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March 22, 2010

VIA ELECTRONIC FILING

Burl W. Haar
Executive Secretary
Minnesota Public Utilities Commission
121 Seventh Place East, Suite 350
St. Paul, MN 55101

Re: In the Matter of the Petition of Minnesota Energy Resources Corporation–PNG for Approval of a Change in Demand Entitlement for its Great Lakes Gas Transmission System;
Docket No. G011/M-09-1283

Dear Dr. Haar:

Enclosed please find the Reply Comments of Minnesota Energy Resources Corporation ("MERC") in response to the March 10, 2010 Comments of the Office of Energy Security ("OES") in the above-referenced docket.

Thank you for your attention to this matter.

Sincerely yours,

/s/ Michael J. Ahern

Michael J. Ahern

cc: Service List

STATE OF MINNESOTA
BEFORE THE MINNESOTA PUBLIC UTILITIES COMMISSION

David C. Boyd	Chair
J. Dennis O'Brien	Commissioner
Thomas Pugh	Commissioner
Phyllis A. Reha	Commissioner
Betsy Wergin	Commissioner

In the Matter of the Petition of Minnesota Energy Resources Corporation-PNG for Approval of a Change in Demand Entitlement for its Great Lakes Gas Transmission System

Docket No. G011/M-09-1283

REPLY COMMENTS OF
MINNESOTA ENERGY RESOURCES CORPORATION

Minnesota Energy Resources Corporation-PNG ("MERC" or "Company") submits to the Minnesota Public Utilities Commission ("Commission") these Reply Comments in response to the March 10, 2010 Comments of the Minnesota Office of Energy Security ("OES") in the above referenced matter.

A. <u>Design-Day Requirements</u>

Based on its review, the OES concluded that MERC conducted its design-day study using a statistically valid model, but the OES had concerns that the analysis may not be able to fully ensure system reliability on an all-time peak day. The OES noted that its primary concern relates to estimating peak-day firm sales throughput, which requires the Company to estimate daily interruptible and transportation customer use before estimating firm sales. Based on the OES's calculations, the Company may not have had sufficient capacity to serve firm customers on an all-time peak day on two dates during the past three heating seasons. The OES noted, however, that the differentials were relatively small and would not impact service reliability. The OES also pointed out that MERC is attempting to mitigate the design-day risk associated with interruptible and transportation customers by requiring gas meter telemetry. The OES recommended that MERC provide the following information in its Reply Comments:

1. a full discussion detailing how it intends to install telemetry on its interruptible and transportation customers and an estimate of how long it will be before it has adequate daily data to estimate its firm design day more accurately;
2. a full discussion explaining how it arrived at its interruptible and transportation customer usage estimates that it incorporates into its design-day analysis; and
3. a full discussion of whether MERC is examining other techniques to improve its interruptible customer usage estimates.

The OES also noted that MERC's adjusted HDD calculation is different from the official calculation used by the National Weather Service. Given this difference, the OES recommended that MERC also provide it its Reply Comments:

4. a full discussion explaining why it uses a different calculation and what, if any, impact using the official wind chill calculation has on MERC's design-day forecast.

Response

1. Installation of Telemetry

MERC has put together a project team to address the telemetry installation. The team is currently in the process of reviewing equipment. The current schedule in the business case is for installation to be completed in late 2010/early 2011.

2. **Interruptible and Transportation Customer Usage Estimates**

Background - Overview of Entire Annual Peak Day Process

The MERC peak day forecast used daily metered throughput data from several hundred meters, daily weather data from six different weather stations, monthly billing data for transportation and interruptible customers that did not have daily meters, and the joint customers' Daily Firm Capacity (DFC) contracted volumes.

The peak day OLS regressions were performed using daily metered demand data for the most recent three December through February periods, daily weather, and indicators for type of day (such as weekday or weekend) and month. Data for non-firm (interruptible, transportation, and joint interruptible) customers who had daily meters was removed before performing the regressions.

