UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

January 23, 2012

Mr. Kenneth Langdon, Site Vice President
Nine Mile Point Nuclear Station, LLC
P.O. Box 63
Lycoming, NY 13093-0063

SUBJECT: NINE MILE POINT NUCLEAR STATION - NRC UNRESOLVED ITEM FOLLOW-UP INSPECTION REPORT 05000220/2011011

Dear Mr. Langdon:

On December 9, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Nine Mile Point Nuclear Station Unit 1. The enclosed inspection report documents the results of the inspection which reviewed actions for an unresolved item (05000220/2008008-02) concerning the second level (degraded grid) voltage protection scheme. The results were discussed via teleconference on December 9, 2011, with Mr. Paul Swift and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations, and with the conditions of your license. The inspection involved a review of selected procedures, analyses, and records and interviews with station personnel.

This report documents one NRC-identified finding of very low safety significance (Green). The finding was determined to involve a violation of NRC requirements. The NRC is treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2 of the Enforcement Policy. If you contest this non-cited violation, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I, the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Nine Mile Point Nuclear Station.

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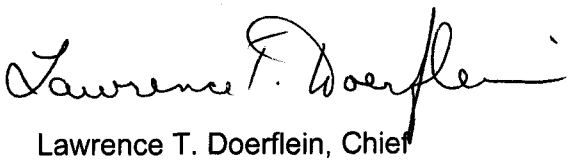
Sincerely,



Lawrence T. Doerflein, Chief
Engineering Branch 2
Division of Reactor Safety

Docket No.: 50-220
License No.: DPR-63

Enclosure:
Inspection Report 05000220/2011011
w/Attachment: Supplementary Information

cc w/encl: Distribution via ListServ

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Sincerely,

/RA/

Lawrence T. Doerflein, Chief
Engineering Branch 2
Division of Reactor Safety

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No.:	50-220
License No.:	DPR-63
Report No.:	05000220/2011011
Licensee:	Nine Mile Point Nuclear Station, LLC (NMP)
Facility:	Nine Mile Point, Unit 1
Location:	Oswego, NY
Dates:	November 14 through December 9, 2011
Inspector:	D. Kern, Senior Reactor Inspector
Approved By:	Lawrence T. Doerflein, Chief Engineering Branch 2 Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000220/2011011; 11/15/2011 - 12/9/2011; Nine Mile Point Nuclear Station, Unit 1; Problem Identification and Resolution.

This report covers a follow-up inspection for Unresolved Item (URI) 05000220/2008008-02. The inspection was performed onsite and in-office by a regional inspector. The inspector identified one finding of very low safety significance (Green). The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process (SDP)." The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

Cornerstone: Initiating Events

- Green. The inspector identified a finding of very low safety significance (Green) involving a non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion III "Design Control," in that station personnel did not implement appropriate measures to ensure design basis and regulatory requirements for the vital bus degraded voltage protection time delay were correctly translated into specifications, procedures, and instructions. Specifically, station personnel implemented the vital bus degraded voltage protection design modification which established a protection relay time delay that resulted in the Emergency Core Cooling System (ECCS) injection times exceeding the times assumed in the Updated Final Safety Analysis Report (UFSAR) Loss-of-Coolant Accident (LOCA) analysis. Constellation performed an operability determination and entered this issue into their corrective action program as condition report (CR) 2011-10339 to track resolution of this issue.

  The performance deficiency was determined to be more than minor because it was associated with the Design Control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inspector evaluated the finding in accordance with Inspection Manual Chapter (IMC) 0609, Significance Determination Process, Attachment 0609.04, "Phase 1-Initial Screening and Characterization of Findings." The finding was determined to be of very low safety significance because the issue was a design deficiency confirmed not to result in loss of operability. The principle underlying cause of this performance deficiency did not reflect current performance and, therefore, no cross-cutting aspect was assigned to this finding. (Section 4OA2)

Report Details

4. OTHER ACTIVITIES

4OA2 Problem Identification and Resolution (71152 - 1 sample)

.1 Annual Sample – (Closed) Unresolved item (URI) 05000220/2008008-02, Vital Bus Degraded Voltage Time Delay Licensing Basis

a. Inspection Scope

In 2008, a component design bases inspection (CDBI) team identified an issue related to design adequacy of the NMP Unit 1 Class 1E 4 kilovolt (kV) vital bus second level undervoltage (commonly known as "degraded" voltage) protection. Specifically, the team noted the existing time delay of a nominal 21 seconds, from detection of a sustained degraded voltage condition until vital bus transfer to the emergency diesel generators (EDGs), was longer than assumed by the LOCA analyses described in the UFSAR. Constellation engineers entered the issue into their corrective action program and subsequently determined that degraded voltage coincident with a LOCA was not a design basis event and, therefore, the degraded voltage time delay (DGV TD) set point did not impact the design basis LOCA/Loss-of-Offsite Power (LOOP) analysis. This URI was established to track the issue pending further NRC review to determine whether NMP Unit 1 was in compliance with their licensing basis for Class 1E 4kV vital bus degraded voltage protection. On October 12, 2010, Region I initiated Task Interface Agreement (TIA) 2011-003 (ML 102861981), requesting assistance from the NRC Office of Nuclear Reactor Regulation (NRR) staff in evaluating the licensing basis for the NMP Unit 1 degraded voltage relay function and determining whether the current station configuration met applicable regulatory requirements.

