revision to the Technical Specifications adds Limiting Conditions for Operation, surveillance requirements and changes to the bases for the

A copy of the Safety Evaluation is also enclosed.

Sincerely,

Original signed by:

Robert A. Hermann, Project Manager  
Operating Reactors Branch #2  
Division of Licensing

Enclosures:

1. Amendment No. 62 to License No. DPR-63
2. Safety Evaluation

cc w/enclosures:  
See next page

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Nine Mile Point Nuclear Station, Unit No. 1

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

NIAGARA MOHAWK POWER CORPORATION

DOCKET NO. 50-220

NINE MILE POINT NUCLEAR STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 62  
License No. DPR-63

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Niagara Mohawk Power Corporation (the licensee) dated January 13, 1984, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility License No. DPR-63 is hereby amended to read as follows:

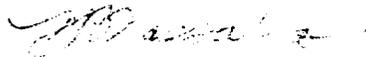
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(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 62, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Domenic B. Vassallo, Chief  
Operating Reactors Branch #2  
Division of Licensing

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: May 24, 1984

ATTACHMENT TO LICENSE AMENDMENT NO. 62

FACILITY OPERATING LICENSE NO. DPR-63

DOCKET NO. 50-220

Revise the Appendix A Technical Specifications by removing and inserting the following pages:

<u>Existing</u> <u>Page</u>	<u>Revised</u> <u>page</u>
iiia	iiia
-	241 ii
-	241 ii1
-	241 ii2
-	241 ii3

The revised areas are indicated by marginal lines.

SECTION	DESCRIPTION	PAGE
3.6.5	Radioactive Material Sources	241k
3.6.6	Fire Detection	241m
3.6.7	Fire Suppression	241q
3.6.8	Carbon Dioxide Suppression System	241u
3.6.9	Fire Hose Stations	241y
3.6.10	Fire Barrier Penetration Fire Seals	241cc
3.6.11	Accident Monitoring Instrumentation	241ee
3.6.12	Reactor Protection System Motor Generator Set Monitoring	241iil

LIMITING CONDITION FOR OPERATION

3.6.12 REACTOR PROTECTION SYSTEM MOTOR GENERATOR SET MONITORING

Applicability:

Applies to the operability of instrumentation that provides protection of Motor Generator sets and the maintenance bus that supplies power to the reactor protection system and reactor trip system.

Objective:

To assure the operability of the instrumentation required for safe operation of the Motor Generator sets and the maintenance bus that supplies power to the reactor protection system and reactor trip system.

Specification:

- a. Except as specified in specifications b and c below, two protective relay systems shall be operable for each Motor Generator set and the maintenance bus.

SURVEILLANCE REQUIREMENT

4.6.12 REACTOR PROTECTION SYSTEM MOTOR GENERATOR SET MONITORING

Applicability:

Applies to the surveillance of instrumentation that provides protection of the reactor protection Motor Generator sets and maintenance bus that supplies power to the reactor protection system and reactor trip system.

Objective:

To verify the operability of protection instrumentation on the Motor Generator sets and maintenance bus that supplies power to the reactor protection and reactor trip buses.

Specification:

- a. At least once every six months Demonstrate operability of the over-voltage, undervoltage and under frequency protective instrumentation by performing an instrument channel test. This instrument channel test will consist of simulating abnormal Motor Generator Set conditions by applying from a test source, an overvoltage signal, an undervoltage signal and an underfrequency signal to verify that the tripping logic up to but not including the output contactors functions properly.



BASES FOR 3.6.12 and 4.6.12 REACTOR PROTECTION SYSTEM MOTOR GENERATOR SET MONITORING

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To eliminate the potential for undetectable single component failure which could adversely affect the operability of the reactor protection system, protection relaying schemes installed on MG sets 131, 141, 162, 172 and maintenance bus 130, provide for overvoltage, undervoltage and underfrequency protection.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
SUPPORTING AMENDMENT NO. 62 TO FACILITY OPERATING LICENSE NO. DPR-63  
NIAGARA MOHAWK POWER CORPORATION  
NINE MILE POINT NUCLEAR STATION, UNIT NO. 1  
DOCKET NO. 50-220

1.0 Introduction and Summary

By letter dated January 13, 1984 Niagara Mohawk Power Corporation (NMPC/ licensee) proposed changes to the Technical Specifications (TS) of Facility Operating License No. DPR-63 for the Nine Mile Point Nuclear Station, Unit No. 1. The revisions to the Technical Specifications addressed in this Safety Evaluation include limiting conditions for operation, surveillance requirements and changes to the bases for the protective relaying that was installed on the output side of the reactor protection and reactor trip bus motor generator sets.

