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November 5, 2010

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

ATTENTION: Document Control Desk

SUBJECT: Nine Mile Point Nuclear Station
Unit No. 2; Docket No. 50-410

Response to Request for Additional Information Regarding Nine Mile Point Nuclear Station, Unit No. 2 – Re: The License Amendment Request for Extended Power Uprate Operation (TAC No. ME1476) – Steam Dryer

REFERENCES: (a) Letter from K. J. Polson (NMPNS) to Document Control Desk (NRC), dated May 27, 2009, License Amendment Request (LAR) Pursuant to 10 CFR 50.90: Extended Power Uprate

(b) Letter from R. Guzman (NRC) to S. L. Belcher (NMPNS), dated October 6, 2010, Request for Additional Information Regarding Nine Mile Point Nuclear Station, Unit No. 2 – Re: The Steam Dryer Review of the Licensing Amendment Request for Extended Power Uprate Operation (TAC No. ME1476)

Nine Mile Point Nuclear Station, LLC (NMPNS) hereby transmits revised and supplemental information in support of a previously submitted request for amendment to Nine Mile Point Unit 2 (NMP2) Renewed Operating License (OL) NPF-69. The request, dated May 27, 2009 (Reference a), proposed an amendment to increase the power level authorized by OL Section 2.C.(1), Maximum Power Level, from 3467 megawatts-thermal (MWt) to 3988 MWt. By letter dated October 6, 2010 (Reference b), the NRC staff requested additional information (RAI) regarding the steam dryer.

The responses to the RAIs are provided in Attachment 1 (non-proprietary) and Attachment 4 (proprietary).

Attachment 4 is considered to contain proprietary information exempt from disclosure pursuant to 10 CFR 2.390. Therefore, on behalf of Continuum Dynamics Incorporated (CDI), NMPNS hereby makes application to withhold this attachment from public disclosure in accordance with 10 CFR 2.390(b)(1). An affidavit from CDI detailing the reason for the request to withhold the proprietary information is provided in Attachment 3.

This letter forwards proprietary information in accordance with 10 CFR 2.390. The balance of this letter may be considered non-proprietary upon removal of Attachment 4.

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NRR

Attachment 2 lists new regulatory commitments identified in this submittal.

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

Very truly yours,

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

I, Joe Pacher, being duly sworn, state that I am Manager – Engineering Services, and that I am duly authorized to execute and file this response on behalf of Nine Mile Point Nuclear Station, LLC. To the best of my knowledge and belief, the statements contained in this document 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 5th day of November, 2010.

WITNESS my Hand and Notarial Seal:

Notary Public

My Commission Expires:

1/17/2011
Date

AMY A. GREEN
Notary Public State of New York
Registration No. 01GR5038047
Qualified in Oswego County
Commission Expires January 17, 2011

JP/STD

Attachments:

1. Response to Request for Additional Information Regarding License Amendment Request for Extended Power Uprate Operation (NON-PROPRIETARY)

2. List of Regulatory Commitments

3. Affidavit Justifying Withholding Proprietary Information From Continuum Dynamics Incorporated (CDI)

4. Response to Request for Additional Information Regarding License Amendment Request for Extended Power Uprate Operation (PROPRIETARY)

cc: NRC Regional Administrator, Region I
NRC Resident Inspector
NRC Project Manager
A. L. Peterson, NYSERDA (w/o Attachment 4)

ATTACHMENT 1

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT REQUEST FOR EXTENDED POWER UPRATE OPERATION (NON-PROPRIETARY)

Certain information, considered proprietary by Continuum Dynamics Incorporated, has been deleted from this Attachment. The deletions are identified by double square brackets.

ATTACHMENT 1
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT REQUEST FOR EXTENDED POWER UPRATE OPERATION (NON-PROPRIETARY)

By letter dated May 27, 2009, as supplemented on August 28, 2009, December 23, 2009 February 19, 2010, April 16, 2010, May 7, 2010, June 3, 2010, June 30, 2010, July 9, 2010, July 30, 2010, October 8, 2010, and October 28, 2010, Nine Mile Point Nuclear Station, LLC (NMPNS) submitted for Nuclear Regulatory Commission (NRC) review and approval, a proposed license amendment requesting an increase in the maximum steady-state power level from 3467 megawatts thermal (MWt) to 3988 MWt for Nine Mile Point Unit 2 (NMP2). By letter dated October 6, 2010, the NRC staff requested additional information in the steam dryer assessment area. The responses to those requests for additional information are provided in this Attachment. The NRC request is repeated (in italics), followed by the NMPNS response.

NMP2-EMCB-SD-RAI-6 S01 (a)

The applicant is requested to provide updated NMP2 main steam line (MSL) data and dryer loads in a revision to Continuum Dynamics, Inc. (CDI) Report No.10-10P, "Acoustic and low frequency hydrodynamic loads at CLTP [current licensed thermal power] level on Nine Mile Point Unit 2 Steam Dryer to 250 hertz (Hz) using ACM Rev. 4.1," following resolution of the follow-up RAI NMP2-EMCB-SD-RAI-8 S01.

NMNPS Response

A revised CDI Report No. 10-10P will be provided that includes the details of the response to NMP2-EMCB-SD-RAI-8 S01 by December 10, 2010.