The inspector interviewed station personnel and reviewed various NMP Unit 1 design basis documents, corrective action program documents, maintenance records, license related correspondence between the NRC and Constellation, and NRC technical evaluations to determine whether the existing degraded voltage protection scheme met applicable regulatory requirements.

b. Findings

Introduction: The inspector identified a finding of very low safety significance (Green) involving a NCV of 10 CFR 50, Appendix B, Criterion III, "Design Control," because station personnel did not implement appropriate measures to ensure design basis and regulatory requirements for the vital bus degraded voltage protection time delay were correctly translated into specifications, procedures, and instructions. Specifically, station personnel implemented the vital bus degraded voltage protection design modification which established a protection relay time delay that resulted in the Emergency Core Cooling System (ECCS) injection times exceeding the times assumed in the UFSAR LOCA analysis.

Description:

Background

NMP Unit 1 UFSAR, Section IX, Electrical Systems, states the electrical system is designed to provide adequate normal and emergency sources of electrical power for normal operation and for prompt shutdown and continued maintenance of the Station in a safe condition under all credible circumstances. Automatic transfer of vital buses PB 102 and 103 from offsite power to onsite EDGs is initiated by low voltage or degraded voltage. UFSAR Table XV-9 lists significant plant input parameters to the LOCA analyses, including a maximum delay time from initiating signal to the last core spray (CS) topping pump at rated speed of 35 seconds.

Niagara Mohawk Power Corporation letter to the NRC dated July 14, 1977, confirmed the degraded voltage protection was installed in Unit 1 during the Spring 1977 refueling outage and that the DGV TD was such that ECCS (specifically core spray) would be available within the required 35 seconds as required by the FSAR (LOCA analyses). Initially, the inverse time characteristic relays were set with a 10 second time delay. However, as noted above, this was based on the licensee belief that degraded voltage coincident with a LOCA was not a design basis event and, therefore, the DGV TD set point did not impact the design basis LOCA-LOOP analysis. In 1984, the licensee requested and received NRC approval to lengthen the DGV TD set point to 18.5 $\pm$3 seconds (license amendment #67). In 1993, the licensee again requested a license amendment to expand the DGV TD set point band to > 3.4 seconds and < 60 seconds. The NRC approved the request and issued amendment #148 in 1994. The licensee implemented both license amendments. In 2008 and 2011, the NRC inspectors verified the NMP Unit 1 DGV TD relays were currently set at a nominal 21 seconds.

Although Constellation did not believe a degraded voltage event coincident with a LOCA was within their licensing basis, during the 2008 CDBI inspection the station engineers reviewed the CS time response for a LOCA coincident with degraded voltage event and a nominal 21 second DGV TD. Total time response included a 21 second DGV TD, plus 10 seconds for an EDG to start and energize a vital 4kV bus, plus 20 seconds for one train of CS and CS topping pump to start (assuming single failure of the opposite core spray train), plus 5 seconds for the CS topping pump to achieve rated speed. The station engineers estimated the time before the last core spray topping pump achieved full speed to be 56 seconds. Condition report (CR) 2008-007746 was initiated to further evaluate this issue. The licensee performed an operability determination (OD) and concluded the ECCS remained capable of performing its safety function, peak fuel clad temperature would remain below the 10 CFR 50.46 limit of 2200 degrees Fahrenheit (°F), and that the UFSAR LOCA analyses assumptions were met.

NRC Evaluation of NMP Unit 1 DGV TD Licensing Basis

On June 29, 2011, NRR issued its Final Response to TIA 2011-003 (ML 11171A702). The NRR staff concluded that Constellation's assertion that the NMP Unit 1 licensing basis does not include degraded grid voltage coincident with a LOCA event was incorrect. Incorporating the current DGV TD set points, the Class 1E 4kV degraded

voltage protection design scheme did not support the 10 CFR 50.46 LOCA analyses timing assumptions for establishment of ECCS flow as described in the UFSAR.

