U.S. NUCLEAR REGULATORY COMMISSION
REGION I

DOCKET/REPORT NOS.: 50-220/95-24
50-410/95-24

FACILITY: Nine Mile Point Units 1 and 2

LICENSEE: Niagara Mohawk Power Corporation

LOCATION: Lycoming, New York

DATES: October 30 - November 17, 1995

INSPECTOR: Leonard S. Cheung — 1/4/96
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Date

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Areas Inspected: This inspection included an assessment of engineering effort in major modifications, simple design changes, and temporary plant modifications. This inspection also included a review of: 1) NMPC's response to, and corrective actions for, the February 7, 1995, event involving Agastat relay failures; and 2) the status of an unresolved item, 50-410/95-01-02.

ENGINEERING INSPECTION DETAILS

1.0 PURPOSE

The purpose of this inspection was to assess the engineering activities provided by Niagara Mohawk Power Corporation (NMPC) to Nine Mile Point, Units 1 and 2, and to verify that plant design changes and temporary modifications were performed in accordance with station procedures and NRC regulations. The inspector also reviewed: 1) NMPC's response to, and corrective actions for, the February 7, 1995, event involving Agastat relay failures; and 2) the status of an unresolved item, 50-410/95-01-02.

2.0 MAJOR PLANT MODIFICATIONS

The station procedure for major plant modifications, NEP-PTM-302, entitled, "Plant Modification," Revision 4, established the methods and requirements for controlling activities of major plant modifications for both units. The station procedure for performing safety evaluations was NIP-SEV-01, "Applicability Reviews and Safety Evaluations." The inspector reviewed the following two major plant modifications.

2.1 Hydrogen and Oxygen Monitoring Replacement, Mod N1-93-013 (Unit 1)

This modification was to replace two obsolete hydrogen and oxygen analyzers (systems 11 and 12). These two analyzer systems were to provide continuous monitoring of hydrogen and oxygen concentrations in the drywell and torus following a design basis accident. The old analyzer systems were supplied by Beckman Instrument, and were later upgraded to safety-related as a result of Regulatory Guide 1.97 implementation. Qualified spare parts for the old systems were unavailable and component replacement was not technically feasible. The new systems were manufactured by Teledyne Analytical Instruments and were qualified for safety-related application.

The inspector reviewed the design change package, P&ID 3-N2.1-S189,sheet 1&2, and Safety Evaluation (SE) 94-075. The new systems were installed during the last refueling outage in April 1995. The inspector also physically observed the installed systems. Each system consisted of a sample cabinet, an instrument (process) cabinet, and a local control panel. The inspector found them properly installed and the indicating instruments functional. Each system received a monthly calibration to ensure functional accuracy.

2.2 Valve Actuators Replacement, PN2Y94MX013 (Unit 2)

This modification was used to replace four motor-operated valves (2RHS*MOV15A/B, MOV25A/B) actuators in the residual heat removal (RHR) system. Based on the torque calculations (for implementing an MOV program for Generic Letter 89-10), the old valve actuators might not have sufficient torque to actuate the valves under dynamic load and degraded voltage conditions. NMPC doubled the actuator size from SMB-1 (40) to SMB-2 (80), to ensure sufficient torques were available for the valves during the degraded voltage condition. Numerous calculations were involved in this modification, including electrical loadings, cable sizes, and seismic evaluations. The safety evaluation for this modification was discussed in SE No. 95-051, Revision 1. The valve

actuator replacement was completed in April 1995, but the modification was not yet closed.

2.3 Conclusion

The modification packages reviewed were of good quality and were implemented in accordance with station procedures. The design activities were well managed. Design criteria and design inputs were appropriate and technically sound. The 10 CFR 50.59 safety evaluations were thorough and complete.