Concerns regarding the deficiencies in the existing design of Reactor Protection System (RPS) power monitoring in BWRs was transmitted to NMPC by NRC generic letter dated September 24, 1980. In response to this, by letters dated December 1, 1982, July 22, 1983, and December 15, 1983, NMPC proposed design modifications. A detailed review and technical evaluation of these proposed modifications and changes to the Technical Specifications were performed by Lawrence Livermore Laboratory (LLL) under contract to the NRC, and with general supervision by NRC staff. This work is reported in LLL report UCID-20037 "Technical Evaluation of the Monitoring of Electric Power to the Reactor Protection System," dated March 1984 (enclosed). We have reviewed this technical evaluation report and concur in its conclusion that the proposed design modifications and technical specification changes are acceptable.

2.0 Proposed Changes and Evaluation Criteria

The following design modifications and technical specification changes were proposed by NMPC for Nine Mile Point Unit 1.

1. Installation of two Class 1E detection and isolation assemblies, similar to the GE designed protection assemblies, in each of the five sources of power to the RPS (four M-G sets and the one alternate source). Each assembly includes a circuit breaker and a monitoring module consisting of an undervoltage, an overvoltage and an under-frequency sensing relay. The set points of the voltage relays are based on an assumed maximum cable voltage drop of 5 volts to provide + 10% of 115 volts at the terminals of the RPS components. If tests indicate excessive cable voltage drop in any RPS power cable, then the

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circuit containing that cable will be modified to assure + 10% of 115 volts at the terminal of the affected RPS component.

2. The addition of trip setpoints, limiting condition for operation and surveillance requirements in the technical specification associated with the design modifications cited above.

The criteria used by LLL in its technical evaluation of the proposed changes include GDC-2, "Design Basis for Protection Against Natural Phenomenon," and GDC-21, "Protection System Reliability and Testability," of Appendix A to 10 CFR 50; IEEE-279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations;."

### 3.0 Evaluation

We have reviewed the LLL Technical Evaluation Report and concur in its findings that (1) proposed modifications will provide automatic protection to the RPS components from sustained abnormal power supply and (2) the proposed changes to the technical specifications include acceptable Limiting Conditions for Operation (LCO) and periodic testing in accordance with the standard technical specification for BWRs. Therefore, we conclude that NMPC's proposed design modifications and changes to the technical specifications are acceptable.

### 4.0 Environmental Consideration

We have determined that the amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and, pursuant to 10 CFR §51.5(d)(4), that an environmental impact statement, or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

### 5.0 Conclusion

We have concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Reviewer: I. Ahmed

