**Constellation Energy**
Nine Mile Point Nuclear Station

P.O. Box 63
Lycoming, New York 13093

January 14, 2005
NMP1L 1915

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Nine Mile Point Units 1 and 2
Docket Nos. 50-220 and 50-410
Facility Operating License Nos. DPR-63 and NPF-69

License Renewal Application – Responses to NRC Requests for Additional Information Regarding the Time-Limited Aging Analysis for Main Steam Isolation Valve Corrosion Allowance and the Closed-Cycle Cooling Water System Program (TAC Nos. MC3272 and MC3273)

Gentlemen:

By letter dated May 26, 2004, Nine Mile Point Nuclear Station, LLC (NMPNS) submitted an application to renew the operating licenses for Nine Mile Point Units 1 and 2.

In a letter dated December 21, 2004, the NRC requested additional information regarding the Time-Limited Aging Analysis for Main Steam Isolation Valve Corrosion Allowance described in Section 4.7.2 of the License Renewal Application (LRA), and the Closed-Cycle Cooling Water System Program described in Section B2.1.11 of the LRA. The NMPNS responses to these requests for additional information are provided in Attachment 1. This letter contains no new regulatory commitments.

If you have any questions about this submittal, please contact Peter Mazzaferro, NMPNS License Renewal Project Manager, at (315) 349-1019.

Very truly yours,

James A. Spina
Vice President Nine Mile Point

JAS/DEV/jm

A107

STATE OF NEW YORK :
: TO WIT:
COUNTY OF OSWEGO :

I, James A. Spina, being duly sworn, state that I am Vice President Nine Mile Point, and that I am duly authorized to execute and file this supplemental information on behalf of Nine Mile Point Nuclear Station, LLC. To the best of my knowledge and belief, the statements contained in this submittal are true and correct. To the extent that these statements are not based on my personal knowledge, they are based upon information provided by other Nine Mile Point employees and/or consultants. Such information has been reviewed in accordance with company practice and I believe it to be reliable.

Subscribed and sworn before me, a Notary Public in and for the State of New York and County of Oswego, this 14th day of January, 2005.

WITNESS my Hand and Notarial Seal:

Sandra A. Oswald
Notary Public

My Commission Expires: 1/14/05
Date

SANDRA A. OSWALD
Notary Public, State of New York
No. 01OS6032276
Qualified in Oswego County
Commission Expires 10/25/05

Attachment:
1. Responses to NRC Requests for Additional Information (RAI) Regarding the Time-Limited Aging Analysis for Main Steam Isolation Valve (MSIV) Corrosion Allowance and the Closed-Cycle Cooling Water System Program

cc: Mr. S. J. Collins, NRC Regional Administrator, Region I
Mr. G. K. Hunegs, NRC Senior Resident Inspector
Mr. P. S. Tam, Senior Project Manager, NRR
Mr. N. B. Le, License Renewal Project Manager, NRR
Mr. J. P. Spath, NYSERDA

## ATTACHMENT 1

**Nine Mile Point Nuclear Station**

**Responses to NRC Requests for Additional Information (RAI) Regarding the Time-Limited Aging Analysis for Main Steam Isolation Valve Corrosion Allowance and the Closed-Cycle Cooling Water System Program**

This attachment provides the Nine Mile Point Nuclear Station, LLC (NMPNS) responses to the requests for additional information contained in the NRC letter dated December 21, 2004, regarding the Time-Limited Aging Analysis (TLAA) for Main Steam Isolation Valve (MSIV) Corrosion Allowance described in Section 4.7.2 of the License Renewal Application (LRA), and the Closed-Cycle Cooling Water System Program described in Section B2.1.11 of the LRA. For each identified LRA section, the NRC RAI is repeated, followed by the NMPNS response for Nine Mile Point Unit 1 (NMP1) and/or Nine Mile Point Unit 2 (NMP2), as applicable.

### LRA Section 4.7.2, Main Steam Isolation Valve Corrosion Allowance (NMP2 Only)

RAI 4.7.2-1

*In the LRA, the applicant stated that flow accelerated corrosion (FAC) is considered negligible for low alloy steel in a dry steam environment, however the time-limited aging analysis (TLAA) includes a calculation for reduction in main steam isolation valve (MSIV) wall thickness due to FAC during plant operation. The applicant further stated that the predicted reduction in MSIV wall thickness due to FAC (7.12 mils) is more than twice the reduction in wall thickness that is predicted to occur while the valve is flooded and subjected to a treated water environment (3.3 mils). This predicted reduction in MSIV wall thickness due to FAC accounts for a significant contribution to the total calculated reduction in wall thickness in the TLAA. Please provide information to justify how FAC in a dry steam environment is considered negligible to the degree that MSIV wall thickness measurements are not specified in the formal FAC program, or identify the applicable program(s) for managing FAC for MSIV at NMP2.*