3.0 SIMPLE DESIGN CHANGES

The simple design changes (SDC) were used to document minor changes of a limited scope. Typically, those design changes were of a single discipline, and were related to simple design and installation. The SDC process was controlled by Administrative Procedure No. NEP-DES-320, Revision 4, entitled, "Design Change Initiation." This procedure provided guidelines to determine whether a design change to the plant should be treated as a major plant modification or a SDC, and provided guidance on processing a SDC. The inspector reviewed the following simple design change documentation packages:

1) Simple Design Change SC2-0034-94 (Unit 2) was used to: a) replace four piston check valves with nozzle check valves (2SWP*V201A&B, V240A&B); b) relocate two check valves (2SWP*V1024, V1025); and c) remove the internals from two check valves (2SWP*V75A&B). All these check valves were in the service water system. NMPC's rationale for replacing the four check valves was that the old valves were vulnerable to silt and corrosion product buildup and had repeated failures in the quarterly surveillance tests. The new valves were a better design and were used successfully in Europe. The 10 CFR 50.59 safety evaluation was documented in SE No. 94-065. The installation of this modification was completed during this year's summer refueling outage. However, this design change was still open during this inspection. The inspector's review of the design documents and the safety evaluation indicated that they were generally of good quality. However, NMPC's failure to recognize that the clearance between the plug and the seat of the new valves was too narrow for the maximum expected mussel size (⅛ inch) to pass caused two check valves (2SWP*V201A&B) to fail the surveillance test on October 30, 1995. The detail of this event was discussed in Section 4.2 of the resident report details. Although NMPC's operability analysis determined that the service water system was still operable despite of the valves' failure in the reverse direction (due to mussel accumulation), NMPC decided to change the design of these check valves to provide a bigger clearance (¼ inch). These check valves were 1¼ inches valves and their forward flow function was to provide cooling water to the Division III switchgear room cooler. Their reverse flow (check) function was to provide isolation between Division I and Division II service water systems.

2) Simple Design Change SC1-0065-95 (Unit 1) was used to add six filters to the off-gas chillers (11, 12, and 13), two filters for each chiller. These were ⅞ inch in-line filters, each with a local differential pressure indicator. The purpose of these filter additions was to prevent clogging

of thermostatic expansion valves and the chiller compressors. The two filters for chiller 13 were installed in October 1995. The other filters would be installed when chiller 13 became operational and chillers 11 and 12 could be taken off the line.

The inspector's review of the above two simple design changes indicated that these design changes were completed in accordance with administrative requirements. All required documents, such as design inputs, 10 CFR 50.59 safety evaluation, and other associated documents, were properly completed. Overall, the program for the design and implementation of these changes was well defined and generally well managed. However, the inspector determined that the initial simple design change (SC2-0034-94) for the service water check valve replacement was ineffective in that it required a second valve design and replacement to complete plant modification.

4.0 TEMPORARY MODIFICATIONS (T-MODS)

All T-mods are controlled by Administrative Procedure GAP-DES-03, "Control of Temporary Modification," Revision 4, dated March 6, 1995. This procedure established the guidelines for T-mod initiation, implementation, annual reviews, and clearance of installed modifications for both units. The controls included technical design reviews, 10 CFR 50.59 "Safety Evaluations," and appropriate drawing and procedure changes.

The inspector reviewed the following four T-mods:

1) T-mod 95-11 (Unit 1) was used to swap two local power range monitor (LPRM) cables. The cable connection for LPRM detector 36-41C was damaged at the drywell penetration. This LPRM was needed for input to the average power range monitor (APRM). NMPC swapped the cable for this LPRM with the good cable for LPRM detector 36-49A. This cable swap made LPRM 36-49A inoperable until the cable would be swapped back during the next Unit 1 refueling outage (about 2 years duration). The T-mod package did not provide explanation why this inoperable condition was acceptable. The inspector was later given existing General Electric documentation which explained that this condition was acceptable.

2) T-mod 95-23 (Unit 1) was used to remove the damaged screen from strainer 190-66 associated with off-gas chiller 13, until parts became available from the vendor.

3) T-mod 94-45 (Unit 2) was used to monitor the vibrations of the feedwater pipes during power ascension beyond previous power level (due to power uprate).

4) T-mod 95-45 (Unit 2) was used to temporarily disable the automatic mass flow control for radiation monitor 2CMS*CAB10A due to flow transducer failure and an unavailable replacement part. The flow was manually set to within an acceptable limit.