NMP2-EMCB-SD-RAI-6 S01 (b)

As described in CDI Report 10-11P, "Stress Assessment of Nine Mile Point Unit 2 Steam Dryer Using the Acoustic Circuit Model Rev. 4.1," dated June 30, 2010, and CDI Report 10-12P, "Design and Stress Evaluation of Nine Mile Point Unit 2 Steam Dryer Modifications for EPU Operation," dated July 30, 2010, the applicant considered several modifications at high-stress locations and showed that the corresponding minimum alternating stress ratio (SR-a) for the dryer with all the modifications implemented is 2.85 at CLTP power level. With velocity-square bump-up factor [[ ]], the stress ratio at EPU would be greater than 2.0. However, as discussed in supplementary RAI NMP2-EMCB-SD-RAI-17 S01, the bump-up factor may be higher than velocity-square. Therefore, the minimum alternating stress ratio at EPU power level for some of the locations identified in the above three groups may be less than 2.0. The licensee is requested to reevaluate the alternating stress ratios for the high-stress locations (Groups 1-4 locations) after the supplementary RAI NMP2-EMCB-SD-RAI-17 S01 related to bump-up factor and RAI NMP2-EMCB-SD-RAI-8 S01(a) related to coherence estimates are resolved.

NMNPS Response

The response to NMP2-EMCB-SD-RAI-17 S01 concludes that the appropriate bump-up factor remains velocity squared. Thus, re-evaluation is not required to address NMP2-EMCB-SD-RAI-17 S01.

A revision to this RAI response will be issued to address the final response to NMP2-EMCB-SD-RAI-8 S01(a) by December 10, 2010.

NMP2-EMCB-SD-RAI-6 S01 (c)

The stress analysis results presented in CDI Report 10-11P, "Stress Assessment of Nine Mile Point Unit 2 Steam Dryer Using the Acoustic Circuit Model Rev. 4.1," Rev. 0, dated June 30, 2010, show that a group of locations (referred to as Group 4) has the minimum alternating stress ratio of 2.65 at CLTP. As discussed in Section 6 of the report, the applicant states that structural modifications are not warranted for these locations because it believes that the ratio would be 2.76 or higher under the following two considerations: (i) use of Fatigue Curve B instead of A of Fig. I-9.2.2, Appendix I, American Society of Mechanical Engineers (ASME) Section III, and (ii) use of [[ ]]. The applicant further states that power ascension testing will demonstrate substantial margin without any modification of the Group 4 locations. The NRC staff has several technical concerns for not accepting the applicant's reasons for not making any modifications to Group 4 locations. However, it appears that the applicant has changed its position and decided to make needed modifications to Group 4 locations. In CDI Report 10-12P, "Design and Stress Evaluation of Nine Mile Point Unit 2 Steam Dryer Modifications for EPU Operation," Rev. 0, dated July 30, 2010, the applicant considers additional structural modifications at Group 4 locations and the corresponding stress analysis results show that the minimum alternating stress ratio for the dryer with all the modifications implemented is 2.85. Since the CDI Report 10-12P was submitted to the NRC as an attachment to the licensee's letter dated July 30, 2010, and the response to RAI NMP2-EMCB-SD-RAI-6 was submitted as an attachment to the licensee's letter dated June 30, 2010, it appears that the report supersedes the RAI response. The applicant is requested to confirm whether the CDI Report 10-12P supersedes the response to RAI NMP2-EMCB-SD-RAI-6.

NMNPS Response

Note that usage of Fatigue Curve B in CDI Report No. 10-11P (submitted by NMPNS letter dated June 30, 2010) and CDI Report No. 10-12P (submitted by NMPNS letter dated July 30, 2010) is limited to qualitative inferences that imply additional margin is present, but is not credited. All numerical results and tabulated stress ratios in these reports use Fatigue Curve C.

CDI Report Nos. 10-11P and 10-12P are complementary, with the latter report providing a more detailed design of the proposed modifications. CDI Report No. 10-12P includes the modifications for Group 4; these modifications were only evaluated from a qualitative perspective in CDI Report No. 10-11P. Both reports supersede CDI Report No. 09-26P (submitted by NMPNS letter dated December 23, 2009).

NMP2-EMCB-SD-RAI-7 (b) S01

In their response to part (b) of RAI NMP2-EMCB-SO-RAI-7, the applicant provides the approximate recirculation pump frequencies of 126 and 129 Hz in CDI Report No. 10-09P, "ACM Rev. 4.1: Methodology to predict full-scale steam dryer loads from in-plant measurements," Rev. 1, June 2010, but does not show the signal amplitudes at those frequencies. Therefore, the applicant is requested to provide modified Figures 5.2a-b in CDI Report No.10-09P to include signals at the recirculation pump frequencies.

NMPNS Response

The only signal conditioning performed by CDI on either the Quad Cities Unit No. 2 (QC2) main steam line (MSL) data or steam dryer pressure data was the removal of electrical noise at 60 and 180 Hertz (Hz) from the MSL data. The recirculation vane passing frequencies for the QC2 Original Licensed Thermal Power (OLTP) data were approximately 126 and 129 Hz. [[

]] Figures 5.2a and b in CDI Report No. 10-09P (submitted by NMPNS letter dated June 30, 2010) show the raw signals provided to CDI by Exelon. [[ ]]

NMP2-EMCB-SD-RAI-8 S01 (a)

CDI Report No.10-09P, "ACM Rev. 4.1: Methodology to predict full-scale steam dryer loads from in-plant measurements," Rev. 1, June 2010, states that a new version of the ACM, Rev. 4.1, is being used to simulate the NMP2 fluctuating steam dryer loads. The ACM 4.1 uses a [[ ]] applied to both the NMP2 data, as well as the QC2 benchmark data, as described in Section 5.1 of the report. The NRC staff has reviewed this [[ ]] and concludes that [[ ]]. Also, coherence uncertainties can be computed for very low coherences. Therefore, there is [[ ]]. In addition, there is [[ ]]. The NRC staff requests the applicant to determine the [[ ]] such that they are conservative and provide the technical basis for the estimates.

NMNPS Response

Based on the NRC RAI and the discussions between NMPNS and the NRC staff on September 23, 2010, NMPNS is re-formulating the Acoustic Circuit Model (ACM) Rev. 4.1 model so that:

1. [[ ]]
2. [[ ]] The application of the model to the NMP2 steam dryer is then done consistent with the benchmark analysis.

