APPLICANTS' EXHIBIT 50

SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

CASE NO. EL05-022

IN THE MATTER OF THE APPLICATION BY OTTER TAIL POWER COMPANY

ON BEHALF OF THE BIG STONE II CO-OWNERS

FOR AN ENERGY CONVERSION FACILITY SITING PERMIT FOR THE

CONSTRUCTION OF THE BIG STONE II PROJECT

PREFILED REBUTTAL TESTIMONY

OF

PETER A. KOEGEL

PROJECT MANAGER

MAPPCOR

JUNE 16, 2006

PREFILED REBUTTAL TESTIMONY OF PETER A. KOEGEL

TABLE OF CONTENTS

BEFORE THE MINNESOTA PUBLIC UTILITIES COMMISSION

DIRECT REBUTTAL TESTIMONY OF PETER A. KOEGEL

I. INTRODUCTION

Q: Please state your name and business address.

A: Peter A. Koegel, 1125 Energy Park Drive, St. Paul, Minnesota.

Q: Did you submit direct testimony in this proceeding?

A: Yes. I submitted my direct testimony as Applicants' Exhibit 9.

II. PURPOSE AND SUMMARY OF TESTIMONY

Q: What is the purpose of your testimony?

A: The purpose of my testimony is to supplement my direct testimony with regard to the Mid-Continent Area Power Pool (MAPP) and MAPP-level forecasts of generation adequacy in the region, in response to the testimony of Minnesota Center for Environmental Advocacy (MCEA) witnesses Schlissel and Sommer dated May 26, 2006.

Q: Please summarize your testimony.

A: Forecasted generation capacity surpluses in MAPP-US and MAPP-Canada consist of various generation resources that I will describe. In addition, I will discuss the reasons why MAPP Members have a Reserve Capacity Obligation, and why Members often plan to achieve generation reserve margins higher than the minimum Reserve Capacity Obligation in any particular year. I will also discuss procedures for accreditation of wind capacity within MAPP.

III. FORECASTED CAPACITY SURPLUSES IN MAPP

Q: On pages 3 and 4 of their May 26, 2006 testimony, MCEA Witnesses Schlissel and Sommer discuss forecasted MAPP-US capacity surpluses. What does the MAPP Load and

Capacity (L&C) Report you discussed in your direct testimony show for installed generation capacity in MAPP-US?

A: According to data filed for the 2006 L&C Report, MAPP-US has a total accredited capacity of more than 34,040 MW (actual figures for 2005 Summer Season). Of that capacity, approximately 3,340 MW (10%) is nuclear, 2,990 MW (9%) is hydro, 18,550 MW (54%) is coal/steam, 66 MW (0.2%) is wind, and 7,900 MW (23%) is fueled by oil and natural gas. Winter season capacities are generally similar, with some minor differences.

Q: What does this generation mix say about Summer and Winter Season capacity surpluses in MAPP-US?

A: MCEA witnesses Schlissel and Sommer state that, according to data provided in my direct testimony, MAPP-US forecasts Winter Season capacity reserves of 4,000 MW above the MAPP Reserve Capacity Obligation in the 2011-2012 winter season, 3,600 MW in the 2012-2013 winter season, and 3,300 MW in the 2013-2014 winter season. They have correctly cited the data. However, the makeup of that capacity surplus is important in this proceeding.

MAPP-UP has 7,900 MW of generation fueled by oil and natural gas. Such units have relatively high production costs, and are among the last in the pool to be called upon to run. So, the entire capacity surpluses the MCEA witnesses are referring to in both the winter and summer seasons are comprised of high production cost, oil and natural gas-fired capacity.

Q: Can you provide an illustration of these capacity reserve figures?

A: Yes. Applicants' Exhibit 50-A is a graphical illustration of historical and projected installed reserve margins in MAPP-US, compared to the 15% Reserve Capacity Obligation. This exhibit shows the actual, year-by-year installed reserve margins of MAPP-US for the period

1980 to 2005, and the projected year-by-year installed reserve margins from 2006 to 2014 from the 2005 L&C report. The generation resources used in developing this chart do not include Big Stone Unit II.

Reserve margins were relatively high during the 1980's, due to the addition of several large generating facilities and slowing demand growth. The last major coal-fired generating plant, Sherburne County #3, was installed in 1987, causing the momentary increase in margins shown in that year.