Since daily telemetered data was not available for all non-firm customers, monthly billing data was used to estimate peak day consumption for the non-firm customers who did not have daily meters.

The daily metered peak day estimate was reduced by the non-firm peak day estimate, and then increased by the Daily Firm Capacity selected by Small Volume Joint Firm / Interruptible customers. Sales forecast growth rates were applied to generate the final peak day forecast.

Analysis of Interruptible, Transportation & Joint Interruptible Customer Usage

Volumes for interruptible, transportation, and joint interruptible customers were handled as follows:

1. Volumes for interruptible, transportation, and joint interruptible customers who had daily meters were removed from daily metered throughput data before performing the regressions. This was done to keep the regression data as "clean and consistent" as possible and eliminate the potential for any double counting.

2. The regression data included both firm and non-firm volumes. The final peak day estimate is limited to firm volumes only, so non-firm volumes needed to be removed. The following steps were performed to determine the non-firm volumes to remove from the regression data results.[1]

    a. Obtain a database of MERC Throughput Data by Demand Area by Month for Interruptible, Transportation and Joint Interruptible Customers (Excludes RES, LCI and SCI)
    b. For each of the months of December, January and February from the prior winter separately for Interruptible, Joint Interruptible and Transportation customers for each of the Demand Area regression groups:
        - Calculate total gross volumes billed
        - Calculate metered volumes to be removed from billing data, from customers such as paper mills, direct connects (including LS Power), taconites and OSEU (EndUsers). This step is performed because corresponding volumes were already removed before the data regressions, so should not be double counted.
        - Calculate the net volumes from the above steps.
    c. For each demand area:
        - Determine the largest monthly value of net volumes for the three month period, for each Demand Area
        - Determine an MDQ estimate in dekatherms from each monthly amount from the previous step first by dividing by 20 (consistent with MPUC Original Sheet No. 8.04 - definition for MDQ where direct daily metering is not available) and then dividing by 10 to convert therms to dekatherms.
        - Subtract the results of the prior step from the results of the daily metered data regression analysis.

3. <u>Techniques to Improve its Interruptible Customer Usage Estimates</u>

MERC believes that the telemetry project will be completed in the next 12 months and that will provide the most accurate data. MERC also believes that an older approach that divided the monthly billed interruptible, joint interruptible, and transportation volumes by days in the month was improved by the current process (described above) which removes actual non-firm daily readings from the daily metered volumes before performing the regression and computing an initial regression design day estimate. The tariff-based non-firm MDQ calculated for non-

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[1] When developed, an "MDQ Report" based on actual daily telemetry would replace this analysis.

firm customers without daily meters is then removed from the regression design day estimate. The current process makes the best use of daily metered data as it becomes available and uses the tariff MDQ calculation as a proxy for the design peak day demand for non-firm customers who do not have daily meters.

4. <u>Impact of Wind Chill Calculation</u>

MERC-PNG uses an Adjusted Heating Degree Day based on 65 degrees Fahrenheit (AHDD65) as its traditional weather variable for design day planning. The AHDD65 makes a simplified linear adjustment to the industry standard Heating Degree Day based on 65 degrees Fahrenheit to approximate the effect of wind speed on natural gas demand. The HDD65 equation is HDD65=MAX(0,65-AvgTemp) where AvgTemp is the average temperature for the day. The AHDD65 equation is AHDD65=HDD65*((100+Windmph)/100)) where Windmph is the average wind speed for the day expressed in miles per hour. Empirical evidence suggests that adjusting for wind effects on heating demand improves forecasting accuracy. The exact nature of the "best" wind adjustment may differ between service territories or between residential, commercial or industrial customers.

