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NINE MILE POINT
NUCLEAR STATION

May 16, 2013

U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

ATTENTION: Document Control Desk

SUBJECT: Nine Mile Point Nuclear Station
Unit No. 1, Docket No. 50-220

Supplement to Nine Mile Point Nuclear Station License Amendment Request for Diesel Generator Initiation - Degraded Voltage Time Delay Setting Change

REFERENCE:
(a) Letter from C. Costanzo (NMPNS) to Document Control Desk (NRC), dated March 8, 2013, License Amendment Request Pursuant to 10 CFR 50.90: Diesel Generator Initiation - Degraded Voltage Time Delay Setting Change

(b) Letter from B. Vaidya (NRC) to C. Costanzo (NMPNS), dated April 24, 2013, Nine Mile Point Nuclear Station, Unit No. 1 - Unacceptable License Amendment Request - RE: Diesel Generator Initiation - Degraded Voltage Time Delay Setting Change With Opportunity to Supplement (TAC No. MF1022)

Nine Mile Point Nuclear Station, LLC (NMPNS) hereby submits a supplement to the Nine Mile Point Unit 1 (NMP1) License Amendment Request for Diesel Generator Initiation - Degraded Voltage Time Delay Setting Change, Reference (a), as requested by the NRC in Reference (b).

Attachment 1 is a summary of the supplement request clarifying that the current NMP1 degraded voltage setpoint complies with the criterion in Regulatory Issue Summary (RIS) 2011-12, "Adequacy of Electric Distribution System Voltages." Attachment 2 contains the excerpts from the preliminary degraded voltage study conducted to verify the degraded voltage setpoint and voltage values. The excerpts include the scope, design inputs and assumptions, acceptance criteria, and conclusions of the study.

A001
NRR

Pursuant to 10 CFR 50.91(b)(1), NMPNS has provided a copy of this supplemental letter, with Attachments 1 and 2, to the appropriate state representative.

There are no regulatory commitments in this submittal.

This supplemental letter does not change the initial determination of "no significant hazards consideration" justified in the original amendment request, Reference (a).

Should you have any questions regarding the information in this submittal, please contact John J. Dosa, Director Licensing, at (315) 349-5219.

I declare under penalty of perjury that the foregoing is true and correct. Executed on May 16, 2013.

Very truly yours,

Christopher R Costanzo

CRC/KJK

Attachments:
1. Supplemental Information for the License Amendment Request for Diesel Generator Initiation - Degraded Voltage Time Delay Setting Change
2. Preliminary Degraded Voltage Study Excerpts

cc: Regional Administrator, Region I, NRC
Project Manager, NRC
Resident Inspector, NRC
A. L. Peterson, NYSERDA

ATTACHMENT 1

SUPPLEMENTAL INFORMATION FOR THE LICENSE AMENDMENT REQUEST FOR DIESEL GENERATOR INITIATION - DEGRADED VOLTAGE TIME DELAY SETTING CHANGE

Nine Mile Point Nuclear Station, LLC
May 16, 2013

ATTACHMENT 1

SUPPLEMENTAL INFORMATION FOR THE LICENSE AMENDMENT REQUEST FOR DIESEL GENERATOR INITIATION - DEGRADED VOLTAGE TIME DELAY SETTING CHANGE

By letter dated March 8, 2013, Nine Mile Point Nuclear Station, LLC (NMPNS) requested NRC approval to implement a degraded voltage time delay setting change at Nine Mile Point Unit 1 (NMP1) in accordance with 10 CFR 50.90. Specifically, the proposed amendment would modify Technical Specification (TS) Table 3.6.2i, "Diesel Generator Initiation," by revising the existing 4.16kV Power Board 102/103 Emergency Bus Undervoltage (Degraded Voltage) Operating Time value and updating the Set Point heading title. The current voltage setpoint of ≥ 3705 volts was approved by the NRC with License Amendment 148, dated April 7, 1994 (TAC NO. M88256). This attachment provides supplemental information in response to the request documented in the NRC's letter dated April 24, 2013. The NRC request is repeated (in italics), followed by the NMPNS response.

NRC Request

The ongoing Component Design Basis Inspections have identified inadequate voltage setpoints at several nuclear plants and the NRC recently issued Regulatory Issue Summary (RIS) 2011-12, "Adequacy of Electric Distribution System Voltages," to inform the industry about the findings at some plants. In order for the staff to complete the review of the proposed amendment request, please provide additional information on the voltage setpoint as requested below.