Each of the above T-mod packages contained a 10 CFR 50.59 applicability review. These T-mods were technically sound and were generally thorough

except the first one which did not contain an explanation why an inoperable LPRM was acceptable. Affected drawings were properly revised to identify the changes.

5.0 MANAGEMENT OVERSIGHT OF ENGINEERING ACTIVITIES

The inspector reviewed the management oversight in the area of backlog control program to assess the effectiveness of their oversight in this area.

5.1 Backlog Control Program and Goal

Each year, Units 1 and 2 Engineering and Technical Support develop their performance goals for the engineering activities, including major modifications, SDCs, T-mods, safety evaluations, and deviation/event reports (DER) dispositions, and re-engineering due to design errors. These goals were documented in the yearly business plan and presented to NMPC senior management. Each month, an engineering performance report was prepared by each engineering functional manager to brief senior management of the status of the group's performance. Computer-generated charts comparing the status of various activities with their goals were also presented. Each functional manager was responsible for the group's performance and for achieving the performance goals in each activity. The inspector reviewed the monthly performance reports for September 1995, and found both the reports and the charts to be very informative. These performance charts indicated that the goals were achieved in most activities.

During previous engineering inspections, the inspectors found that both Units 1 and 2 had many outstanding T-mods with excessive durations, some were more than five years. During this inspection, the inspector noticed that NMPC had made substantial improvement in reducing both the total number of T-mods and the T-mod durations. Very few outstanding T-mod exceeded 2 years old. The total T-mods at Unit 1 were reduced from 27 a year ago to only 9 in August this year, with 2 T-mods exceeded 2 years old. For Unit 2, the total T-mods were reduced from 31 in December 1994 to 22 in September this year, with six T-mods exceeded 2 years old. Most of the T-mods exceeding 2 years old were either being planned for removal or being changed to permanent modifications.

5.2 Conclusions

The inspector concluded that NMPC had good management oversight of engineering activities. The monthly engineering performance reports and the computer-generated performance charts provided NMPC senior management an effective tool to monitor the performance of each engineering group in various engineering activities. During this year, NMPC had made substantial improvement in reducing both the total number of outstanding T-mods and the T-mod durations.

6.0 REVIEW OF EVENT RESPONSES

The inspector reviewed NMPS's actions in response to the February 7, 1995, event at Unit 1 involving Agastat relay failures which resulted in plant shutdown. The inspector's review was to determine the appropriateness of NMPC' response to this events.

On February 7, 1995, Nine Mile 1 initiated a plant shutdown because of Agastat relay failures. These relays were used in the analog trip system. NMPC's response to these events are discussed as follows.

6.1 Agastat GP Relays

There are four analog trip system (ATS) cabinets located in the Unit 1 reactor building. These cabinets contained Rosemount trip units and Agastat GP series relays. Some of these relays were normally energized (NE), while the remaining were normally de-energized (ND). ATS is the portion of RPS that includes the relays associated with various parameters that feed the protective circuitry to initiate protective actions, such as reactor scram or core spray actuation. According to NMPC, the four ATS cabinets were supplied by General Electric Company (GE) and started services in 1980. Two of these normally-energized relays (K37A, B, C, D and K38A, B, C, D) in each cabinet were used to monitor the presence of RPS 24Vdc power supplies. Each relay had multiple normally open (NO) and normally closed (NC) contacts. However, only one NC and one NO contact were used. The NC contact was used to energize a local indicating light at the ATS cabinet, indicating RPS power was available. The NO contact was used to provide annunciation and energization of an indicating light in the control room "F panel" upon RPS power failure to the ATS cabinet. The relay coil was connected to the reactor protection system (RPS) logic circuitry. The location of the ATS cabinets was subject to a high energy line break (HELB) harsh environment. Some equipment in the ATS cabinet, including some ND Agastat GP relays, were required to function up to one hour and eight seconds after the HELB. Because K37 and K38 relay coils were connected to the RPS logic circuits, the relay coils must be able to maintain their electrical integrity and not to disrupt the RPS power supplies following a postulated HELB accident. Therefore, these eight relays (K37A, B, C, D and K38A, B, C, D) were required to be environmentally qualified (EQ). NMPC classified these relays to be EQ passive, since their active functions (closed or open relay contacts) were not considered safety-related. These relays were shown in a GE elementary wiring diagram, C-27064C, "Analog Trip System Cabinet A, B, C, D." Sheet 1. The inspector examined these cabinets and noticed that all relays were mounted horizontally next to each other, making it very difficult to observe the relay coil conditions.