The National Weather Service offers a wind chill calculation that is designed to compute how cold a specific combination of ambient temperature and wind speed feels on exposed human skin. One of the primary uses of this wind chill calculation is to determine the number of minutes of safe outdoor exposure before the onset of frostbite. The current NWS wind chill equation is non-linear, requires average daily temperature to be below 50 and average wind speed to be above 3 mph:

Wind Chill=IF(AvgTemp<50,IF(Windmph>3,(35.74+(0.6215*AvgTemp)-(35.75*Windmph^0.16)+(0.4275*AvgTemp*Windmph^0.16)),AvgTemp),AvgTemp)

The wind chill calculated as above can be used as a temperature surrogate in computing a "wind chill heating degree day" based at 65 degrees Fahrenheit, or WCHDD65 as WCHDD65=MAX(0,65-wind chill). Although there are differences between exposed human skin and the various compositions of the exterior walls of homes and buildings, this method of adjusting for wind effects on ambient temperature may provide a better statistical "fit" for some regions or customer classes for peak day forecasting purposes.

There are two generally accepted "goodness of fit" statistics for regressions: sigma, also called the standard error of the regression, and R-Squared, also called the percent of variability in the dependent variable (demand) that is explained by the independent regression variables (weather and day indicators). Lower sigmas indicate less "spread" of the data around the regression line and therefore a better regression. Higher R-Squared values indicate a better regression.

MERC-PNG ran several ordinary least squares regressions to compare the results when using the AHDD65 variable with the results when using a WCHDD65 variable. These regressions were added to those already performed for the initial filing. A new regression detail file including all data used and Excel regression results is attached ("PNG-GLGTWinter2010PeakDayWindChill20100315.xls"). The differences between using AHDD65 and WCHDD65 are summarized for all of MERC-PNG in the attached summary file ("MERCWindChillTestingSummary20100319.xls"). MERC-PNG uses the Adjusted R-Squared statistic in the summary attachment because it corrects for the potential error introduced when comparing (non-adjusted) R-Squared values for regressions using different numbers of variables.

As the attached summary file shows, the WCHDD65 regression has a 13.3% higher sigma (632 vs. 558) and a lower Adj. R- Squared (0.863 vs. 0.894) than the regression using the

AHDD65 variable for MERC-PNG-GLGT. Both goodness of fit measures indicate that, for MERC-PNG-GLGT, the AHDD65 variable is better at predicting the load response to a combination of wind and temperature than the WCHDD65 variable. The AHDD65 regressions have a 2% lower sigma for PNG-VGT, a 2.4% lower sigma for PNG-NNG, and a 13.3% lower sigma for PNG-GLGT than the comparable WCHDD65 regressions.

The results of this analysis do not provide sufficiently compelling evidence for MERC-PNG to switch from using the traditional AHDD65 variable to a wind-chill based variable such as WCHDD65.

B. Volume Risk Adjustment

The OES noted that MERC uses a 97.5 percent volume risk adjustment in its design-day estimate, which means that there is roughly a 2.5 percent chance that any given design-day estimate will exceed the daily throughput estimate at a given point. The OES recommended that MERC provide the following in its Reply Comments:

1. a full discussion explaining why it chose the 97.5 percent confidence level that it uses in its design-day analysis; and
2. a full analysis, including supporting calculations, comparing demand costs at the 97.5 percent confidence level and at the 99.9 percent confidence level.

Response

1. Selection of 97.5% Confidence Level

As detailed in its response to OES Information Request No. 1 in Docket No. G011/M-08-1285 (included as Attachment 1),[2] MERC-PNG adopted the 97.5% confidence level to strike a

[2] MERC also provided this response to OES Information Request No. 1 in Docket No. G007/M-09-1281 and OES Information Request No. 5 in Docket No. G011/M-09-1284.

reasonable balance between 1) the probability of design day weather resulting in requirements higher than the forecast, and 2) the incremental cost of providing additional peak day supply and capacity. The importance of using a confidence level is generally recognized in statistics because the point estimate (point on the peak day regression line corresponding to design day weather conditions) represents the expected value (in this case, customer demand) under design conditions, including a 50% chance that the actual customer demand under design conditions could exceed the point estimate. The confidence level is, therefore, a statistically valid concept that incorporates the risk preferences of management, regulators, and other stakeholders into the forecast.