1. *Validate that the voltage setpoint of 3705V satisfies the criterion delineated in the RIS as related to the starting and running voltage requirements for the safety related loads at all busses.*

2. *Provide excerpts from calculation(s) that establish the limiting voltage at various safety buses for equipment operability with the 102/103 Power Boards at 3705V.*

Response

NRC Request 1

A preliminary degraded voltage study was performed to address the concerns described in RIS 2011-12. The study calculates both motor starting and running voltages at the terminals of all safety-related equipment with the voltage at the Degraded Voltage Relay (DVR)-monitored buses at the DVR dropout setting of 3705V. This study was performed to validate that the voltage requirements (starting and running) for all safety related equipment were preserved by the DVR dropout voltage setpoint. This study concludes that adequate starting and running voltages are provided to all safety related equipment during bounding accident conditions with the DVR-monitored buses at the DVR dropout setting of 3705V. The methodologies used in the study satisfy the criterion delineated in RIS 2011-12 related to the starting and running voltage requirements for safety related loads.

SUPPLEMENTAL INFORMATION FOR THE LICENSE AMENDMENT REQUEST FOR DIESEL GENERATOR INITIATION - DEGRADED VOLTAGE TIME DELAY SETTING CHANGE

NRC Request 2

Attachment 2 contains excerpts from the preliminary degraded voltage study, including scope, design inputs and assumptions, acceptance criteria, and conclusions. A summary of the results of the study, showing limiting starting and running voltages at the safety related power board buses that are required to maintain equipment operability with Power Boards 102 and 103 at 3705V, is provided in Table 1 and Table 2 below.

Table 1: Train A Limiting Starting and Running Voltages – Power Board 102 at 3705V

Train A Safety Related Power Board Bus	Limiting Starting Voltage (in volts AC)	Limiting Running Voltage (in volts AC)
4160V Power Board 102	3,602	3,705
600V Power Board 161B	504	519
600V Power Board 167	504	519
600V Power Board 1671A	504	519
600V Power Board 16B	504	520

Table 2: Train B Limiting Starting and Running Voltages – Power Board 103 at 3705V

Train B Safety Related Power Board Bus	Limiting Starting Voltage (in volts AC)	Limiting Running Voltage (in volts AC)
4160V Power Board 103	3,574	3,705
600V Power Board 1671B	485	504
600V Power Board 1671C	485	504
600V Power Board 171B	495	514
600V Power Board 17B	495	514

ATTACHMENT 2

PRELIMINARY DEGRADED VOLTAGE STUDY EXCERPTS

PRELIMINARY DEGRADED VOLTAGE STUDY EXCERPTS

Scope of Study

The study scope includes evaluating both motor starting and running voltages while Power Boards 102 and 103 are held to 3705 Volts (89.06% of 4160). This voltage (3705 V), which is the Technical Specification setting, corresponds to the minimum dropout of the degraded voltage relay (Calculation 4.16KVAC-PB102/103SETPT/27). In addition, this study includes the temperature effects at accident temperatures (high energy line break - HELB) on the resistance and reactance values used in this calculation.

Inputs & Assumptions

1. The Thevenin equivalent sources feeding Power Boards 102 and 103 are assumed to have a short circuit strength of 175 MVA and an X/R ratio of 11. This assumption was based on reviewing the short circuit results associated with ETAP scenario C5-S2-SC as well as reviewing the short circuit rating of the nearby switchgear (350 MVA). Assuming a low short circuit strength is conservative since it will cause a greater voltage drop for the motor start simulations. This assumption only has an impact on the motor starting simulations; it has no impact on the steady state voltage simulations.

2. Unless otherwise known, motors are assumed to have a steady state voltage range capability in accordance with NEMA MG-1 (Section 12.44.1, +/- 10% of nameplate). Some of the 575 V motors have been specified to have lower voltage capabilities than the NEMA MG-1 minimum value (i.e., Containment Monitor sample pump motors and Control Room fan motor).

3. Unless otherwise known, equipment other than motors are assumed to have a steady state voltage range capability that is equal to the capability of motors.