Interim benchmark results are shown in Figure RAI-8 S01 (a) - 1. These figures are typical of the revised benchmark using this approach and should be compared to Figures 6.2f and 6.2h of CDI Report No. 10-09P, Rev. 1 (submitted by NMPNS letter dated June 30, 2010). This approach addresses the concern raised in the RAI with regard to the application of the coherence filter. A revised benchmark report (CDI Report No. 10-09P) and NMP2 specific loads report (CDI Report No. 10-10P) will be provided based on this approach by December 10, 2010.

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Figure RAI-8 S01 (a) - 1 - Power Spectral Density (PSD) comparison at 790 Megawatt Electric (MWe) for pressure sensor data (black curves) and current Acoustic Circuit Model (ACM) Rev. 4.1 prediction (red curves), for P12 (top) and P21 (bottom)

NMP2-EMCB-SD-RAI-8 S01 (b)

The procedure used to estimate [[ ]] is based on the assumption that the [[ ]]. The applicant is requested to provide plots of the [[ ]] at the low power level used in the Quad Cities Unit No. 2 (QC2) benchmark. If the [[ ]] are not nearly zero, the applicant should justify their assumption that the low power measurements are [[ ]]. The applicant is requested to provide the same information for the NMP2 calculations.

NMNPS Response

Figure RAI-8 S01 (b) - 1 and Figure RAI-8 S01 (b) - 2 show the coherences for the low power signals used in QC2 and NMP2, as requested. The coherence analysis is described in Section 5.1 of CDI Report No. 10-09P, Rev. 1 (submitted by NMPNS letter dated June 30, 2010).

The coherence between upper and lower strain gage arrays from the MSL of QC2 and NMP2 at low power conditions is shown in Figure RAI-8 S01 (b) - 1. [[

]]

[[

]] The strain gages show an average coherence of approximately 0.4. [[

]] The coherence in the present analysis is only used to scale the reduction of upper and lower MSL measurements and errors associated with this scaling are accounted for in the bias and uncertainty and added back into the pressure loading.

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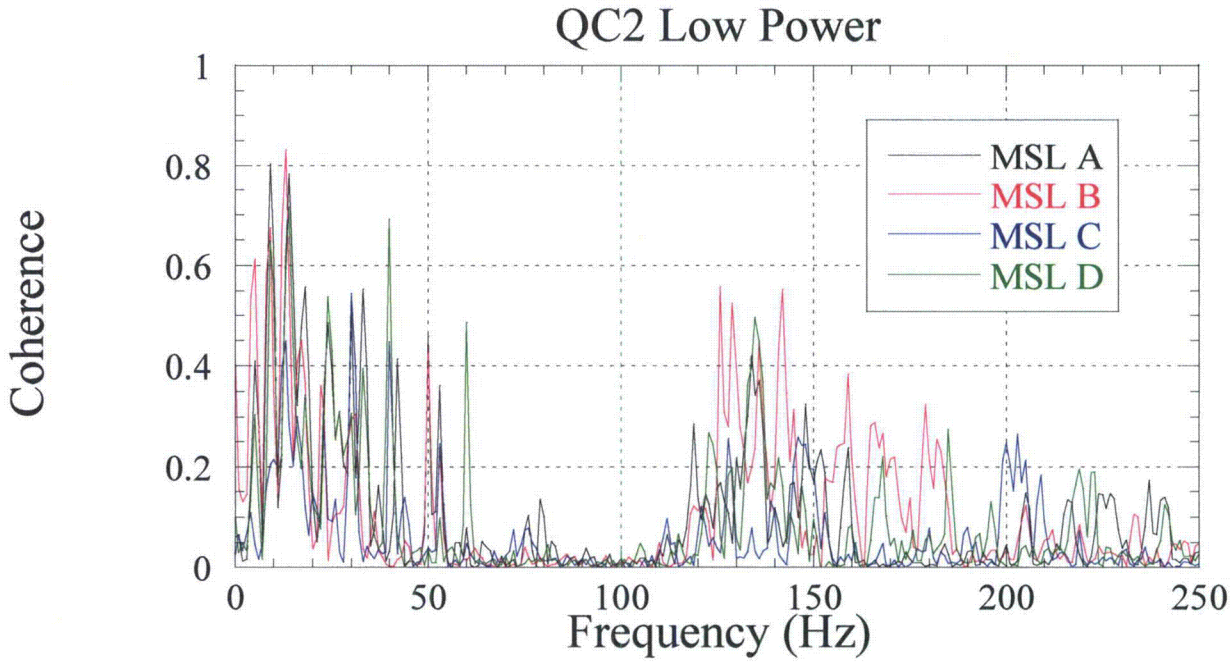

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Figure RAI-8 S01 (b) – 1 - Low power coherence.

[[

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Figure RAI-8 S01 (b) – 2 - [[

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NMP2-EMCB-SD-RAI-8 S01 (c)

The applicant is requested to provide the signal processing and time record parameters, such as time record length, window length, window type, number of averages, and any other parameters of interest, used to compute the QC2 benchmark MSL spectra and coherences. The applicant should also explain whether the same time record and signal processing parameters are used for the NMP2 MSL measurements and calculations. If the parameters are different, then the applicant is requested to establish the effects of the differences on the estimated dryer loads and stresses.

NMNPS Response

The differences between the QC2 and NMP2 signals are shown below:

Plant	Samples/sec	Sample Time (sec)	Points Analyzed
QC2	2000	65.5	131,072
NMP2	2500	104.9	262,144

Table RAI-8 S01 (c) – 1 – Differences Between QC2 and NMP2 Signals

The delta frequency is less than 0.16 Hz. The windowing for coherence and power spectral density (PSD) are 1 Hz. There should be no effect on the estimated dryer loads and stresses as a result of the differences summarized in Table RAI-8 S01 (c) - 1.