The NRC determination was based, in part, on the following:

- NMP Unit 1 UFSAR Section 1A "Principle Design Criteria," paragraph 7.0 documents the Unit 1 principal design criteria for the electrical power system. Paragraph 7.0 states, "Sufficient normal and standby auxiliary sources of electrical power are provided to assure a capability for prompt shutdown and continued maintenance of the Station in a safe condition under all credible circumstances."

- Since degradation of offsite power could cause loss of capability of safety-related equipment, the NRC requested, in NRC letter dated June 2, 1977, that all licensees, including NMP Unit 1, verify existing plant design or propose design modifications to ensure onsite emergency power systems met certain criteria to protect safety-related equipment against degraded grid voltage conditions. The criteria included Staff Position B.1.c.1 which states, "The second level of under-or-over voltage protection.....allowable time delay, including margin, shall not exceed the maximum time delay that is assumed in the FSAR accident analysis." In other words, the DGV TD should be short enough to ensure the total time duration from detection of a sustained degraded voltage condition to ECCS injection (core spray at rated speed) is within the maximum allowable time assumed in the FSAR accident analyses.

- Niagara Mohawk Power Corporation letter to the NRC dated July 14, 1977, in response to Staff Position 1, confirmed that the DGV TD was such that ECCS (specifically core spray) would be available within the required 35 seconds as required by the FSAR (LOCA analyses).

- In 1984 and 1994, license amendments (#67 and #148) were requested, approved, and implemented. Neither the Niagara Mohawk license amendment requests, nor the NRC approved license amendment safety evaluations specifically addressed whether the UFSAR LOCA analyses assumption for allowable delay between initiating signal and ECCS injection continued to be satisfied. The 2011 NRC TIA Final Response concluded that when performing these license amendment safety evaluations, the NRC staff had most likely assumed NMP Unit 1's design met the Staff Position B.1.c.1 or assumed that the time delays did not impact the accident analysis. At that time, the NRC staff was not aware the DGV TD set point revisions would exceed UFSAR LOCA analyses assumptions.

Based on review of the associated NRR TIA response and onsite inspection follow-up to this issue, including discussions with Constellation staff, the inspector concluded the existing DGV TD set point requirements listed in Technical Specification Table 3.6.2i were not bounded by existing UFSAR LOCA analyses.

During this inspection period, station personnel initiated CR 2011-010339 to address the nonconformance of the degraded voltage protection scheme discussed above. The

operability determination for CR 2011-010339 concluded the degraded voltage protection system remained capable of performing its safety function. In addition, the CR identified potential plant modifications to address the issue and established appropriate interim compensatory measures to prevent further revisions to the DGV TD set points until after CR 2011-010339 is resolved. The inspector reviewed the OD and noted it did not qualitatively or quantitatively address the affect on fuel peak clad temperature or oxidation during a LOCA concurrent with a sustained degraded voltage event. Additionally, the OD was based on analysis performed for only the GE11 fuel type. NMP Unit 1 is currently loaded with both GE11 and GNF2 fuel assemblies. The inspector discussed these deficiencies with station engineers. Constellation performed additional analysis and determined that peak fuel clad temperature and oxidation would remain within 10 CFR 50.46 limits and, therefore, the degraded voltage protection scheme remained capable of performing its safety function. The inspector concluded the revised OD was technically sound.

The inspector reviewed maintenance records (work orders C91065519 and C91065595) and determined that the actual DGV TD set points installed in the plant were bounded by the values evaluated in the OD.

Analysis: The inspector determined that the failure to implement appropriate measures to ensure design basis and regulatory requirements for the vital bus degraded voltage protection time delay were correctly translated into specifications, procedures, and instructions was a performance deficiency. The inspector determined that the performance deficiency was greater than minor because it is similar to IMC 0612, "Power Reactor Inspection Reports," Appendix E, "Examples of Minor Issues," examples 3.j and 3.k in that the resulting DGV TD set points were beyond that assumed in the NMP-1 UFSAR LOCA accident analysis and created reasonable doubt of ECCS operability. Additionally, the performance deficiency was associated with the Design Control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inspector evaluated the significance of this finding using IMC 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings." The finding was determined to be of very low safety significance because the issue was a design deficiency confirmed not to result in loss of operability. The principle underlying cause of this performance deficiency did not reflect current performance and, therefore, no cross-cutting aspect was assigned to this finding.

