April 19, 1994

Docket No. 50-220

MEMORANDUM FOR: Robert A. Capra, Director
Project Directorate I-1
Division of Reactor Projects I/II

FROM: Conrad E. McCracken, Chief
Plant Systems Branch
Division of Systems Safety and Analysis

SUBJECT: RESULTS OF THE ON-SITE EQ REVIEW AT NINE MILE POINT, UNIT 1 (TAC M85648)

During the period from March 14 through March 17, 1994, Christopher Gratton and Ann Dummer of my staff, along with Frank Quinn of SCIENTECH (an NRC contractor), performed an on-site review of EQ-related information at Nine Mile Point Unit 1 in support of the staff's task action plan to identify and address existing EQ issues and concerns. The purpose of this review was to gather information and not to assess licensee compliance with NRC regulations. The results of the staff's review is included as Enclosure 1, and Enclosure 2 provides the contents of a draft letter that may be used for transmitting this information to the licensee.

If you should have any questions regarding the review that was conducted at Nine Mile Point Unit 1, please contact Chris Gratton of my staff at 504-1055.

Original signed by

Conrad E. McCracken, Chief
Plant Systems Branch
Division of Systems Safety and Analysis

Enclosures:
As stated

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Enclosure 1

NRC STAFF ON-SITE REVIEW OF EQ INFORMATION AT NINE MILE POINT UNIT 1

1.0 INTRODUCTION

As a result of the staff's activities related to license renewal, environmental qualification (EQ) was identified as an area that required further review. A major concern in this regard was whether the EQ requirements for older plants (i.e., those with EQ programs developed under DOR Guidelines or NUREG-0588, Category II, requirements) were adequate to support license renewal. Consequently, the staff concluded that differences in EQ requirements between older and newer plants constituted a potential generic issue which should be evaluated for backfit independent of the license renewal activities.

Separate from the activities supporting license renewal and in response to issues that were raised by the Office of the Inspector General (OIG) in a report dated August 12, 1992, the NRC staff conducted an assessment of fire protection requirements. The staff's report dated February 27, 1993, identified a number of weaknesses and made specific recommendations for improving the NRC fire protection program. In view of the weaknesses that were identified, the staff concluded that other NRC programs such as EQ should also be reviewed to identify and correct any programmatic weaknesses that may exist.

Consequently, the NRC established a task action plan for identifying and addressing issues and concerns that currently exist in the area of EQ. One element of this task action plan involves a number of site visits by the staff to gather first-hand information on EQ and to discuss current issues, problems and trends with nuclear power plant personnel. It is emphasized that the purpose of these site visits is not to assess licensee compliance with NRC regulations.

Nine Mile Point Unit 1 was the fourth plant selected for the staff's on-site EQ review activity. The review was performed from March 14 through March 17, 1994, by Christopher Gratton and Ann Dummer of the NRC, Office of Nuclear Reactor Regulation, and by Frank Quinn of SCIENTECH, an NRC contractor. This report is a brief summary of the on-site review activity that was conducted, and serves to document the results of the staff's efforts in this regard.

2.0 BACKGROUND INFORMATION RELEVANT TO NINE MILE POINT UNIT 1

Nine Mile Point Unit 1 (NMP-1) is operated by the Niagara Mohawk (the licensee) and began commercial operation on December 1, 1969. The unit is powered by a General Electric boiling water reactor rated for 1850 Megawatts thermal. NMP-1 construction permit was issued on April 12, 1965; therefore, the licensee follows the environmental qualification guidelines found in the Division of Operating Reactors "Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors."

3.0 REVIEW DETAILS

The staff's on-site review activity is directed toward gathering EQ-related information in support of a generic programmatic review, and it is the staff's desire to promote an atmosphere of cooperation and support during each of the site visits. The staff's review plan calls for gathering information through licensee presentations, discussions with plant personnel, and document reviews.

3.1 Licensee Presentations

As part of the review team's orientation to the NMP-1 EQ program, the licensee presented specific information relevant to Nine Mile Point. The licensee explained the history of the EQ program at Nine Mile, outlined the EQ Group organization, explained the EQ files and procedures, described the various training on EQ available to site personnel, introduced the EQ-related databases that are under development, and discussed other topics relevant to EQ. The licensee also provided a video tour of EQ components.