NMP2-EMCB-SD-RAI-8 S01 (d)

It is well established that the accuracy and uncertainty of complex dynamic fluid-structure simulation tools are frequency dependent. The applicant is requested to provide a table of bias errors and uncertainties for the ACM 4.1 over frequency ranges consistent with those used for the ACM 4.0.

NMNPS Response

NMPNS will revise the ACM Rev. 4.1 model to provide bias and uncertainty values over frequency ranges consistent with those used for ACM Rev. 4.0 by December 10, 2010. These bias and uncertainty values will be very similar to those shown in Figure RAI-8 S01 (d) - 1. These were previously provided to the NRC staff at the March 18, 2010 meeting.

[[

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Figure RAI-8 S01 (d) -1 – Bias and Uncertainty Values Provided at Meeting Conducted on March 18, 2010

NMP2-EMCB-SD-RAI-17 S01

In the licensee's response to RAI-17, which is included in Attachment 3 of the RAI response letter dated May 7, 2010, NMPNS states that the [[ ]]. This value is larger than the velocity-squared factor of [[ ]] used by CDI in the dryer stress analysis at EPU. NMPNS states that since the acoustic resonance of the safety relief valve standpipes is not expected to occur at EPU, it is appropriate to use the velocity-squared factor as the bump-up factor. To substantiate this position, NMPNS cites pressure measurements in the literature taken on surfaces exposed to turbulent boundary layers and refers to Boiling Water Reactor Vessel and Internals Project (BWRVIP) Report 182, which includes a guidance flow chart to screen for acoustic resonance conditions. First, the flow in the reactor dome includes turbulent free jets issuing from the dryer vanes, separated flow over the dryer sides, and swirl flow at the steam lines inlets. These flow types are much more complex than turbulent flow along a flat surface, which is referred to by NMPNS. Secondly, BWRVIP-182 recommends using the velocity squared ratio as a "minimum value" for the bumpup factor when the scale model test results yield lower values. This procedure was agreed upon and confirmed by the BWRVIP in its response to NRC RAI 8 on Report BWRVIP-182. In its response, the BWRVIP stated that, "At any frequency, the factor used to increase the in-plant CLTP pressures shall not be less than the ratio of flow velocities squared." Therefore, since the measured mean value of the bump-up factor (Fig. 9.1 of CDI Report No. 08-13P, Rev. 1) is consistently higher than the velocity-squared factor over the whole frequency range of interest (0-250 Hz), the applicant is requested to use the [[ ]] in the dryer stress analysis at EPU conditions. The NRC staff's evaluation of the dryer stress ratio at EPU will be based on a [[ ]] over the frequency range of interest.

NMPNS Response

The computed bump-up factor from subscale test data (shown in Figure 9.1 of CDI Report No. 08-13P, Rev. 1 (submitted by NMPNS letter dated May 27, 2009)) was based on a conservative examination of the available test data (summarized in Table 6.1 of CDI Report No. 08-13P, Rev. 1). The two tests used to compute the bump-up factor are shown in Table RAI-17 S01 - 1:

Test Designation	Test Date	Orifice Diameter (in)	Mach Number	Comments
nmp-f509-18	04/22/08	[[ ]]	[[ ]]	[[ ]]
nmp-f509-47	04/25/08	[[ ]]	[[ ]]	[[ ]]

Table RAI-17 S01 – 1 – Data for Test Designations nmp-f509-18 and nmp-f509-47

It is noted that the Mach number at Current Licensed Thermal Power (CLTP) conditions is 0.0933, while the Mach number at Extended Power Uprate (EPU) conditions is 0.1099 (Table 5.1 of CDI Report No. 08-13P, Rev. 1). Thus, the use of Test nmp-f509-18, with a Mach number of 0.1128, is conservative and leads to a mean bump-up factor of [[ ]] as shown in Figure 9.1 of CDI Report No. 08-13P, Rev. 1.

[[

]] (also from Table 6.1 of CDI Report No. 08-13P, Rev. 1):

Test Designation	Test Date	Orifice Diameter (in)	Mach Number	Comments
nmp-f509-09	04/21/08	[[ ]]	[[ ]]	[[ ]]
nmp-f509-41	04/23/08	[[ ]]	[[ ]]	[[ ]]

Table RAI-17 S01 – 2 – Data for Test Designations nmp-f509-09 and nmp-f509-41

[[

]] Their ratios give the bump-up factors shown in Figure RAI-17 S01 - 1:

[[

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Figure RAI-17 S01 – 1 – Bump-up Factor Developed from NMP2 Subscale Data

The eight locations are shown by the eight pressure transducer identifiers. A solid line shows the average bump-up factor for all eight main steam line locations.

The average of the bump-up factors, from the interpolated subscale test data, is [[ ]], compared to the velocity-squared factor of [[ ]] used in the EPU analysis.

Figure RAI-17 S01 – 1 would replace Figure 9.1 in CDI Report No. 08-13P, Rev. 1 (submitted in the NMPNS License Amendment Request dated May 27, 2009) if the report were revised to reflect the calculation of bump-up described above.

NMP2-EMCB-SD-RAI-18 S01

It appears that the applicant has misunderstood the RAI. The RAI does not suggest that the stress at the node on the weld be treated as nominal stress. Therefore, this RAI provides additional clarification.

In Section 4.4 of the CDI Report 09-26P, "Stress Assessment of Nine Mile Point Unit 2 Steam Dryer at CLTP and EPU Conditions", the fatigue stresses at a limited number of fillet welds are calculated by estimating the nominal stress at the weld and multiplying it by factor of 4 in accordance with the ASME Code, Section III, Table NG-3352-1. The NRC staff finds this approach acceptable, but the procedure used in estimating the nominal stress does not follow the intention of the ASME Code. The Code intention is to use the nominal stress at the weld and not at an element away from the weld. One way to follow the ASME Code intention is to calculate the nominal stresses at one, two, and three elements away from the weld line and then extrapolate these stresses to the weld line. This extrapolated stress may be treated as nominal stress at the weld for estimating the fatigue stresses. The licensee is requested to use the nominal stress at the weld for estimating the fatigue stresses at the fillet weld.