The 97.5% confidence level selected by MERC-PNG has some support from the practices of other natural gas LDCs. In 2008, MERC participated in an industry survey regarding design day forecasts. One of the questions was "On a day in the future when your design peak day criteria actually occur, what is an acceptable chance that the actual load experienced is higher than your forecast?" More than sixty percent of the utilities responding to this question indicated making adjustments to their forecast to provide a 95% or higher confidence level that the actual load under an actual occurrence of design conditions would not exceed the forecast. Reasons provided for this adjustment included modeling error, data error, and extrapolating beyond the recently experienced data (forecasting a peak day using design criteria values for independent variables that exceed the independent variable values for nearly all of the recent available data, i.e. using nearly average weather data to predict an extreme cold outlier).

Of those responding utilities that make an adjustment so that actual load under design conditions would not exceed the forecast: approximately 20% support a 95% to 96% confidence level, approximately 5% support a 96 % confidence level, approximately 45% support a 97% to 98% confidence level, approximately 5% support a 98% confidence level, and approximately 20% support a confidence interval higher than 98%.

The clustering of the responses to this survey question around a 97% to 98% confidence level reinforced MERC-PNG's belief that a 97.5% confidence level represented a reasonable balance between the probability of design day weather resulting in requirements higher than the forecast and the incremental cost of providing additional peak day supply and capacity.

2. <u>Comparison of Demand Costs at the 97.5 Percent Confidence Level and at the 99.9 Percent Confidence Level</u>

The regression goodness of fit measure "sigma" is a measure of variability around the regression line – higher sigmas imply a wider spread. The statistical confidence level concept quantifies the risk that the actual load under design conditions could exceed the forecast. (Note: There is an implicit assumption that the "population" experiencing the design conditions is the same as the "population" that provided the data for the regression.) There is a statistical relationship between the confidence level percentage and the number of sigmas required to provide that level of confidence that an actual observation will not exceed the regression point estimate plus "z" sigmas.

Given a desired confidence level and the sigma from the regression, the resulting volume required can be computed, as shown in the "Peak Day Volume Risk Confidence Level" sections of the attached "MERCWindChillTestingSummary20100319.xls" file. One section contains calculations based on a 97.5% confidence level and the other section contains calculations based on 99.9% confidence level. The bottom two lines just above the "Notes" section show that increasing the confidence level for PNG-GLGT from 97.5% to 99.9% requires an incremental 606 Dth of firm peak day supply and capacity, with a theoretical peak day of 11,408 MMBtu. In the 2009-2010 demand entitlement filing, MERC filed total firm capacity of 11,500 MMBtu. Assuming a five (5) percent reserve margin, MERC-PNG would need to acquire an incremental 478 MMBtu of capacity from GLGT. The incremental annual capacity costs to acquire the incremental capacity would be approximately $19,835. That number was derived by taking the 478 MMBtu incremental capacity times twelve (12) months times the GLGT maximum tariff rate for firm transportation of $3.458.

C. Demand Entitlement Level

The OES noted that the firm peak-day sendout on MERC's Great Lakes system for the 2008-2009 heating season was 9,779 Mcf/day, an increase of 4,714 Mcf/day (or approximately 93.11 percent) over the 2007-2008 heating season. As shown in OES Attachment 4, the peak-day sendout during the 2008-2009 heating season is the greatest firm throughput recorded on the Great Lakes system and represents a significant increase over the previous heating season. Given this information, the OES recommended that MERC provide, in its Reply Comments:

- a full discussion explaining the circumstances surrounding the peak-day sendout during the 2008-2009 heating season.

Response

Since MERC does not have daily measurement capabilities for all interruptible and transportation customers, MERC has to estimate those volumes. With the change of methodology going to a MDQ approach to project interruptible and transportation volumes in the design day study, the same approach was applied here. MERC took the total peak throughput of 11,491 that occurred on January 14, 2009 and deducted the projected daily MDQ based upon the following process:

- Compute the daily average of actual interruptible, joint interruptible and transportation volumes (45,047 dth / 31 = 1,453 dth). MERC expects that this average daily volume would be consumed on a day with the monthly average 70.5 AHDD.