3.2 Discussions with Plant Personnel

For two days, the EQ review team participated in group discussions about EQ issues with personnel from the engineering, procurement, risk analysis, maintenance, planning and scheduling, and training organizations (see Table 1). The purpose of these discussions was to learn about programs that had been established for implementing and maintaining equipment qualification, and to learn about specific problems and concerns that exist as a result of EQ requirements and how those problems and concerns are being addressed. In general, the station personnel were aware of EQ requirements and the program and practices established to implement EQ at NMP-1.

Table 1
Discussion Groups

Functional Discussion Groups:	Number of Participants:
1. Engineering	5
2. Procurement and IPEEE	6
3. Electrical Maintenance, Planning, and Training	8
4. I&C Maintenance, Planning, and Training	5

3.3 Document Review

The NRC EQ Team reviewed the information specified in the EQ Site Visit Plan as it related to EQ of equipment and components. This included both Niagara Mohawk Power Corporation and Nine Mile Point-specific documents. Documents

reviewed included the NMP-1 Environmental Qualification Master List, the NMP-1 Environmental Qualification Required Maintenance (EQRM) documents, information on the DOR Guidelines & IEEE 323-1974 equipment, the Environmental Qualification Program Manual (NEP-DES-400), the NMP-1 Systems List, information related to bonded-jacket cables in harsh environments, EQ report titles for Boston Insulated Wire (BIW) cable, and EQ-related LERs.

3.4 Results

Based on the information that was obtained at Nine Mile Point during the on-site EQ review, the staff found that a number of program elements and practices seemed to be important for establishing and maintaining equipment qualification. The staff also documented some of the EQ-related problems and concerns that were discussed as part of the site visit.

Noteworthy EQ-Related Program Elements and Practices:

- NMP consolidates all EQ requirements in a document called the Environmental Qualification Required Maintenance (EQRM). To promote consistency, the specifications listed in the EQRMs are used verbatim when developing procedures involving EQ equipment. The EQRMs are brief, concise and clearly written, were developed with the involvement of operations personnel, and have a condition monitoring bias. Each EQRM lists the component, manufacturer, model number, and tag number, and includes specific requirements for scheduled maintenance and corrective maintenance. Special "Notes" are frequently used to draw attention to important concerns.

  EQRMs include specific inspection instructions for "condition monitoring" activities which are then included in maintenance procedures. These condition monitoring instructions alert technicians to look for signs of aging in DOR equipment. For example, the EQRM for cables instructs the technicians to look for radiation and thermal effects by inspecting the cable for degradation (i.e. sponginess, chafing, jacket cracking, flat spots), minimum bend radius, and mechanical wear. The EQRM on solenoid actuators and position switches directs the inspection of all non-metallic materials for cracks, embrittlement, or discoloration.

- The licensee clearly marks all EQ-related steps in maintenance procedures.

- As part of the original qualification of EQ equipment, the licensee conducted numerous qualification tests of DOR components and acquired extensive experience qualifying components. The licensee has shared information related to the qualification process with representatives of other licensees.

- The licensee trains all employees on EQ fundamentals using EPRI training materials as part of the their orientation to the site. Maintenance technicians get initial background training on EQ that emphasizes the

requirements and equipment subject to qualification. Continuing training on procedures and EQRMs is also offered.

- The licensee has a dedicated EQ group, located at the headquarters office, that coordinates EQ activities and provides support for plant modifications. The EQ Site Coordinator maintains an interface between the EQ group and the site maintenance activities. The licensee is currently in the process of moving the EQ group, along with other engineering activities, to the site. The EQ Action Item (EQAI) process controls the EQ group's review of plant modifications.

- NMP is developing two data bases related to EQ. The first is the System Component Evaluation Worksheet/Mechanical Equipment Qualification (SCEW/MEQ) Data Base, which is a composite relational data base containing all relevant EQ qualification information. The other is the Non-metallic Material Equipment Qualification Data Base (NMEQDB), which is a comprehensive collection of data related to the material properties of EQ components and includes ASTM and Military Specification references. The licensee plans to use this data base for purchasing replacement parts, re-evaluating the life of EQ components in hot spots, developing acceptance criteria for condition monitoring, and supporting risk assessment activities. Although neither database is complete, they were both on-line and demonstrated their capabilities by supporting the NMP staff during the site visit.

- The EQ group works closely with Procurement Engineering. A dedicated representative from the EQ group coordinates with Procurement Engineering when reviewing procurement requirements and assists in the qualification of suppliers. Procedures have been developed to control the interface between EQ and Procurement.

