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November 11, 2015

Mr. Darrell Nitschke  
Executive Director  
North Dakota Public Service Commission  
600 E. Boulevard Ave., Dept. 408  
Bismarck, ND 58505-0480



RE: Calpine Corporation's Supplemental Testimony of Todd Thornton  
Northern States Power Advance Prudence Determination  
Case No. PU-15-096  
OAH File No. 20150094

Dear Mr. Nitschke:

Please find enclosed, the original and seven copies of Calpine Corporation's Supplemental Testimony of Todd Thornton offered as Exhibit: Calpine – 2 (Late Filed).

Also enclosed please find an Affidavit of Service by Mail.

Please contact me should you have any questions.

Sincerely,

**CROWLEY FLECK PLLP**

A handwritten signature in black ink, appearing to read "Blaine T. Johnson", followed by a horizontal line.

Blaine T. Johnson

Enc.

Before the North Dakota Public Service Commission  
State of North Dakota

In the Matter of Northern States Power  
Company's Advance Determination of  
Prudence for its 345 MW Power Purchase  
Agreement with Mankato Energy Center II,  
LLC

Case No. PU-15-96

**SUPPLEMENTAL TESTIMONY OF TODD THORNTON**  
**Sr. Vice President – Origination and Development**  
**Calpine Corporation**

**Q. What is the anticipated CO<sub>2</sub> output per megawatt hour of Calpine's Mankato Energy Center II plant?**

A. While the MECII emissions rate will vary depending on operations, MEC II will not exceed the GHG BACT (Green House Gas – Best Available Control Technology) limit of 1,000 lb/MW-hr based on 1 X 1 combined cycle operation.

**Q. Does this GHG BACT limit meet NSPS?**

A. Yes, this proposed limit is consistent with the limit required by 40 CFR Part 60 Subpart TTTT for the proposed unit. The following energy efficiency processes, practices, and designs for the proposed combined cycle combustion turbine will ensure compliance with the BACT and NSPS limit:

- Use of Combined Cycle Power Generation Technology
- Combustion Turbine Energy Efficiency Processes, Practices, and Designs
  - Efficient turbine design
  - Turbine inlet air cooling
  - Periodic turbine burner tuning
  - Reduction in heat loss
  - Instrumentation and controls
- HRSG Energy Efficiency Processes, Practices, and Designs
  - Efficient heat exchanger design
  - Insulation of HRSG
  - Minimizing fouling of heat exchange surfaces
  - Minimizing vented steam and repair of steam leaks
- Plant-wide Energy Efficiency Processes, Practices, and Designs
  - Fuel gas preheating
  - Drain operation
  - Multiple combustion turbine/HRSG trains
  - Boiler feed pump fluid drive design

Before the North Dakota Public Service Commission  
State of North Dakota

In the Matter of Northern States Power  
Company's Advance Determination of  
Prudence for its 345 MW Power Purchase  
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LLC

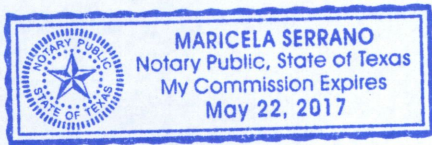
Case No. PU-15-96

STATE OF TEXAS            )  
  )ss.  
COUNTY OF HARRIS        )

Todd Thornton, being first duly sworn on oath, deposes and states that he is the Senior Vice President of Origination and Development for Intervenor, Calpine Corporation, in the above captioned matter, that he has read the testimony submitted in the above captioned matter under his name, that they were prepared under his direction, that he knows the contents thereof, and that the same is true and correct to the best of his knowledge and belief.

Todd Thornton

Subscribed and sworn to before me this 11 day of November, 2015



Maricela Serrano  
Notary Public  
My Commission Expires: May 22, 2017

BEFORE THE PUBLIC SERVICE COMMISSION  
OF THE STATE OF NORTH DAKOTA

In the Matter of Northern States Power  
Company's Advance Determination of  
Prudence for its 345 MW Power Purchase  
Agreement with Mankato Energy Center II,  
LLC

Case No. PU-15-096

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AFFIDAVIT OF SERVICE BY MAIL

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STATE OF NORTH DAKOTA     )  
  )§  
COUNTY OF BURLEIGH     )

Lisa Herberholz, being first duly sworn on oath, deposes and says: That she is a citizen of the United States over the age of eighteen years and not a party to, nor interested in, the above entitled action.

That on the 12<sup>th</sup> day of November, 2015, this affiant did deposit in the United States Post office at Bismarck, North Dakota, a true and correct copy of Exhibit: Calpine – 2 (Late Filed) – Supplemental Testimony of Todd Thornton.

That the document with postage prepaid was mailed, directed to the persons to be served at their last known post office address as follows:

Zeviel T. Simpser  
Briggs & Morgan PA  
2200 IDS Center  
80 South Eighth Street  
Minneapolis, MN 55402

Janet D. Seaworth  
Administrative Law Judge  
PO Box 7127  
Bismarck, ND 58507-7127

Dave H. Sederquist  
Senior Consultant, Regulation and Finance  
Xcel Energy  
2302 Great Northern Drive  
Fargo, ND 58102

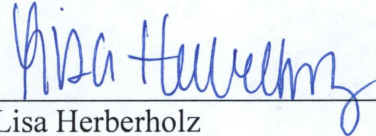
Alison Archer  
Attorney at Law  
414 Nicollet Mall, Fifth Fl.  
Minneapolis, MN 55401

Illona A. Jeffcoat-Sacco  
Attorney at Law  
600 E. Boulevard Ave., #408  
Bismarck, ND 58505-0480

Mitchell D. Armstrong  
Special Assistant Attorney General for PSC  
Smith, Bakke, Porsborg, Schweigert &  
Armstrong  
122 East Broadway Avenue  
P.O. Box 460  
Bismarck, ND 58502-0460

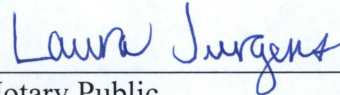
Brian Schmidt  
Special Assistant Attorney General for PSC  
Smith, Bakke, Porsborg, Schweigert &  
Armstrong  
122 East Broadway Avenue  
P.O. Box 460  
Bismarck, ND 58502-0460

To the best of affiant's knowledge, the addresses above given were the actual post office addresses of the parties intended to be served.



\_\_\_\_\_  
Lisa Herberholz

Subscribed and sworn to before me this 12<sup>th</sup> day of November, 2015.



\_\_\_\_\_  
Notary Public  
Burleigh County, North Dakota  
My Commission Expires: \_\_\_\_\_