Enforcement: 10 CFR 50, Appendix B, Criterion III, "Design Control" requires, in part, that measures be established to ensure applicable regulatory requirements and design basis as specified in the license application are correctly translated into specifications, procedures, and instructions. Specifically, the NRC letter, dated June 2, 1977, specified that the degraded grid voltage time delay shall not exceed the maximum time delay that is assumed in the FSAR accident analysis. Contrary to the above, the licensee implemented the vital bus degraded voltage protection design modification in 1977 which established a protection relay time delay that resulted in the ECCS injection times exceeding the times assumed in the UFSAR Loss-of-Coolant Accident analysis. In addition, the DGV TD was increased in 1984 and 1994. Because the violation was of

CRs 2011-010339, 2011-010521, and 2011-010523 this violation is being treated as an NCV, consistent with the Enforcement Policy. **(NCV 05000220/2011011-01, Vital Bus Degraded Voltage Time Delay Not Maintained Within LOCA Analysis Assumptions)**

4OA6 Meetings, including Exit

Exit Meeting

On December 9, 2011, the inspector presented the inspection results to Mr. Paul Swift, Manager, Engineering Services, and other members of the NMP staff. The inspector verified no proprietary information was retained by the inspector or documented in this report.

ATTACHMENT: SUPPLEMENTAL INFORMATION

ATTACHMENT

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

B. Close, Supervisor, Fuels Engineering
T. Darling, Supervisor, Licensing Engineering
J. Dosa, Director, Licensing
M. Kahn, General Supervisor, Design Engineering
B. Shanahan, Supervisor, Electrical/I&C Design Engineering
M. Shanbhag, Senior Licensing Engineer
P. Swift, Manager, Engineering Services

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Open and Closed

05000220/2011011-01	NCV	Vital Bus Degraded Voltage Time Delay Not Maintained Within LOCA Analysis Assumptions (Section 4OA2)

Closed

05000220/2008008-02	URI	Vital Bus Degraded Voltage Time Delay Licensing Basis (Section 4OA2)

LIST OF DOCUMENTS REVIEWED

Section 4OA2: Problem Identification and Resolution

Procedures
CNG-CA-1.01-1000, Corrective Action Program, Rev. 0501
CNG-CM-1.01-1003, Design Engineering and Configuration Control, Rev. 0401
CNG-OP-1.01-1002, Conduct of Operability Determinations/Functionality Assessments, Rev. 0101
N1-RCSP-GEN-334, Operating Cycle Calibration for Loss and Degraded Voltage Relays on Emergency Switchgear, Rev. 0100

Condition Reports
2008-007746
2011-010339*
2011-010521*
2011-010523*
2011-010528*
* Condition Reports written as a result of inspection effort

Miscellaneous
General Electric Evaluation NEDC—31446P, NMP Unit 1 Loss of Coolant Accident Analysis with Two Spargers Available, dated September 1993
General Electric Hitachi Evaluation, Nine Mile Point Unit 1 Sustained Degraded Voltage Condition Concurrent with a LOCA PCT Assessment – Final Report dated November 8, 2008
General Electric Hitachi Evaluation, Nine Mile Point Unit 1 GNF2 ECCS-LOCA Evaluation dated January 2011
Constellation Letter to NRC, Response to NRC Generic Letter 2006-02 "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power" dated July 26, 2007
Niagara Mohawk Letter to NRC, Application to Convert Provisional Operating License to Full-Term Operating License or Alternatively to Extend the Termination Date of the Provisional Operating License dated July 5, 1972
Niagara Mohawk Letter to NRC Regarding NMP Unit 1 Degraded Voltage Analysis dated October 18, 1976
Niagara Mohawk Letter to NRC Regarding NMP Unit 1 Degraded Voltage Analysis dated November 30, 1976
Niagara Mohawk Letter to NRC Regarding NMP Unit 1 Undervoltage Protective Relaying Circuits dated August 3, 1984
Niagara Mohawk Letter to NRC, NMP Unit 1 Operating License Amendment Request dated April 13, 1984
Niagara Mohawk Letter to NRC, NMP Unit 1 Operating License Amendment Request dated November 18, 1993
Nine Mile Point Unit 1 Updated Final Safety Analysis Report, Rev. 22
NRC Administrative Letter 98-10, Dispositioning of TS That Are Insufficient to Assure Plant Safety
NRC Regulatory Issue Summary 2011-12, Adequacy of Station Electric Distribution System Voltages

LIST OF ACRONYMS

ADAMS	Agencywide Documents Access and Management System
CDBI	Component Design Bases Inspection
CFR	Code of Federal Regulations
CR	Condition Report
CS	Core Spray
DGV TD	Degraded Voltage Time Delay
ECCS	Emergency Core Cooling System
EDG	Emergency Diesel Generator
°F	Degrees Fahrenheit
FSAR	Final Safety Analysis Report
IMC	Inspection Manual Chapter
kV	Kilovolt
LOCA	Loss of Coolant Accident
MS	Mitigating Systems
NCV	Non-Cited Violation
NMP	Nine Mile Point Nuclear Station, LLC
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
OD	Operability Determination
SDP	Significance Determination Process
TIA	Task Interface Agreement
TS	Technical Specifications
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item