Response

The prediction of the actual expected wall thickness loss was based on conservative assumptions of the corrosion rate during outage and operational conditions. The corrosion rate in a dry steam environment during operation is negligible compared to the corrosion rate in air and oxygenated water environments. However, because the duration of exposure to dry steam will be much longer compared to the duration of exposure to air and oxygenated water, the total amount of wall loss predicted to occur during operation is not negligible. The total wall thickness loss

during operation due to FAC is 7.12 mils (0.00712 inches), based on a corrosion rate of 0.13 mils per year. The total calculated wall loss during outage periods, when the valve internals are exposed to oxygenated treated water, is 3.3 mils, based on a corrosion rate of 5 mils per year. The largest contribution to the total wall thickness reduction occurs while the valve internal surfaces are exposed to air during outages, which was calculated to be 15.2 mils, based on a corrosion rate of 3.3 mils per year. The total of calculated wall thickness losses for all environmental conditions is 25.6 mils (0.0256 inches) over a 60-year lifetime. This is not considered negligible; however, the calculation is based on conservative assumptions and the result still only represents approximately one-fifth of the total corrosion allowance of 0.120 inches. The time-limited aging analysis (TLAA) was thus judged to remain valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i). This conclusion has not changed.

In the NMP2 Main Steam System aging management review (AMR), the main steam isolation valves (MSIVs) were determined to be susceptible to loss of material due to FAC. The FAC Program is the aging management program assigned to manage this aging effect. This program follows the industry recommendations included in EPRI NSAC 202L, which is referenced in NUREG-1801, Section XI.M17, "Flow-Accelerated Corrosion." Typically, valves are not monitored directly for wall thinning because of non-parallel surfaces and material compositions (castings) that are not conducive to ultrasonic testing. Therefore, the piping downstream of valves is typically inspected in systems where FAC is a concern. More detail on the FAC Program can be found in LRA Section B2.1.9.

RAI 4.7.2-2

*In the LRA, the applicant included in the TLAA Section the use of predictive methods to calculate MSIV wall thinning. In order for the staff to evaluate the accuracy of these predictions, please provide actual measurements of the wall thickness of the MSIVs and the wall thinning that they have experienced. In addition, please provide a discussion of the actual reduction in wall thickness as compared to the reduction in wall thickness that would have been expected using the predictive methods applied in the TLAA.*

Response

The NMP2 MSIV bodies are visually inspected via the Inservice Inspection Program in accordance with the requirements of the ASME Code, Section XI. However, actual measurements of wall thinning are not required and have not been taken on the MSIV bodies. The FAC Program uses a predictive computer model (CHECWORKS) to identify critical locations for monitoring of FAC. The MSIVs were not identified as critical locations. The MSIV corrosion allowance was identified as a TLAA only because the NMP2 Updated Safety Analysis Report (USAR) provides the value of the 40-year corrosion allowance, not because of an actual concern with wall thinning due to FAC.

The corrosion rate used in the TLAA calculation for operating conditions (0.13 mils per year) was obtained from a predictive model output for piping immediately upstream of an MSIV. Because the predicted corrosion rates were so low, these locations would not be identified as critical areas for inspection.

**LRA Section B2.1.11, Closed-Cycle Cooling Water System Program**

RAI B2.1.11-1

*The jacket water cooling portion of the NMP1 Emergency Diesel Generator (EDG) System utilizes chromate as a corrosion inhibitor. In contrast, NMP2 employs nitrite as a corrosion inhibitor. When used as a corrosion inhibitor, nitrite does not prevent microbiological growth and, in fact, it serves as a nutrient for certain types of bacteria. Bacteria and microbiologically influenced corrosion (MIC) are frequently found in EDG cooling water systems. Operating experience shows that MIC was previously identified in the NMP1 EDG cooling water. Please discuss why NMP1 and NMP2 utilize different corrosion inhibitors in the EDG jacket cooling water. Please also provide a discussion of the operating experience at both units including the history of MIC at NMP1 and the reasons that you believe the NMP2 EDG cooling system will remain free of microbiological growth while operating with nitrite inhibitors.*

Response

The NMP1 and NMP2 Emergency Diesel Generator (EDG) Systems, including their cooling water subsystems, are described in LRA Sections 2.3.3.A.8 and 2.3.3.B.30, respectively. For each of the five diesel generators, two at NMP1 and three at NMP2, the cooling water subsystems include heat exchangers that are exposed to raw water on the tube side and treated water on the shell side. The raw water (untreated fresh water) is drawn from Lake Ontario, pumped through the tube side of the diesel engine heat exchangers, and discharged back to the lake, for both NMP1 and NMP2. The treated water on the shell side circulates between the diesel engine (where it absorbs heat) and the engine heat exchangers (where the heat is transferred to the raw water). For NMP1, the treated water contains chromates as a corrosion inhibitor. For NMP2, nitrite is used for the same function. Different chemicals are used at the two units due to industry practice at the time of initial plant operation. Even though the chromates used at NMP1 have been found to be carcinogenic, the costs for removal and disposal have been determined to be restrictive. Therefore, NMPNS has chosen to continue the use of two different chemicals as corrosion inhibitors for the diesel engines at the two units.