NMPNS Response

CDI Report 09-26P (submitted by NMPNS letter dated December 23, 2009) was superseded by CDI Report No. 10-11 and CDI Report No. 10-12 (submitted by NMPNS letters dated June 30, 2010 and July 30, 2010, respectively).

The current stress evaluations in CDI Report Nos. 10-11 and 10-12 do not refer to the "nominal" stresses alluded to in the RAI. All alternating stress ratios on welds are obtained in the standard manner by multiplying the finite element analysis (FEA) stress intensity by the 1.8 weld factor.

NMP2-EMCB-SD-RAI-20 S01

As mentioned in Appendix A of the CDI Report 09-26P, the closure plate modification includes the addition of stiffening ribs on the plate. In the finite element analysis, the modified closure plate is modeled by a thicker closure plate, which is dynamically equivalent for the fundamental mode of in-plane vibrations. The fundamental frequency of the modified plate is 256.0 Hz. The applicant develops [[

]].
Since the frequencies representing bending, and torsional modes of the modified closure plate will be [[ ]], in the development of the unit solutions considered here, the modified closure plate will behave statically as far as bending and torsional deformation of the closure plate is concerned. However, the finite element model of the modified closure plate is statically not equivalent to the closure plate modified with ribs. The licensee is requested to evaluate the errors introduced by this inconsistency in the steam dryer stresses at CLTP.

NMPNS Response

The closure plates are to be modified by the addition of horizontal ribs or stiffeners that increase the fundamental frequency to 256 Hz. Since explicit modeling of the ribs in the steam dryer model would change the finite element mesh, all unit solutions of the full steam dryer would have to be regenerated at all frequencies. Therefore, it was decided to instead incorporate a dynamically equivalent closure plate where the thickness and density of the closure plate are adjusted to: (i) match the fundamental frequency of the rib-reinforced closure plate and (ii) maintain the same mass. The latter objective was motivated by the observation that the additional ribs do not appreciably increase the overall mass of the closure plate structure. The advantage of using a dynamically equivalent plate is that when it is incorporated into the full steam dryer finite element model the finite element mesh and node numbering remain unchanged. This means that unit solutions can be generated over a limited frequency range and easily "swapped out" with the unit solutions generated using the original (unmodified plate) with the new ones using the reinforced plate. In the steam dryer model considered in CDI Report No. 10-12, the unit solutions pertaining to this modified closure plate were generated over the 30 - 250 Hz frequency range [[

]]. For a fixed plate geometry (except thickness), the plate frequencies scale as:

$$f^2 \sim Et^2/\rho$$

where E is the Young's modulus of the plate, t is the plate thickness and ρ is the plate material density. It is shown that for a fixed Young's modulus, the combined application of these requirements (i) and (ii) above results in a thickness and density given by:

$$\frac{f^2}{f_0^2}=\frac{t^2\rho_0}{\rho t_0^2},\quad \rho=\frac{\rho_0 t_0}{t}\quad\Rightarrow\quad t=t_0\left(\frac{f}{f_0}\right)^{2/3}$$

where subscript "0" refers to the unmodified plate, f is the target fundamental frequency (256 Hz) and ρ and t are the equivalent plate values. This results in an equivalent closure plate thickness of 0.255", which was the value used in the steam dryer analysis.

A deficiency raised in the RAI is that while the plate has been adjusted to be dynamically equivalent, static equivalence is not necessarily demonstrated. To quantify this deficiency, a series of static calculations was carried out to compare the stiffness of the reinforced closure plate with the ribs explicitly modeled against the stiffness of the modified and dynamically equivalent plate described above. In these calculations, the closure plate was cantilevered on its vertical straight edge (the one connected to the vane bank in the steam dryer), and the curved edge (the one connected to the hood in the steam dryer) was subjected to a distributed: (i) 10 lbf net transverse force and (ii) 10 lbf-in net moment. These are the dominant forces expected from relative vane bank motions in the dryer (these motions are associated with a twisting of the upper support ring which in turn is due to the non-symmetric positions of the steam dryer supports).

These loads are applied to the closure plate with explicitly modeled stiffening ribs (Model A) and a closure plate without ribs, but with an altered thickness (Model B). Since the same load is applied to each model, the calculated maximum displacement provides a measure of the static stiffness that the closure plate presents to the steam dryer. The displacements resulting when these forces are applied to each model are shown in Figure RAI-20 S01 - 1.

Table RAI-20 S01 -1 shows the maximum displacements obtained with each model. For Model B the plate thickness is adjusted to match the maximum displacement of the explicitly modeled rib structure (Model A). The tabulated results show that the effective thickness range is 0.245"–0.270" with an average value at 0.258". This agrees very closely (to within 1.2%) with the 0.255" effective thickness used in the steam dryer model. The errors incurred in utilizing the uniform plate approximation are compensated for by the frequency shifting required in dynamic analysis (this will address differences in predicted mode frequencies) and the bias (25.26%) inferred from the Hope Creek shaker test representing differences between the actual and modeled dryer due to modeling idealizations.

To summarize, a uniform plate with thickness 0.258" most accurately reproduces the static deflections obtained for a closure plate with explicitly modeled stiffening ribs. This thickness closely matches the value (0.255") used for the closure plate in the steam dryer analysis. Thus, for engineering analysis purposes, the closure plate modeled in the steam dryer is statically similar (to within 1.2%) to the actual plate with the ribs explicitly accounted for. In addition, the closure plate used in the steam dryer is dynamically equivalent to the actual rib-reinforced closure plate in terms of the matched modal frequencies. Taken in combination, these observations imply that the closure plate representation in the steam dryer analysis is both statically and dynamically equivalent to the rib-reinforced structure in the 0 - 250 Hz frequency range.