6.2 Agastat GP Relay Failures

On December 20, 1994, while testing the ATS logic using Work Order 94-03419-00, the technicians pulled fuses F-PSIA-14A and F-PSIC-15C, and noticed that the indicating lights at "F panel" in the control room did not energize. However, the technicians observed that the indicating lights at the local panels did go off as expected. Subsequently, NMPC generated DER 1-94-2537 and determined that relays K37A and K38C were not functioning properly. NMPC issued Work Order 95-00302-00 on January 26 to replace these relays.

On February 7, 1995, while replacing these two relays, the technicians observed that both relays were severely degraded. The upper portions of the relay coil bobbins disintegrated. Since this degraded condition could affect many NE relays in the RPS system, NMPC issued DER 1-95-0275 to address this

problem. The EQ group and plant management were notified of this condition. Subsequently, a normal plant shutdown was initiated the same day at 8:30 p.m.

6.3 Immediate Corrective Actions

Following the above event, NMPC initiated an extensive effort in identifying the root causes and required corrective actions for this incident. NMPC also inspected the emergency diesel generator control cabinet and found that no GP relays were used. During the plant shutdown (coincident with the refueling outage), NMPC replaced all affected relays. A total of 64 NE relays were replaced in the ATS cabinets. NMPC conducted a thorough walkdown of other control cabinets and identified four more NE agastat GP relays in the anticipated transient without SCRAM (ATWS) system and these relays were also replaced. NMPC sent the removed old relays, except the eight EQ relays, to GLS Enterprises in Huntsville, Alabama, for functional testing. The GLS test indicated that although those relays were severely degraded, they were still operable.

6.4 Operability Evaluation

For the eight EQ relays that were not sent for testing, NMPC performed an operability analysis based on the assumption that if a HELB accident occurred just before replacement of the first two relays on February 7, 1995, these relays would not jeopardize the safe shutdown of the plant. These relays were required to maintain electrical integrity one hour and eight seconds following a postulated HELB in the surrounding area. The harsh environments for those areas would be: 1) temperature profile consisted of a 212°F peak for less than 1 minute, decreasing to 172°F after 500 seconds, and down to approximately 160°F at the 1-hour HELB duration; 2) pressure peak would be 1 psig at 100% relative humidity; and 3) total integrated dose (TID) would be $1x10^6$ rads. NMPC used the test results of Southwest Research Institute test Report 04-1738-001, and Wyle Laboratory Report 17655-ARY-1.1 as the basis for their analysis. The analysis concluded that although the affected relays could not perform their active functions (opening and closing relay contacts) which were not safety-related, they could maintain their electrical integrity during the 1-hour and 8 seconds following a HELB. The inspector reviewed this analysis and agreed that the conclusion was reasonable.

6.5 Root Cause Determination

NMPC attributed the cause for not replacing the NE agastat GP relays earlier to incorrect aging calculation by Wyle Laboratories in 1988. The Wyle Laboratory aging calculation for Agastat GP relays was based on the test results by Acton Laboratories in Acton, Massachusetts in 1988 (Acton Report 18227-81N-1). NMPC stated that Wyle Laboratory used incorrect activation energy for the relay coil bobbins (electrical activation energy was used instead of mechanical activation energy), and calculated the service life of NE GP relays to be 26.3 years, and the ND relays to be greater than 40 years. Following the February 7, 1995, incident, NMPC revised the aging calculation for agastat GP relays using test data from a Southwest Research Institute test and the Acton Laboratories test and determined the service life for NE relays to be 4.5 years and that for ND relays to be 21.94 years. Subsequently, NMPC

revised their EQ-required maintenance (EQRM) accordingly, scheduling the NE relays to be replaced within 4.5 years, and the ND relays within 21.94 years. The inspector reviewed the revised aging calculations and found them to be conservative.