Enclosure:  
Technical Evaluation Report

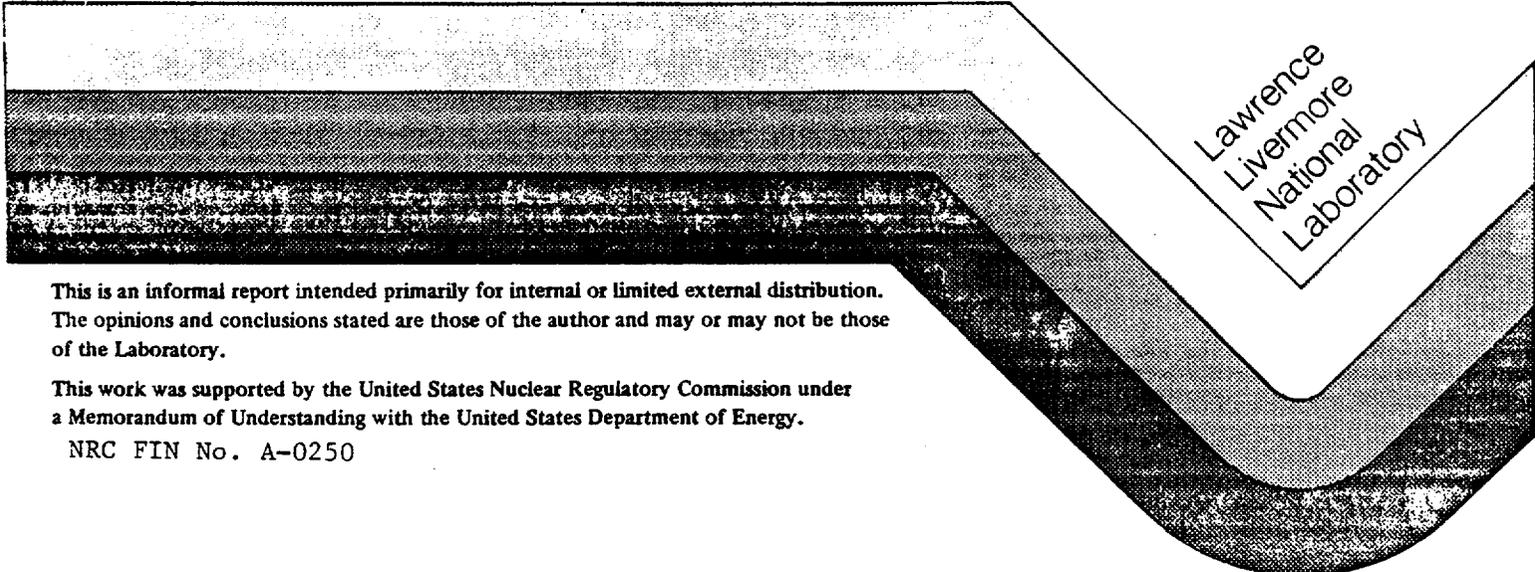
Dated: May 24, 1984

TECHNICAL EVALUATION REPORT ON THE  
MONITORING OF ELECTRIC POWER  
TO THE REACTOR PROTECTION SYSTEM FOR THE  
NINE MILE POINT NUCLEAR STATION, UNIT 1

(Docket No. 50-220)

James C. Selan

March 16, 1984

The logo for Lawrence Livermore National Laboratory is a stylized, multi-layered V-shape. It consists of several horizontal bands of varying shades of gray and black, creating a sense of depth and movement. The text "Lawrence Livermore National Laboratory" is written in a sans-serif font, slanted upwards, and positioned within the upper right portion of the V-shape.

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This is an informal report intended primarily for internal or limited external distribution. The opinions and conclusions stated are those of the author and may or may not be those of the Laboratory.

This work was supported by the United States Nuclear Regulatory Commission under a Memorandum of Understanding with the United States Department of Energy.

NRC FIN No. A-0250

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SELECTED ISSUES PROGRAM

TECHNICAL EVALUATION REPORT ON THE  
MONITORING OF ELECTRIC POWER TO THE REACTOR PROTECTION SYSTEM  
FOR THE NINE MILE POINT NUCLEAR STATION, UNIT 1

(Docket No. 50-220)

March 16, 1984

By

James C. Selan

Lawrence Livermore National Laboratory, Nevada

## ABSTRACT

This report documents the technical evaluation of the monitoring of electric power to the reactor protection system (RPS) at the Nine Mile Point Nuclear Station, Unit 1. The evaluation is to determine if the proposed design modification will protect the RPS from abnormal voltage and frequency conditions which could be supplied from the power supplies and will meet certain requirements set forth by the Nuclear Regulatory Commission.

The proposed design modifications will protect the RPS from sustained abnormal voltage and frequency conditions from the supplying sources.

## FOREWORD

This report is supplied as part of the Selected Operating Reactor Issues Program II being conducted for the U. S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Division of Licensing, by Lawrence Livermore National Laboratory.

The U. S. Nuclear Regulatory Commission funded the work under the authorization entitled "Selected Operating Reactor Issues Program II," B&R 20 19 10 11 1, FIN No. A-0250.

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TECHNICAL EVALUATION REPORT ON THE  
MONITORING OF ELECTRIC POWER  
TO THE REACTOR PROTECTION SYSTEM  
AT THE NINE MILE POINT NUCLEAR STATION, UNIT 1

(Docket No. 50-220)

James C. Selan

Lawrence Livermore National Laboratory, Nevada

1. INTRODUCTION

During the operating license review for Hatch 2, the Nuclear Regulatory Commission (NRC) staff raised a concern about the capability of the Class 1E reactor protection system (RPS) to operate after suffering sustained, abnormal voltage or frequency conditions from a non-Class 1E power supply. Abnormal voltage or frequency conditions could be produced as a result of one of the following causes: combinations of undetected, random single failures of the power supply components, or multiple failures of the power supply components caused by external phenomena such as a seismic event.