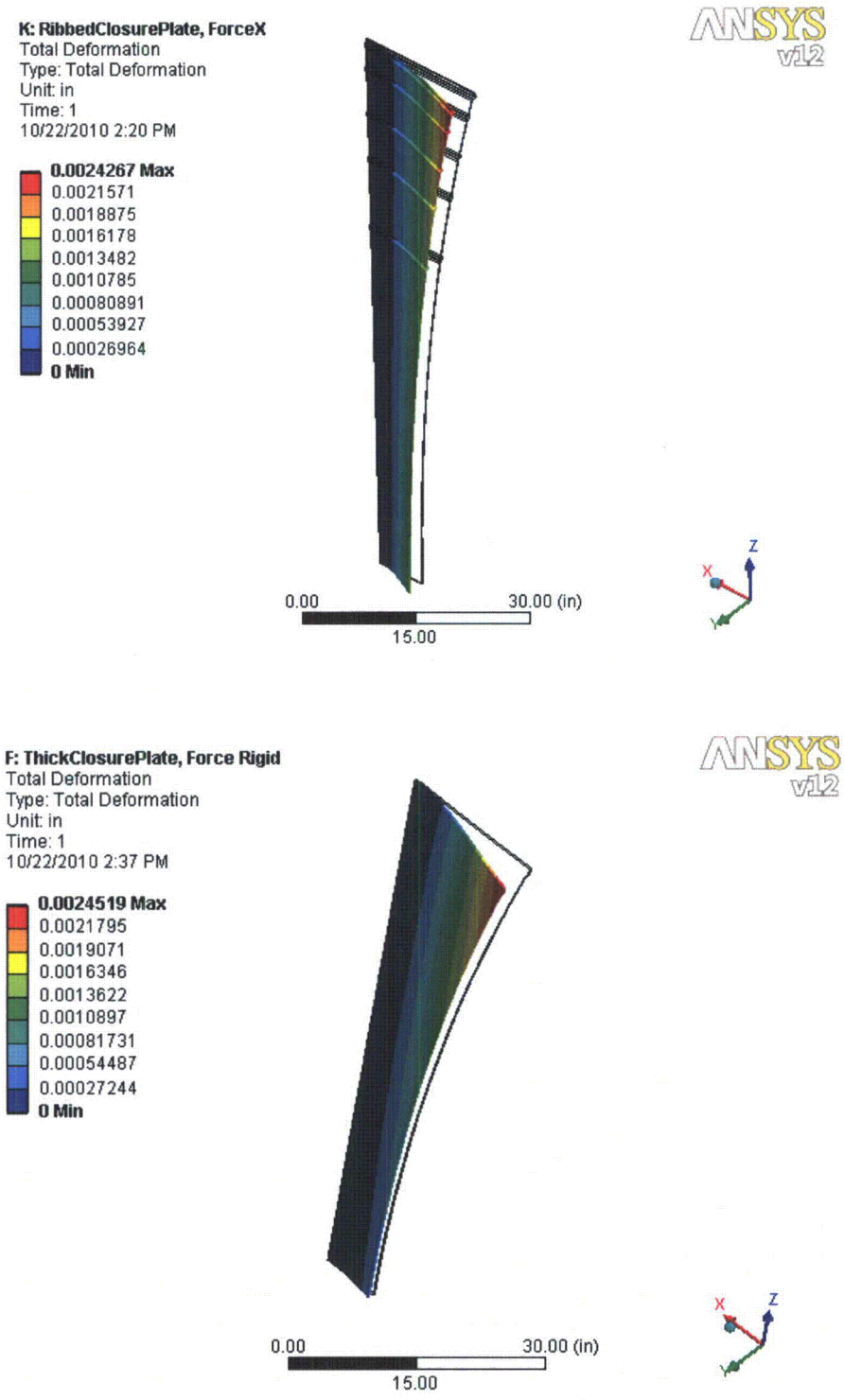

Figure RAI-20 S01 - 1 - Displacement of ribbed (Model A) and uniform (Model B) plates under rigid transverse forcing.

Loading	Maximum displacement, in	
	Ribbed plate (Model A)	Uniform plate (Model B)
10 lbf Force	2.427×10^{-3}	2.452×10^{-3} for 0.27" thickness
10 lbf-in Moment	3.512×10^{-4}	3.574×10^{-4} for 0.245" thickness

Table RAI-20 S01 - 1 - Maximum displacements for ribbed closure plate (Model A) and uniform plate (Model B) with specified thickness.

NMP2-EMCB-SD-RAI-21 S01

The applicant states that the submodeling procedure, which is applied to the modified closure plate, is designed to produce more accurate estimates of the stress field in the vicinity of the weld location of interest. The applicant further states that as one moves away from this location, the stress field in the submodel including the portion along its intersection lines (cut boundaries) deviates from the global model for two reasons: (1) cut boundary is near another structural discontinuity, and (2) the matching between the stress components in the global model and submodel is carried out near the weld location rather than near the submodel perimeter including cut boundaries. The applicant also states that locating the cut boundaries too far away will compromise the validity of the linearly varying body force distribution used to account for inertial effects and acoustic loads. While the NRC staff notes the difficulties involved in applying submodeling approach in this specific case, it is obvious that the approach used here is not a valid one because the stress field at the cut boundaries deviates as the mesh is refined and, therefore, the accuracy of the stress results obtained cannot be assessed. The cut boundaries shall be taken sufficiently far enough away from the high-gradient, localized stress locations (such as weld) to ensure the accuracy of the stress results obtained using the refined mesh. The applicant is requested to evaluate the applicability of its submodeling approach to the subject weld. The approach, if used, may be revised such that (1) the mesh refinement at the weld produces local changes to stresses and strains, while stresses and displacement at the cut boundaries remain unchanged, and (2) the body force distribution is properly considered.