- Compute the expected design peak day MDQ of actual interruptible, joint interruptible and transportation volumes (45,047 dth / 20 = 2,252 dth). MERC expects that this volume would be consumed on a design peak day of 107 AHDD.

- Determine the difference between design day MDQ and average volumes for interruptible, joint interruptible, and transport (2,252 dth – 1,453 dth = 799 dth).

- Determine the average incremental volume per AHDD as the volume difference between design peak and average divided by the AHDD difference between design peak and average (799 dth / (107 AHDD – 70.5 AHDD)) = 21.9 dth per AHDD.

- Pro-rate incremental volumes above average to the actual 92.4 AHDD peak day based on the actual AHDD difference from average: to get 1,453 + (92.4 AHDD – 70.5 AHDD) x 21.9 dth per AHDD = 1,933 dth.

- Add back the Joint Firm volumes of 218 dth. By taking the total peak throughput (11,491 dth) minus the estimated interruptible, joint interruptible and transportation MDQ (1,933 dth) and adding back the Joint Firm volume (218 dth) equals the 9,777 dth that was filed.

After further review, that methodology is probably not the best approach to estimate actual non-firm volumes for PNG-GLGT because additional actual information is available. MERC believes a more accurate and reasonable approach for PNG-GLGT is to take the total actual peak throughput, subtract out actual non-firm volumes where daily measurement is available and estimate the remainder of the non-firm volumes based upon the actual non-firm supply nominations for the peak day. The following is MERC's estimate of peak firm volumes for PNG-GLGT on January 14, 2009 based upon the alternate approach described above:

July 2008 through June 2009 Actual Firm Peak Day

	Actual Peak Date	Adjusted Heating Degree Day	Actual Peak Through-Put	Daily Measurement Available	Transportation Nominations	Estimate Peak Day Firm Volumes
PNG-GLGT	1/14/2009	94	11,491	(2,090)	(1,337)	8,064

MERC further believes the actual firm peak volume that was filed in the 2007-2008 Demand Entitlement is not accurate. By applying the same approach as above, the resulting actual firm peak day volumes are as follows:

July 2007 through June 2008 Actual Firm Peak Day

	Actual Peak Date	Adjusted Heating Degree Day	Actual Peak Through-Put	Daily Measurement Available	Transportation Nominations	Estimate Peak Day Firm Volumes
PNG-GLGT	1/29/2008	96	11,070	(1,340)	(1,603)	8,127

D. <u>PGA Error</u>

While analyzing MERC's proposal, the OES observed that the Company incorrectly calculated the rate impact of Call Options in its cost recovery by inadvertently using firm sales, rather than total sales, to calculate the per-unit cost. The OES recommended that:

- MERC correct the calculation error in its monthly PGA filing related to its Call Option rates as soon as possible and refund any, and all, over-recoveries associated with this error in its September 1, 2010 true-up filing.

<u>Response</u>

MERC acknowledges that there was an error in the Company's calculation as noted by the OES. MERC will correct the error in its April 2010 PGA filing. If there are any over-recoveries due to this error, MERC will refund or reallocate the over-recoveries among rate classes in the September 1, 2010 true-up filing.

DATED this 22nd day of March, 2010.

Respectfully submitted,

DORSEY & WHITNEY LLP

/s/ Michael J. Ahern

Michael J. Ahern
50 South Sixth Street
Minneapolis, MN 55402
(612) 340-2600

Attorney for MERC

State of Minnesota
Office of Energy Security

Utility Information Request

Docket Number: G011/M-09-1285 Date of Request: December 8, 2009

Requested From: Minnesota Energy Resources Corporation Response Due: December 18, 2009

Analyst Requesting Information: Adam Heinen

Type of Inquiry:	[ ]......Financial	[ ]......Rate of Return	[ ]......Rate Design
	[ ]......Engineering	[ ]......Forecasting	[ ]......Conservation
	[ ]......Cost of Service	[ ]......CIP	[]......Other

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
1	Subject: Volume Risk Adjustments

Reference: MERC-PNG Viking Initial Filing, Page 8

A. Please provide a full explanation of how MERC-PNG arrived at its desired confidence level of 97.5 percent, which is mentioned in the above reference.