6.6 Additional Corrective Actions For EQ Equipment

As part of the corrective actions for DER 1-95-0275, NMPC initiated Task 2.14 to determine if other normally energized EQ equipment had similar problems (equipment operated beyond their qualified life). The EQ files for the following equipment were reviewed and verified by the EQ engineers that the qualified lives were correct: 1) other types of NE relays, 2) NE solenoid-operated valves, and 3) certain NE electric motors. The results of Task 2.14 indicated no other EQ equipment had been operated beyond their qualified life.

On June 23, 1995, NMPC transmitted a 10 CFR Part 21 report to the NRC for the incorrect aging calculations of NE agastat GP relays performed by Wyle Laboratories. The NRC determined this to be not a generic concern because the Wyle Laboratories calculations were specifically used by Nine Mile Unit 1 only.

The inspector considered NMPC's corrective actions to address the EQ deficiency for the eight NE EQ relays to be appropriate. However, NMPC's failure to replace those relays before they became severely degraded, after more than 14 years in service in spite of a 4.5 years qualified life, was a violation of 10 CFR 50.49, Item e(5), which required the qualified equipment to be replaced or refurbished at the end of the qualified life unless ongoing qualifications demonstrated that the equipment had additional life. At the time of the inspection, there was no evidence that an ongoing qualification program was in place to demonstrate the equipment had additional qualified life. However, the NRC determined this violation not to be cited because the four criteria specified in Section VII.B.1 of the NRC Enforcement Policy were satisfied. Specifically, this was a Severity Level IV violation identified by NMPC; it was not a violation that could reasonably be expected to have been prevented by NMPC's corrective action for a previous violation; it was not a willful violation; and appropriate corrective actions had been implemented to prevent recurrence.

6.7 NMPC's Response to Operational Experience

NMPC's root cause analysis indicated that there were various opportunities for the 68 severely degraded NE Agastat GP relays to be identified and replaced. A review by the inspector of the industrial reports concerning the GP relay deficiencies is discussed as follows.

In 1983, Grand Gulf Nuclear Station experienced multiple failures (12 out of approximately 1700) of Agastat GP relays. Subsequently, Mississippi Power and Light Company issued a 10 CFR Part 21 report. A combined effort by GE and Amerace (manufacturer of Agastat relays) determined that the failures were due to end-of-service life for NE relays. On March 24, 1984, the NRC issued Information Notice (IN) 84-20 to alert nuclear utilities of accelerated thermal degradation of NE GP relays. Based on the test data obtained by GE,

the service life of NE GP relays were determined to be 4.5 years. Although Amerace modified the design for GP relays manufactured after 1977, IN 84-20 stated that there was no evidence that the new design would extend the service life of NE relays.

The inspector reviewed NMPC internal response to IN 84-20. This internal response stated that, "the equipment qualification program is looking into replacing the agastat relays due to 4.5 year energized service life."

In 1988 (about 8 years after the GP relays started service), NMPC hired Wyle Laboratories to perform an aging calculation for the GP relays based on the test data of an EQ test performed by Acton Laboratories. The Wyle calculation determined that, based on Arrhenius methodology which had been accepted by the NRC, the qualified life of NE GP relays was 26.3 years plus 24 hours accident conditions. This calculation was later determined by NMPC to be incorrect because the wrong activation energy was used in the calculation.

On July 17, 1990, NMPC was notified of the Turkey Point Unit 3 relay failures. Four normally energized agastat GP relays failed to function after 3 years and 8 months service. The cause of failure was determined to be thermally-induced embrittlement.

On May 28, 1991, NMPC was notified of Perry Plant relay failure. A NE Agastat GP relay failed to change state when de-energized. Failure analysis identified armature binding due to thermal degradation of relay coil bobbin.