NMPNS Response

There are several statements in this RAI that suggest that some key aspects of the sub-modeling methodology have not been clearly conveyed. During the NMPNS presentation to the NRC staff on September 23, 2010, a review of the overall sub-modeling procedure was given which helped identify the specific technical concerns. Therefore, in the response below, a summary of the sub-modeling steps (similar to that in the September 23, 2010 presentation) is provided. This summary clarifies the motivation for, and technical consistency of, the sub-modeling methodology adopted by CDI. This is followed by responses to the specific questions raised in the RAI supported by numerical calculations using the drain channel/skirt sub-model considered in CDI Report No. 10-12P.

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The stress reduction factors and the linearized stresses along the contributing paths are given in Table RAI-21 S01 - 1 for each of the calculations, C0 to C2. Also, the percent differences between these results are listed. The main observation is that both the linearized stresses and the stress reduction factors are all in close agreement. The maximum difference between the linearized stresses is 5.2%, whereas the maximum difference between the stress reduction factors is 3.8%. As explained above, these differences are all attributable to finite mesh size and sub-model size and the differences are well within the bias error associated with mesh discretization (9.53%).

SCL path	Linearized Stresses			Differences	
	C0	C1	C2	(C1-C0)/C0	(C2-C0)/C0
B	1683	1747	1697	3.8%	0.8%
C	1468	1474	1455	0.4%	-0.9%
D	1228	1279	1292	4.2%	5.2%
E	1187	1202	1220	1.3%	2.8%
	Stress Reduction Factors				
SRF	**0.654**	**0.678**	**0.659**	**3.8%**	**0.8%**

Table RAI-21 S01 – 1 - Linearized stresses and stress reduction factors for each of the calculations, C0 to C2, described above together with the differences between these results.

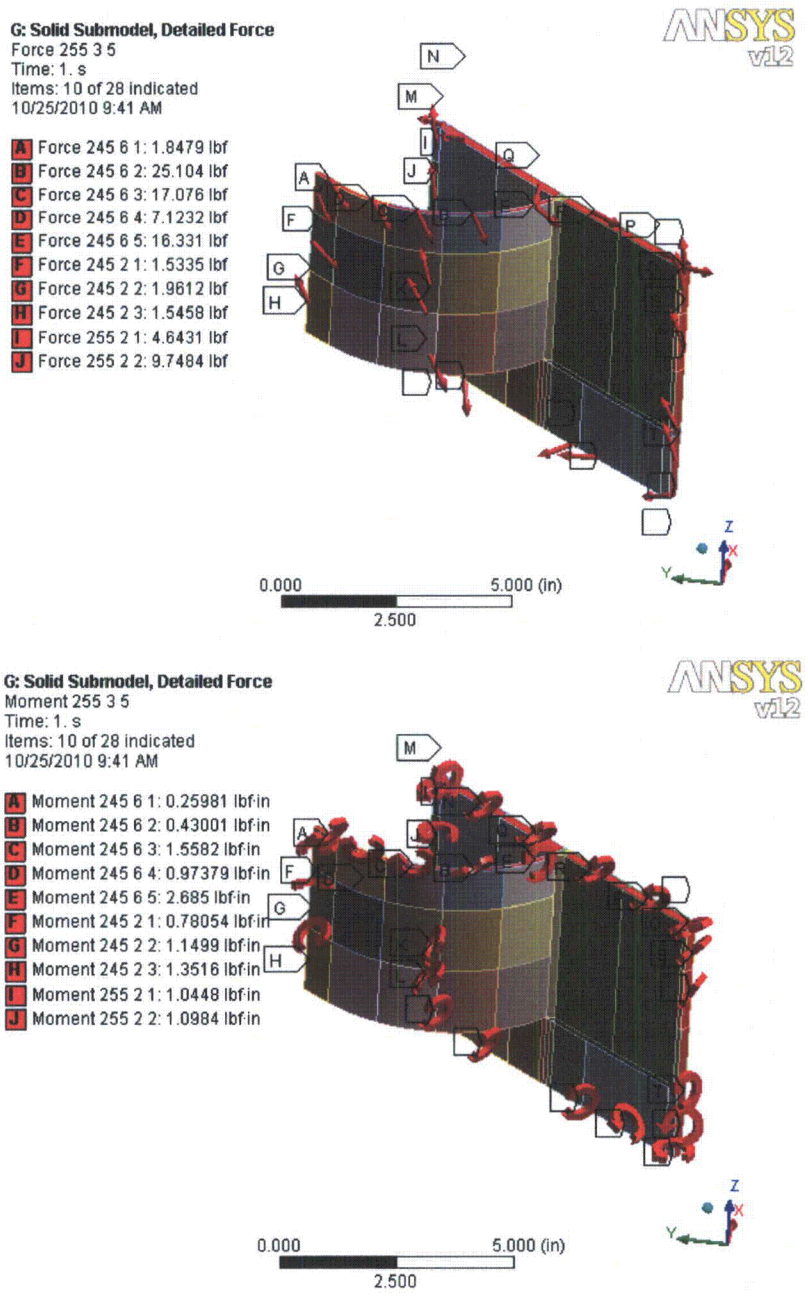

Figure RAI-21 S01 - 4 - The high resolution stress distribution extracted from the global steam dryer model and applied as element forces (top) and moments (bottom) to the solid sub-model.

NMP2-EMCB-SD-RAI-23 S01

In its previous RAI response, the applicant conservatively shows that the drain channel flaw will not experience fatigue crack growth during EPU operation because the fatigue stresses acting at the flaw location are not high. However, the NRC staff requests the applicant to re-evaluate its response to this RAI, in light of addressing the supplementary RAIs above related to the ACM 4.1 code and bump-up factor.