The aging management results for the diesel engine heat exchangers are shown in LRA Tables 3.3.2.A-7 and 3.3.2.B-29 for NMP1 and NMP2, respectively. For both units, the tube side (exposed to raw water) is managed by the Open-Cycle Cooling Water System Program and the shell side (exposed to treated water) is managed by the Closed-Cycle Cooling Water System Program. Operating experience at NMP1 has shown the occurrence of corrosion, tube leaks, and flow restrictions from microbiologically influenced corrosion (MIC) buildup due to exposure to the raw water environment. There has been no aging degradation identified on the shell side (exposed to chromate treated water). The heat exchangers were replaced in 1998 and 2002 with new heat exchangers that utilize a tube material that is more corrosion resistant. Inspections to date, since replacement, have not identified any occurrences of corrosion or tube leaks. Flow restrictions in the cooling water supply piping were removed by mechanical means, and this piping is now cleaned periodically to maintain required flow rates. NMP1 also performs quarterly testing of the chromate treated water to ensure that effective corrosion inhibitor is present.

For NMP2, operating experience has also shown occurrences of corrosion and tube leaks on the tube side of the diesel engine heat exchangers. This aging degradation is due to exposure to untreated raw water. Corrective actions have included mechanical removal of the corrosion and plugging of the leaking tubes, and could eventually include replacement of the NMP2 heat exchangers. NMP2 also performs monthly testing of the shell side (i.e., the treated water side) of the heat exchangers for bacteria and total organic carbons (TOC). If these parameters are found to be out of specification, or an adverse trend is observed, corrective action is taken that includes chemically treating or replacing the shell side water. Additionally, NMP2 performs chemical treatments of the service water twice a year that include the raw water portion of the EDG jacket water cooling system. These treatments are targeting macro organisms (zebra mussels) and have a secondary benefit of acting as a biocide for microorganisms, thereby helping to control microbiological growth on the tube side of the heat exchangers. Therefore, based upon the control of microbiological growth in the service (raw) water system and monthly sampling of the EDG jacket water cooling system, NMPNS would detect and correct contamination of the treated water side of the heat exchangers in a timely manner and minimize any microbiological growth.

RAI B2.1.11-2

*Given the operating experience with MIC in the NMP1 EDG jacket cooling water, please provide additional information to explain NMP's conclusion that NMP2 closed cooling water systems will not experience microbiological growth. Please provide a discussion of the testing of closed cooling water systems and the trending of the test results in those systems. For any closed cooling water systems that have experienced microbiological growth (including the NMP1 EDG cooling water system), please describe the corrective actions taken and any lessons learned that have been applied to the corrosion monitoring practices at both NMP1 and NMP2.*

Response

As described in the NMPNS response to RAI B2.1.11-1 above, the operating experience with MIC in the NMP1 EDG jacket water cooling system occurred on the open-cycle cooling water portion of the system. The MIC was induced due to the exposure of carbon steel piping to the raw water environment from Lake Ontario. Therefore, there is no direct relationship with this experience and the closed-cycle portion of the EDG jacket water cooling system at either unit.

However, as in the case of the EDG jacket water cooling systems, if a tube leak were to occur, there could be an introduction of raw water from the open-cycle portion of the system to the treated water portion of the system. This situation could only occur in the NMP1 EDG jacket water cooling system, NMP1 Reactor Building Closed Loop Cooling System, NMP1 Turbine Building Closed Loop Cooling System, NMP2 EDG jacket water cooling system, NMP2 Reactor Building Closed Loop Cooling System, and NMP2 Control Building Ventilation Chilled Water (HVK) System, since these systems have heat exchangers with treated water on one side (closed-cycle side) and raw water on the other side (open-cycle side). Except for the NMP2 HVK system, chemistry sampling on the closed-cycle portion of these systems is currently performed either quarterly or more frequently than quarterly. Sampling of the NMP2 HVK system is included in the enhancements identified for the Closed-Cycle Cooling Water System Program, as

described in LRA Sections A2.1.14 and B2.1.11. To date, operating experience has identified corrosion in the closed-cycle portions of the systems but no occurrences of MIC that exceed the acceptance criteria. The extent of corrosion was evaluated for impact on system operability and was mechanically removed as necessary. Also, if sampling results were to indicate raw water intrusion into the treated water portion, the condition would be evaluated and corrective actions, including heat exchanger tube plugging, would be implemented to resolve the condition. Therefore, based upon the design of the applicable systems, chemistry sampling practices, and operating experience, NMPNS concludes that MIC is not an aging effect of concern for the closed-cycle portions of the above listed systems.