The concern for the RPS power supply integrity is generic to all General Electric (GE) boiling water reactors (BWR) MARK 3's, MARK 4's, and MARK 5's and all BWR MARK 6's that have not elected to use the solid state RPS design. The staff therefore pursued a generic resolution. Accordingly, GE proposed a revised design, in conceptual form, for resolution of this concern [Ref. 1]. The proposed modification consists of the addition of two Class 1E "protective packages" in series between each RPS motor-generator (M-G) set and its respective RPS bus, and the addition of two similar packages in series in the alternate power source circuit to the RPS buses. Each protective package would include a breaker and associated overvoltage, undervoltage and underfrequency relaying. Each protective package would meet the testability requirements for Class 1E equipment.

With the protective packages installed, any abnormal output type failure (undetectable random or seismically caused) in either of the two RPS M-G sets (or the alternate supply) would result in a trip of either one or both of the two Class 1E protective packages. This tripping would interrupt the power to the effected RPS channel, thus producing a scram signal on that channel, while retaining full scram capability by means of the other channel. Thus, fully redundant Class 1E protection is provided, bringing the overall

RPS design into full conformance with General Design Criteria (GDC)-2 [Ref. 2], and GDC-21 [Ref. 3] (including IEEE-279 [Ref. 4] and the standard review plan [Ref. 5]). The NRC staff reviewed the proposed GE design and concluded that the modification was acceptable [Ref. 6], and should be implemented in conformance with the applicable criteria for Class 1E systems.

The NRC requires that the components of the RPS not be exposed to unacceptable electric power of any sustained abnormal quality that could damage the RPS. This involves providing means to detect any overvoltage, undervoltage, or underfrequency condition that is outside the design limits of the RPS equipment and to disconnect the RPS from such abnormal electric power before damage to the RPS can occur. The equipment which performs these functions must satisfy the single failure criterion and be seismically qualified. The NRC issued a generic letter [Ref. 7] to all operating BWR's requesting the licensees to submit design modification details and Technical Specifications for post implementation review.

By letters dated December 1, 1982 [Ref. 8], July 22, 1983 [Ref. 9], December 15, 1983 [Ref. 10], and January 13, 1984 [Ref. 11], Niagara Mohawk Power Corporation, the licensee, submitted design modification details regarding the monitoring of electrical power to the RPS at the Nine Mile Point Nuclear Station, Unit 1.

The purpose of this report is to evaluate the licensee's submittal with respect to the NRC criteria and present the reviewer's conclusion on the adequacy of the design modifications to protect the RPS from abnormal voltage and frequency conditions.

## 2. DESIGN DESCRIPTION

The licensee has proposed to install two Class 1E detection and isolating packages (similar to the approved GE conceptual design) to monitor the electric power in each of the sources of power (four M-G sets and an alternate source) to the RPS. Each package consists of a contactor (size NEMA 5), auxiliary relay, undervoltage relay, overvoltage relay, and an underfrequency relay. The time delay to open the contacts in the output is defined by each monitoring relay's selected operating characteristic. There is no time delay associated with the operation of the auxiliary relay in the contactor circuit since it is energized at all times and operation of any monitoring relay after its selected time delay de-energizes this relay causing the contacts of the respective contactor to open.

### 3. EVALUATION

The NRC stated several requirements that the licensee must meet in their design modification to monitor the power to the RPS. A statement of these requirements followed by an evaluation of the licensee's submittals is as follows:

- (1) "The components of the RPS shall not be exposed to unacceptable electric power of any sustained abnormal quality that could damage the RPS."

The monitoring package will detect overvoltage, undervoltage, and underfrequency conditions with the following setpoints.

Nominal voltage 120 volts, 60 Hz nominal

<u>Condition</u>	<u>Setpoint</u>	<u>Time Delay</u>
Overvoltage	< 132 volts	< 4.0 seconds
Undervoltage	> 108 volts	< 4.0 seconds
Underfrequency	> 57 Hz	< 2.0 seconds

With these chosen setpoints, a maximum voltage drop of 4.5 to 5.0 volts ensures that the GE verified operating voltage limits of  $\pm 10\%$  of 115 volts at the RPS components are not exceeded. The licensee has not verified these voltage drops. If field measurements result in larger voltage drops, then circuit modifications as indicated in Reference 10 will be required to maintain these chosen setpoints.