4. Unless otherwise known, motors are assumed to have a minimum voltage starting capability of 80% of nameplate. Motors that have been found to require a higher starting voltage are shown in Table 1 below:

Table 1: Non Standard – Minimum Terminal Voltage Criteria (Starting)

Load Type	Nominal Volts	Rated Volts	Criteria (% Rated)	Criteria (Volts)	Criteria (% Nominal)	Basis for Criteria
Containment Monitor Sample Pump Motor	600	575	84.87	488.00	81.33	Motors run continuously and are not part of the LOCA start sequence

5. Unless otherwise known, motors are assumed to be operational (i.e., will not stall) if they are operating at a terminal voltage above 80% of nameplate. NEMA Design B Motors typically have a breakdown torque value of 2.0 per unit (reference NEMA Design B Motors, 1998, Revision 2, Section 12.39.1), so a voltage of 70% would be sufficient to keep NEMA B motors from stalling (torque is proportional to voltage squared). The issue of equipment operability for non-motor loads is equipment specific. Each piece of equipment required for accident mitigation having a low voltage is evaluated.

6. The two 2.5 HP Containment Monitor Sample Pump motors can be modeled as one 5.0 HP motor.

7. Any cable models that were added to the ETAP database were assumed to be routed in non-magnetic conduit or trays unless specifically known to be routed in conduit. Approximately 24 low voltage (600V or 480V) cables were added to the ETAP database. Any new low voltage cables were assumed to be rated for 1.0 kV and have copper conductors. Cables larger than #10 were assumed to be 3/C and/or triplex cables with the #10 cable being assumed to be 3 -1/C cables. The resistance and reactance values from the ETAP library are similar to the resistance and reactance values used in the ELMS program as shown in Table 2 below:

Table 2: Resistance and Reactance Values

Voltage Class (kV)	Cable Size	ETAP Cable Library	ETAP -AC Resistance 90 deg C (ohm / 1000 feet)	ELMS -AC Resistance 90 deg C (ohm / 1000 feet)	ETAP – AC Reactance (ohm / 1000 feet)	ELMS -AC Reactance (ohm / 1000 feet)
1	2	1.0NCUN3	0.212	0.203	0.039	0.030
1	4	1.0NCUN3	0.337	0.324	0.042	0.031
1	10	1.0NCUN1	1.258	1.301	0.050	0.033

8. Any cable models that were added to the ETAP database were assumed to have an ampacity equal to the ETAP default de-rated value.

9. Maximum conductor temperature was assumed to be 164 degrees C rather than the usual value of 90 degrees C. This conductor temperature is based on a worst case HELB environment temperature of 370 degrees F (187.8 degrees C) and a 50 degree C rise associated with current flow in the conductor. The resulting conductor temperature (237.8 degree C) was reduced to 164 degree C based on the assumption that one-half of the cable length would be exposed to the HELB environment and one-half of the cable length would be exposed to normal plant environment {(237.8+90)/2 = 164 degree C}. The basis for assuming only one-half of the cable length would be exposed to the HELB environment is contained in the the BWR Owner's Group document titled "Guideline for Voltage Drop Calculation for Evaluating Degraded Voltage Conditions and Thermal Overload Protection Application for Motor Operated Valves (Generic Letter 89-10)," February 1992. For simplicity, this conductor temperature of 164 degree C was applied to all cables and resulted in the cable resistance increasing by about 23% as compared to the 90 degree C resistance value.

10. The impact of operating a motor beyond its nominal brake horsepower rating is assumed to be consistent with the assumptions made by ETAP Version 7.1 with regards to power factor and efficiency. For Nine Mile Unit 1, the Control Rod Drive (CRD) NC08A and B (104% and 110%) and the Turbine Building ventilation exhaust fan (TBVEF) H-SPD 203-06 motors (103%) are assumed to be operating beyond their nominal rated horsepower.

11. The motor acceleration times are assumed to be the nominal values used in ELMSAC-DEGVOLT-STUDY.

12. MOVs are assumed to pull locked rotor current during their entire stroke interval.

13. The Static Battery Chargers (EPN numbers SC161A, SC161B, SC171A and SC171B) operate from a 575 V source with an allowable voltage range from +9% to -16%. This means the minimum required voltage is 483 volts = 80.5% of 600 volts.

14. The Static Uninterruptible Power Supply Systems (EPN numbers UPS162A, UPS162B, UPS172A and UPS172B) operate from a 575 V source with an allowable voltage range from +10% to -15%. This means the minimum required voltage is 488.75 volts = 81.46% of 600 volts.

15. The Containment Monitor sample pumps can operate with a voltage range of 575 VAC (+10% to -15%).

16. The Containment Monitor sample pumps require a voltage of 488 VAC (84.87% of 575 V or 81.33% of 600V) in order to start.