B. Please provide a full explanation, including calculations where applicable, of how MERC-PNG's volume risk adjustment influences load under design-day conditions.

If this information has already been provided in written testimony or in response to an earlier OES information request, please identify the specific testimony cite(s) or OES information request number(s).

Response:

A. MERC-PNG used management judgment and traditional statistical techniques to select the 97.5% confidence level that actual firm customer demand under design peak day conditions would not exceed the estimate. MERC-PNG selected 97.5% because the resulting confidence level covers actual observations up to 1.96 standard deviations (sigmas) above the regression line and represents a reasonable balance between the volume risk inherent in covering only 1 sigma and the incremental supply required to cover 3 sigmas.

Covering only 1 sigma leaves about a 16% chance that actual firm customer demand under design-day conditions would exceed the forecast, which seemed too risky. Covering 3 sigmas reduces the risk that actual firm customer demand under design-day conditions would exceed the forecast to about 0.1%. It takes the same incremental peak day volumes to move from covering 1 sigma to covering 2 sigmas as it does to move from covering 2 sigmas to covering 3 sigmas. Covering 2 sigmas instead of 1 reduces the volume risk from 16% to about 2.5%. Covering 3 sigmas instead of 2 reduces the volume risk from about 2.5% to about 0.1%. MERC-PNG management did not feel that the incremental risk reduction associated with moving from 2 to 3 sigmas justified the incremental peak day volumes required and increasing their associated costs to ratepayers. MERC-PNG management decided that 2.5% was a reasonable volume risk and fine tuned the number of sigmas to 1.96 based on the traditional statistical one-tailed test.

There is no single correct answer as to the proper method for selecting the peak day design volume risk conditions. Any method will result in different risks and costs for MERC-PNG's customers, as MERC-PNG needs to balance 1) the probability that firm customer requirements under design-day weather conditions could exceed the peak day requirements forecast and 2) the costs associated with actual firm supply exceeding firm requirements.

B. MERC-PNG's volume risk adjustment does not influence the actual load under design-day conditions. The volume risk adjustment quantifies the risk that actual load under design-day conditions could exceed the peak day forecast.

Relying on the regression line forecast alone provides an average "point estimate" of load under design-day conditions with a 50% chance that actual load under those design-day conditions would be higher than the forecast. MERC-PNG management interprets this as a 50% chance of facing more demand than the regression line shows on the day that our customers need service most.

Statistical confidence levels based on the 1-tail test are employed to convert the management risk preference of a 2.5% chance that actual load under design-day conditions could exceed the forecast to a volume risk adjustment required to provide that level of statistical confidence. Traditional statistical practice indicates that adding 1.96 sigmas to the regression line value provides an estimate that covers all but the highest 2.5% of expected occurrences. This approach does nothing to change the actual load under design-day conditions, it just recognizes that the actual load under design-day conditions is unknown and quantifies the chance that the peak day forecast could be exceeded when design-day conditions occur.

AFFIDAVIT OF SERVICE

STATE OF MINNESOTA)
) ss.
COUNTY OF HENNEPIN)

Sarah J. Kerbeshian, being first duly sworn on oath, deposes and states that on the 22nd day of March, 2010, the Reply Comments of Minnesota Energy Resources Corporation were electronically filed with the Minnesota Public Utilities Commission and the Minnesota Department of Commerce. A copy of the filing was delivered by electronic service or first class mail to the remaining individuals on the attached service list.

/s/ Sarah J. Kerbeshian

Subscribed and sworn to before me
this 22nd day of March, 2010.

/s/ Paula R. Bjorkman
Notary Public, State of Minnesota

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