- The licensee established a program to monitor temperatures at 21 areas throughout the plant. The temperatures were taken over a three year period to confirm the calculations made by the plant designers and to modify the qualified life of EQ components. There is currently a program to monitor temperatures in the drywell to determine whether ambient temperatures are increasing as the plant ages.

- The licensee is using Infrared Thermography (IRT) to predict when equipment will fail. Heat sensitive cameras are used to measure the change in temperature of select components. IRT could potentially be used to trend equipment temperatures for the maintenance rule. The licensee is also investigating ways IRT could be used to perform EQ-related condition monitoring of electrical equipment.

- The licensee is implementing a computerized logging system called Smart Rounds. Operators will record performance data electronically and upload the data to a mainframe where it can be trended by the licensee's engineering staff. Smart Loggers will replace the operator's normal log taking responsibilities in the near future.

- The licensee has laboratory facilities in-house to assist with commercial grade dedication and EQ of some components. The labs have the capability to perform materials testing such as Fourier Transform-Infrared Reflectometry (FT-IR) for material identification as part of commercial grade dedication.

- I&C maintenance planners regularly review the maintenance history of EQ components scheduled for repair. If there is evidence that a component has a higher than normal failure rate, the planner writes a Deviation/Event Report (DER) to the system engineers. Planners also use NPRDS for additional failure frequency information. The licensee conducts failure analysis on deficient EQ equipment as necessary.

- The licensee performed a thorough evaluation of the operability of bonded-jacket cables in response to recent NRC information notices. NMP investigated the cable applications, the effects of possible reduced insulation resistance, and the accident performance of affected instrumentation. The resulting recommendations included: development of a cable condition monitoring technique to incorporate into EQRMs, evaluation of specific cable applications and instrument accuracy requirements, and replacement of selected cable during the next refueling outage.

- EQ components are clearly identified by ID tags. Grease tags are also used to identify qualified grease applications.

- The licensee routinely takes and files photographs of the installed configuration of EQ components.

- The licensee actively participates in industry working groups, and is a member of the Nuclear Utility Group on EQ (NUGEQ).

Problem Areas/Areas of Concern Expressed by Plant Personnel:

- Tight budgeting continues to be a challenge to any advancements in the area of EQ.

- In areas designated as radiation harsh only environments or High Energy Line Break (HELB) areas, the conservative assumptions used in calculating radiation levels prevent equipment upgrades to more modern digital equipment.

- The licensee would like the flexibility to implement the new source term for EQ applications before having to apply it to all other applications at the plant. There is concern that the NRC will require the licensee to implement the new source term "across-the-board," or not at all. This flexibility would allow them to modify the exposure levels of EQ components throughout the plant without expending significant resources to implement the new source term in the rest of the plant's procedures and calculations.

- The licensee noted that suppliers of EQ components are dwindling. Use of independent test labs for qualifying EQ equipment results in higher qualification costs and longer lead times when ordering replacement equipment.

- Currently, there are no provisions for the short term relaxation of boundary requirements to conduct maintenance based on a risk assessment. The compensatory actions that must be taken for a short term breach of a mild-harsh boundary are excessive compared with the probability of a LOCA/HELB during the maintenance. This is only a concern at Unit 2 due to the plant configuration differences between Units 1 and 2.

4.0 CONCLUSIONS

The review team found that plant personnel at Nine Mile Point were very open and receptive to the NRC visit, and expressed no reservations in sharing plant practices and experiences. Consequently, the on-site EQ review at Nine Mile Point was very worthwhile and productive, helping the NRC staff to better understand and appreciate the programs and practices being implemented in order to satisfy EQ requirements, and also highlighting some of the problems and concerns that currently exist. The information obtained during the Nine Mile Point site visit is very useful and will be factored into the staff's generic programmatic review of EQ.

Enclosure 2

Boiler Plate Letter - Contents

During the period from March 14 through March 17, 1994, the NRC performed an on-site review of EQ-related information at Nine Mile Point Unit 1 in support of the staff's task action plan to identify and address existing EQ issues and concerns. The purpose of this review was not to assess compliance with NRC regulations, but rather to gather information that is critical to the staff's ongoing EQ review. Due to the support and cooperation that was afforded by plant personnel at all levels, the time spent by the NRC staff at Nine Mile Point was very productive and worthwhile. We appreciate very much the time and effort that was spent by your staff in assisting us in this effort. The results of the staff's EQ review is enclosed for your information.

In addition to the standard distribution for Nine Mile Point, please include the following addressees on the cc list:

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