17. The Control Room Fan Motor 12 can run with a degraded voltage of 495 VAC (86.09% of 575 V or 82.5% of 600 V).

18. RFPAOP 51-165 (3 HP, 575V) has voltage capability of +/- 10% of rated.

19. Maximum HELB temperatures are as shown in Table 3 below.

Table 3: Maximum HELB Temperature

Description	Maximum Temperature (deg F)	Chart
Worst Case Plant – All EQ Zones	310	WCPLT
Worst Case Outside Primary Containment	310	WCOPC
Worst Case Reactor Building	308	RB29802
Worst Case Turbine Building	305	ST24001
Reactor Water Cleanup Aux Pump Room	370	RB26101

Special Note:
Maximum temperature of 370 deg F in RB26101 is excluded from "worst case" because break detection instrumentation and cable are the only EQ equipment in this zone.

20. The Control Room Chiller compressor 12 motor has been re-wound to 550 volts.

21. The loads on Powerboard 1671B are not needed for plant operation during a LOCA.

22. Calculation ELMSAC-DEGVOLT assumes that only one motor-driven reactor feed pump (RFP 29-03) starts coincident with the accident sequence; however, subsequent to the modification of the shaft driven RFP, both motor-driven RFPs would auto-start.

23. Calculation ELMSAC-DEGVOLT assumes that RFP 29-03 motor starts coincidently with the core spray actuation (time = 0). Analysis has shown that for the case when the non-safety and safety 4.16 kV buses are tied together (11 and 102) and (12 and 103), the RFP motors would start approximately 8 seconds after the core spray actuation. The scenario that causes the buses to be tied together and then the subsequent start of the RFP motors is a small break LOCA condition (reference ELMSAC-DEGVOLT-STUDY). A large break LOCA would start the RFPs before the safety and non-safety buses are tied together.

Acceptance Criteria

Running Voltage (Steady State)

1. 4 kV Motors
   90% of 4kV = 3600 volts = 86.538% of 4160V

2. 575V Motors
   90% of 575V = 517.5 volts = 86.25% of 600V

3. 550V Motors
   90% of 550V = 492 volts = 82.5% of 600V

Starting Voltages (Motor Starting)

1. 4kV Motors
   80% of 4kV = 3200 volts = 76.92% of 4160V

2. 575V Motors
   80% of 575V = 460 volts = 76.67% of 600V

3. 550V Motors
   80% of 550V = 440 volts = 73.33% of 600V

Conclusions

1. Some equipment steady state terminal voltages fell below the standard 90% voltage criteria. Three pieces of 550 V rated equipment had their terminal voltage fall below 90% of 550 V and thirty-three pieces of 575 V rated equipment had their terminal voltage fall below 90% of 575 V. The worst case 550 V rated equipment terminal voltage was 89.29% of 550 V and the worst case 575 V rated equipment terminal voltage was 85.99% of 575 V.

   The steady state voltages at the 4kV equipment terminals were adequate for each of the three steady state load flow simulations and had margin of about 3%.

   550V Equipment Voltage Exceptions

   Table 4 below summarizes the worst case steady state voltage exceptions for the 550V equipment. The voltages are displayed in % of 600 volts and the design criterion is 90% of 550V, or 82.5% of 600V.

Table 4: 550V Equipment Level Voltages (% of 600V - Sorted by Magnitude)

Equipment	Volts %	V/ Criteria
CMGSET MG167	81.85	0.992
DG 102 RFEF 209-03	82.10	0.995
DG 102 RFEF 209-04	82.19	0.996

   The CMGSET MG167 is not needed for accident mitigation and, therefore, only needs to be further evaluated for commercial consequences as opposed to safety consequences.

   The Diesel Generator roof exhaust fans are within their expected operability limit (80% of 550V = 73.33% of 600V, refer to Assumption #5) and, therefore, are not expected to stall.

   575V Equipment Voltage Exceptions

   Table 5 below summarizes the worst case steady state voltage exceptions for the 575V equipment. The voltages are displayed in % of 600 volts and the design criterion is 90% of 575V, or 86.25% of 600V.