NMPNS Response

Based on the response to NMP2-EMCB-SD-RAI-17 S01, a re-evaluation is not required to address NMP2-EMCB-SD-RAI-17 S01.

A revision to this RAI response will be issued to address the final response to NMP2-EMCB-SD-RAI-8 S01(a) by December 10, 2010.

NMP2-EMCB-SD-RAI-24 S01

The applicant states that the inspection and the stress analysis results show that the indication in the drain channel-to-skirt vertical weld is not related to flow-induced vibration (FIV) fatigue because (1) the stresses at this weld are low, and (2) the multiple inspections have not shown any growth. The NRC staff requests the applicant to re-evaluate its response to this RAI, in light of addressing the supplementary RAIs above to show that the stress analysis results for the NMP2 steam dryer at CLTP are acceptable. In addition, the applicant should note the frequency of the fatigue stresses, with amplitude greater than 13,600 pounds per square-inch, can be lower than 1 Hz, and it may take several operating cycles for crack initiation.

NMPNS RESPONSE

Based on the response to NMP2-EMCB-SD-RAI-17 S01, a re-evaluation is not required to address NMP2-EMCB-SD-RAI-17 S01.

A revision to this RAI response will be issued to address the final response to NMP2-EMCB-SD-RAI-8 S01(a) by December 10, 2010.

While the potential exists for very low frequency to exist, these frequencies do not increase with steam line velocity. Long term monitoring in accordance with BWRVIP-139 will ensure the indications remain stable. No additional evaluation is warranted.

ATTACHMENT 2

LIST OF REGULATORY COMMITMENTS

Nine Mile Point Nuclear Station, LLC
November 5, 2010

ATTACHMENT 2
LIST OF REGULATORY COMMITMENTS

The following table identifies actions committed to in this document by Nine Mile Point Nuclear Station, LLC. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

Direct questions regarding these commitments to J. J. Dosa, Director Licensing, at (315) 349-5219.

REGULATORY COMMITMENT	DUE DATE
A revised CDI Report No. 10-10P will be provided that includes the details of the response to NMP2-EMCB-SD-RAI-8 S01.	December 10, 2010
A revision to the responses to [RAIs NMP2-EMCB-SD-RAI-6 S01 (b), -23 S01, and -24 S01] will be issued to address the final response to NMP2-EMCB-SD-RAI-8 S01(a).	December 10, 2010
A revised benchmark report (CDI Report No. 10-09P) and NMP2 specific loads report (CDI Report No. 10-10P) will be provided based on [the approach described in the response to RAI NMP2-EMCB-SD-RAI-8 S01 (a)].	December 10, 2010
NMPNS will revise the ACM Rev. 4.1 model to provide bias and uncertainty values over frequency ranges consistent with those used for ACM Rev. 4.0.	December 10, 2010

ATTACHMENT 3

AFFIDAVIT JUSTIFYING WITHHOLDING PROPRIETARY INFORMATION FROM CONTINUUM DYNAMICS INCOPORATED (CDI)

Nine Mile Point Nuclear Station, LLC
November 5, 2010

Continuum Dynamics, Inc.

(609) 538-0444 (609) 538-0464 fax 34 Lexington Avenue Ewing, NJ 08618-2302

AFFIDAVIT

Re: Response to Request for Additional Information Regarding Nine Mile Point Nuclear Station, Unit No. 2 – Re: The License Amendment Request for Extended Power Uprate Operation (TAC No. ME1476) – Steam Dryer

I, Alan J. Bilanin, being duly sworn, depose and state as follows:

1. I hold the position of President and Senior Associate of Continuum Dynamics, Inc. (hereinafter referred to as C.D.I.), and I am authorized to make the request for withholding from Public Record the Information contained in the documents described in Paragraph 2. This Affidavit is submitted to the Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 2.390(a)(4) based on the fact that the attached information consists of trade secret(s) of C.D.I. and that the NRC will receive the information from C.D.I. under privilege and in confidence.

2. The Information sought to be withheld, as transmitted to Constellation Energy Group as attachments to C.D.I. Letter No. 10158 dated 3 November 2010, Response to Request for Additional Information Regarding Nine Mile Point Nuclear Station, Unit No. 2 – Re: The License Amendment Request for Extended Power Uprate Operation (TAC No. ME1476) – Steam Dryer.

3. The Information summarizes:

   (a) a process or method, including supporting data and analysis, where prevention of its use by C.D.I.'s competitors without license from C.D.I. constitutes a competitive advantage over other companies;
   (b) Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;
   (c) Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

   The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs 3(a), 3(b) and 3(c) above.

4. The Information has been held in confidence by C.D.I., its owner. The Information has consistently been held in confidence by C.D.I. and no public disclosure has been made and it is not available to the public. All disclosures to third parties, which have been limited, have been made pursuant to the terms and conditions contained in C.D.I.'s Nondisclosure Secrecy Agreement which must be fully executed prior to disclosure.

5. The Information is a type customarily held in confidence by C.D.I. and there is a rational basis therefore. The Information is a type, which C.D.I. considers trade secret and is held in confidence by C.D.I. because it constitutes a source of competitive advantage in the competition and performance of such work in the industry. Public disclosure of the Information is likely to cause substantial harm to C.D.I.'s competitive position and foreclose or reduce the availability of profit-making opportunities.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to be the best of my knowledge, information and belief.

Executed on this 3rd day of NOVEMBER 2010.

Alan J. Bilanin
Continuum Dynamics, Inc.

Subscribed and sworn before me this day: November 3, 2010

Eileen P. Burmeister, Notary Public

EILEEN P. BURMEISTER
NOTARY PUBLIC OF NEW JERSEY
MY COMM. EXPIRES MAY 6, 2012