On January 25, 1992, FitzPatrick reported that two NE Agastat GP relays responded sluggishly due to heat and age-related degradation. NMPC issued DER-92-0500, "Accelerated Aging of Agastat GP Relays." Corrective actions for this DER were not thorough enough to identify and correct Nine Mile Unit 1 over-aged GP relays.

All of the above information and operational experiences dealt with NE GP relay failures due to relay age and thermal degradation, which were very similar to the relay deficiencies at Nine Mile Unit 1. However, thorough corrective actions were never in place to identify and replace the over-aged NE GP relays before those relays were severely degraded. This constitutes a violation of 10 CFR 50, Appendix B, Criterion XVI, Corrective Action, which requires measures to be established to assure that conditions adverse to quality are promptly identified and corrected **(VIO 50-220/95-24-01)**. Lack of corrective actions was also identified by NMPC as the root cause of DER 1-95-0275. Although NMPC had taken extensive corrective actions for the February 7, 1995, incident, the inspector had not reviewed and verified these corrective actions during this inspection. In addition, the effectiveness of NMPC's operation experience program was not reviewed and assessed during this inspection.

6.8 Agastat Time Delay Relays

On December 31, 1987, the NRC issued Information Notice (IN) 87-66 to alert licensees of potential problems of using commercial-grade agastat 7000 series time delay relays (TDR) for safety-related applications. The IN stated that these TDRs were not suitable for safety-related application because the design, manufacturing, testing and modifications, including material substitutions for those relays were not controlled by the manufacturer. As a substitution, nuclear-grade E7000 series can be used. This information was also confirmed (in more detail) by Amerace (relay manufacturer) in a letter dated November 12, 1993. IN 87-66 also stated that the life expectancy of 7000 series was about 2 years and that for E7000 was 10 years. NMPC issued Problem Report 1529 on May 23, 1989, to address this issue. Because inaccurate documentation was used for review and walkdown was not conducted, no relays for safety-related applications were identified.

On May 1, 1992, NMPC issued DER 1-92-2016 to readdress the above issue. As a result, two series 7000 relays for safety-related application were identified. These two relays were subsequently replaced with nuclear-grade E7000 series relays.

During the walkdown for the resolution of DER 1-95-0275, NMPC identified additional series 7000 relays used for safety-related application. Subsequently, DER 1-95-0773 was issued to address 7000 series relay issue. Additional walkdown of cabinets in the auxiliary control room was conducted. NMPC identified six 7000 series relays used for safety-related functions. Five of those relays were in the automatic depressurization system (ADS) logic, and the sixth was an alarm relay in the instrument air system. These relays were removed and replaced by six nuclear-grade E7000 series relays during the spring 1995 refueling outage.

Following the removal of the six 7000 series relays, NMPC's Instrumentation and Control (I&C) department conducted a test of those relays on March 13, 1995, using Procedure N1 ISP066-003. The test result indicated all six relays were functional.

According to NMPC, the following corrective actions were completed for the resolution of DER 1-95-0773:

1) Performed equivalency evaluation of nuclear-grade E7000 series relays to commercial-grade 7000 series relays;

2) Generate seismic calculation for horizontal mount configuration;

3) Performed post-maintenance/surveillance tests for the installed new relays; and

4) Revised affected drawings, calculations, and data base.

These corrective actions had not been reviewed and verified by the inspector during this inspection.

The inspector determined that NMPC's failure to identify and replace promptly the unqualified agastat 7000 series relays for safety-related applications was a violation of 10 CFR 50, Appendix B, Criterion XVI, Corrective Actions, which requires measures to be established to assure that conditions adverse to quality to be promptly identified and corrected **(VIO 50-220/95-24-01)**. Lack of corrective actions was also identified by NMPC as the root cause of DER 1-95-0773.