Table 5: 575V Equipment Lowest Voltages (% of 600V - Sorted by Magnitude)			
Equipment	**Volts %**	**Voltage/ Criteria**	**Note/Bus**
HOT WTR CIRC PMP	82.41	0.955	1671B (Not needed during a LOCA)
CTRL RM FAN MTR 12	82.99	0.962	167C, Good down to 82.5%
UPS 162B	83.46	0.968	Good down to 81.46%
UPS 162A	83.46	0.968	Good down to 81.46%
LBRF 203-251	83.69	0.970	1671B (Not needed during a LOCA)
LAF 203-185	83.74	0.971	1671B (Not needed during a LOCA)
UPS 172B	83.85	0.972	Good down to 81.46%
UPS 172A	83.85	0.972	Good down to 81.46%
BATT CHG SC161A	84.31	0.978	Good down to 80.5%
BATT CHG SC161B	84.31	0.978	Good down to 80.5%
BATT CHG SC171B	84.72	0.982	Good down to 80.5%
BATT CHG SC171A	84.72	0.982	Good down to 80.5%
CT MON SYS SMPLP 11	84.75	0.983	161B, Good down to 81.46%
CTMT MON SMPL PU 12	84.91	0.985	171B, Good down to 81.46%
MOV 33-02R	85.19	0.988	161B (Not running during steady state)
PENT.HSE SPLY AIR FAN	85.35	0.990	600V PB PH-1 (Fed from 600V PB 14B, Non-Safety)
PENT.HSE AIR-COND	85.35	0.990	600V PB PH-1 (Fed from 600V PB 14B, Non-Safety)
MOV 33-01R	85.57	0.992	171B (Not running during steady state)
MOT-29-383	85.81	0.995	PB 141B (Fed from 600V PB 14C, Non-Safety)
FN-29-393	85.81	0.995	PB 141B (Fed from 600V PB 14C, Non-Safety)
MOT-29-265	85.82	0.995	PB 141B (Fed from 600V PB 14C, Non-Safety)
AIR COMP MOT 95-297	85.95	0.996	600V PB142 (Fed from 600V PB 14B, Non-Safety)
95-297 AUXILIARIES	85.95	0.996	600V PB142 (Fed from 600V PB 14B, Non-Safety)
95-297 WATER PUMP	85.95	0.996	600V PB142 (Fed from 600V PB 14B, Non-Safety)
DFDSP 104-16	85.97	0.997	Fed from 600V PB 161A, 16A, 4160V PB11, Non-Safety
TPHN RM2 AC	86.03	0.997	PB 141B (Fed from 600V PB 14C, Non-Safety)
TOVE 97.1-01	86.03	0.997	PB 141B (Fed from 600V PB 14C, Non-Safety)
UCNMS 203-59	86.03	0.997	PB 141B (Fed from 600V PB 14C, Non-Safety)
TRB BLDG ELEV	86.03	0.997	PB 141B (Fed from 600V PB 14C, Non-Safety)
LFEF 203-08	86.03	0.997	PB 141B (Fed from 600V PB 14C, Non-Safety)

Some of the equipment listed in the above table has degraded voltage capabilities that are below the standard 86.25% of 600V. That equipment has been noted along with the degraded voltage capability of the equipment. It should be noted that loads fed from safety related bus 1671B are not needed during a LOCA.

Loads in the above table that are not needed for accident mitigation only need to be evaluated for potential economic consequences as opposed to safety consequences.

The motor with the lowest equipment terminal voltage (HOT WTR CIRC PMP) has a terminal voltage of 82.41% of 600V, or 85.99% of 575V, which is still well above the assumed operability limit of 80% of 575V (refer to Assumption #5); therefore, none of the motors are expected to stall.

2. By comparing the Degraded Voltage Relay (DVR) characteristics with the 4kV bus voltage profiles, it can be concluded that the DVR would operate about 12-15 seconds into the scenario. The operation of the DVR is an expected result because the simulation starts by assuming that the 4 kV bus voltages are floating just above the minimum dropout of the DVR and then the LOCA loads are sequenced on. The addition of the LOCA loads will cause the bus voltage to dip further and hence the DVR relay will eventually operate. However, it is important to demonstrate that none of the overcurrent devices operate prior to the DVR for this scenario because this could cause those loads to be "locked out" and unavailable once the 4kV buses are energized with the emergency diesel generators.

3. The motor starting simulation (LOCA at time = 0) results in some exceptions to the standard assumed requirements for adequate motor starting voltages (80% of motor rated). These exceptions are noted in Table 6 below.

Table 6: Motor Terminal Voltage During Start (Voltages in % of Motor Rated)

Motor	Motor Rated V (kV)	Start Time (Sec)	Volts at start time (% of Rated)	Bus
RFP 29-03	4.000	8.00	78.39	12
RFPAOP 51-164	0.575	8.00	75.00	1671A
RFPAOP 51-165	0.575	8.00	70.57	1671C

Note that the above three motor loads (RFP 29-03, RFPAOP 51-164, and RFPAOP 51-165) are not safety related.