- (2) "Disconnecting the RPS from the abnormal power source shall be automatic."

The monitoring package will automatically disconnect the RPS buses from the abnormal power supply after the set time delay should the parameters setpoints be exceeded.

- (3) "The power monitoring system shall meet the requirements of IEEE 279-1971, GDC-2 and GDC-21."

The monitoring packages meet the Class 1E requirements of IEEE 279, the single failure criteria of GDC-21, and the seismic qualifications of GDC-2.

- (4) "Technical Specifications shall include limiting conditions of operation, surveillance requirements, and trip setpoints."

The licensee submitted Technical Specification changes [Ref. 11] which included limiting conditions for operation when the number of operable monitoring channels is less than required and surveillance requirements which include a functional test, channel calibration and verification of setpoints.

#### 4. CONCLUSION

Based on the information submitted by Niagara Mohawk Power Corporation for the Nine Mile Point Nuclear Station, Unit 1, it is concluded that:

- (1) The proposed setpoints of the relays in the two protective packages to be installed in series, in each of the power sources to the RPS buses, will automatically protect the RPS components from sustained abnormal overvoltage, undervoltage, and underfrequency conditions outside the design limits of the RPS components.
- (2) The protective packages meet the requirements of Class 1E equipment (IEEE 279), single failure criteria (GDC-21), and seismic qualification (GDC-2).
- (3) The proposed time delay before contactor opening will not result in damage to components of the RPS or prevent the RPS from performing its safety functions.
- (4) The following minimum and maximum limits to the trip setpoints, limiting conditions for operation (LCO), and surveillance requirements, as proposed by the licensee in accordance with the Standard Technical Specifications, will protect the RPS components from sustained abnormal power:
  - (a) Overvoltage  $\leq$  132 volts, time delay  $\leq$  4.0 seconds  
Undervoltage  $\geq$  108 volts, time delay  $\leq$  4.0 seconds  
Underfrequency  $\geq$  57 Hz, time delay  $\leq$  2.0 seconds
  - (b) With one electric power monitoring channel for an inservice MG set or alternate supply inoperable, restore the inoperable channel to operable status within 72 hours or remove the associated MG set or alternate supply from service.
  - (c) With both electric power monitoring channels for the inservice MG set or alternate supply inoperable, restore at least one to operable status within 30 minutes or remove the associated MG set or alternate supply from service.
  - (d) A functional test at least once per 6 months and a channel calibration once per operating cycle to determine the operability of the protective instrumentation including simulated automatic actuation, tripping logic, output circuit breaker tripping, and verification of the setpoints.

## REFERENCES

1. General Electric Company letter, MFN 408-78 (G. G. Sherwood) to NRC (R. S. Boyd), dated October 31, 1978.
2. General Design Criteria-2 (GDC-2), "Design Bases for Protection Against Natural Phenomena," of Appendix A, "General Design Criteria for Nuclear Power Plants," in the Code of Federal Regulations, Title 10, Part 50 (10 CFR 50).
3. General Design Criteria-21 (GDC-21), "Protection System Reliability and Testability," of Appendix A, "General Design Criteria for Nuclear Power Plants," in the Code of Federal Regulations, Title 10, Part 50 (10 CFR 50).
4. IEEE Std. 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations."
5. NUREG-75/087, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants."
6. NRC memorandum from Faust Rosa to J. Stolz, T. Ippolito, and G. Lainas, dated February 19, 1979.
7. NRC letter to Operating BWR's, dated September 24, 1980.
8. Niagara Mohawk Power Corporation letter (C. V. Mangan) to the NRC (D. B. Vassallo), dated December, 1982.
9. Niagara Mohawk Power Corporation letter (T. E. Lempges) to the NRC (D. B. Vassallo), dated July 22, 1983.
10. Niagara Mohawk Power Corporation letter (T. E. Lempges) to the NRC (D. B. Vassallo), dated December 15, 1983.
11. Niagara Mohawk Power Corporation letter (C. V. Mangan) to the NRC (D. B. Vassallo), dated January 13, 1984.

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