6.9 Unit 2 Agastat GP Relays

The inspector asked about the conditions of Unit 2 Agastat GP relays. NMPC stated that all Agastat relays at Unit 2 were installed in the control building, and were not subject to a harsh environment. Therefore, the EQ rule did not apply to those relays. As a result of the Unit 1 February 7, 1995, event, NMPC issued DER 2-95-0299 on February 8, 1995, to address the Agastat relay issue. NMPC stated that they performed various aging calculations using the test data from Southwest Research Institute Report 04-1738-001, the measured temperature points at the relay locations, and the mechanical activation energy of 0.84 eV. These calculations indicated that the service life of the NE GP relays in the control building was greater than 14 years. Unit 2 had a preventive maintenance program in place to replace 50% of the NE GP relays during the next refueling outage, and the remaining 50% during the following outage, all within 14 years. NMPC stated that all calculations with supporting data and the relay replacement program were available for the NRC's review. The inspector considered this to be an unresolved item pending NRC's review and verification of NMPC's calculations **(URI 50-410/95-24-02)**.

6.10 Conclusion

The inspector concluded that NMPC responded appropriately to the relay failure event on February 7, 1995. NMPC shut down Nine Mile 1 as a conservative measure before the operability of the relays in the RPS logic could be determined. The corrective actions taken by NMPC in response to the February 7, 1995, event were determined to be appropriate. However, NMPC's previous corrective actions in response to operational experiences before 1993 were determined to be inadequate. A violation with two examples was identified in this area. In addition, a noncited violation of failure to replace environmentally-qualified equipment before the end of their qualified life was also identified.

7.0 FOLLOWUP OF PREVIOUS INSPECTION ITEM

7.1 (Closed) URI 50-410/95-01-02: Common Cause Failure of Unit 2 EDGs

(Closed) Unresolved Item 50-410/95-01-02 pertained to common cause failure of the emergency diesel generators (EDG) caused by design deficiency. LER 50-410/95-02 was issued to report the design deficiency of the EDG governor cooling system. Because this design deficiency could affect both Division I and Division II diesel generators, NMPC determined that Unit 2 had operated outside the design basis. In the operability analysis, NMPC determined that if a design basis accident (DBA) had occurred, Unit 2 could be shutdown safely. The analysis was based on a successful 24-hour operation of the

Division II EDG. Additional long-term core cooling could be provided by using the station blackout procedures to line up the Division III EDG to the emergency bus normally powered by Division II EDG. Because the continuous rating of the Division II EDG (2600 kW) was less than that of Division III EDG (4400 kW), and that the Division II EDG loading calculation indicated a electrical loading of greater than 2600 kW 24 hours after the DBA, the inspector questioned (during the March 1995 inspection) whether the Division III EDG had sufficient capacity to power the long-term cooling equipment.

During this inspection, the inspector verified that for long-term core cooling 24 hours following a DBA, only one residual heat removal (RHR) pump (1000 Hp), one service water pump (600 Hp) and one spent fuel cooling pump (415 Hp) were required. The total power consumption of these pumps were less than the continuous rating of the Division III EDG (2600 kW). NMPC explained that the other alternative was to use the diesel-driven fire pump (although not safety-related) to provide lake water for core cooling.

The inspector considered NMPC's explanations to be appropriate. This item is closed.

8.0 EXIT MEETING

NMPC's management was informed of the scope and purpose of this inspection at the entrance meeting on October 30, 1995. The findings of this inspection were discussed with the NMPC's representatives during the course of the inspection, and presented to NMPC management during the exit meeting on November 17, 1995. No proprietary materials were reviewed during this inspection. NMPC did not dispute the inspection findings at the exit meeting. A list of attendees is presented in Section 9.0.

On December 1, 1995, the inspector informed Mr. R. Abbot and other NMPC representatives during a telephone conversation that, as a result of additional document review, one additional example of the inadequate corrective action violation was identified. NMPC did not dispute the additional inspection findings.

9.0 PERSONS CONTACTED

Niagara Mohawk Power Corporation

R. Abbot, Vice President, Nuclear Generation
D. Baker, Engineer, Licensing
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U.S. Nuclear Regulatory Commission

M. Buckley, Resident Inspector
B. Norris, Senior Resident Inspector

All of the above personnel were present at the exit meeting on November 17, 1995.