During the 1990's to the present, MAPP-US reserve margins were maintained above the 15% minimum level by additions of new generating capacity almost entirely fueled by natural gas. At the present time, based on generation additions reported to MAPP by its Members, capacity deficits will occur soon unless significant new additions are added in the 2006 to 2014 time frame.

Q: What do you conclude from Applicants' Exhibit 50-A?

A: I conclude the following:

- MAPP-US had significant installed capacity margins during the 1980's. These margins have been declining since then, due to ongoing load growth in the region.
- Reserve margins were maintained at adequate levels during the 1990's, primarily through the addition of new, natural gas-fired capacity.
- Continuing load growth will result in inadequate generation capacity by 2011, unless additional resources are added.

Q: How much natural gas-fired capacity has been installed in MAPP-US during the period shown in Applicants' Exhibit 50-A?

A: I prepared Applicants' Exhibit 50-B, which depicts actual generation capacity additions in MAPP-US by fuel type during the same time period shown in Exhibit 50-A. Exhibit 50-B shows the end of major coal-fired baseload additions in the late 1980's, followed by about 6,600 MW of gas-fired peaking and combined-cycle intermediate additions since then. Clearly, the generation mix in MAPP has moved strongly toward natural gas during the past two decades. Additional new coal-fired units are being proposed and committed in the 2006 to 2009 timeframe.

Q: What does the MAPP Report you discussed in your direct testimony show for installed generation capacity in MAPP-Canada?

A: MAPP-Canada has a total accredited capacity of about 8,900 MW (actual figures for the 2005 Summer Season). Of that capacity, none is nuclear, approximately 5,880 MW (66%) is hydro, 1,750 MW (20%) is coal/steam, 9 MW is wind (0.1%) and 1,280 MW (14%) is fueled by oil and natural gas. Winter season capacities are generally similar, with some minor differences.

Q: What does the MAPP Report say about projected capacity surpluses in MAPP-Canada in 2011, and how do those figures break down by utility?

A: MAPP-Canada projects a 1,383 MW surplus in the summer season of 2011. Of that amount, Manitoba Hydro Electric Board (MHEB) represents the lion's share at 1,350 MW. Saskatchewan Power (SP) represents the balance of 33 MW.

MAPP-Canada projects a 1,200 MW surplus in the 2011/2012 winter season. Of that amount, MHEB represents 1380 MW. SP represents the balance: a net capacity deficit of 180 MW in that season.

Q: What does the MAPP-Canada generation mix say about Summer and Winter Season capacity surpluses there?

A: Similar to the situation of MAPP-US that I described earlier, a portion of the apparent capacity surpluses in MAPP-Canada is fired by high-cost oil and natural gas. The availability of such surpluses is also affected by transmission constraints, the energy-based rather than capacity-based makeup of the MHEB System, and the willingness of Canadian utilities to sell any surpluses to utilities in the U.S. Bryan Morlock describes these factors in more detail in his rebuttal testimony.

IV. MAPP RESERVE REQUIREMENTS

Q: On Pages 4 to 6 of their May 26, 2006 testimony, MCEA witnesses Schlissel and Sommer talk about what they call excess generation capacity in MAPP compared to the 15% MAPP Reserve Capacity Obligation you introduced in your direct testimony. Why does MAPP have a Reserve Capacity Obligation?

A: By sharing generation reserves over the transmission network, MAPP Members can maintain lower total reserves than they would otherwise have to maintain themselves. This helps keep costs low, for the same level of generation reliability.

To manage this sharing process, MAPP determines the appropriate minimum reserve level, secures Members' approval of it, and administers compliance procedures to ensure its ongoing viability.

Q: Do MAPP Members try to achieve exactly 15% reserves in any particular year?

A: No. The Reserve Capacity Obligation is a minimum "floor," for reliability purposes. For practical reasons a Member utility may plan for a level somewhat higher.

First, the 15% installed Reserve Capacity Obligation is measured based on actual peak demand; not forecasted. Compliance is determined after-the-fact, and the MAPP Members have agreed to significant financial penalties should a Member fail to meet their obligation. So, as a hedge against higher-than-forecasted peak demands due to weather or other unforeseen circumstances, Members may plan to have capacity sufficient to cover more than 15% of their forecasted peak in any particular year.

Second, a Member may plan to have an intentionally-elevated reserve margin for one or more years as they accomplish an adjustment in their fuel mix. An example would be adding low energy cost, baseload capacity to offset production from high-cost natural gas-fired capacity.

Finally, as a practical matter, a Member may not have capacity additions every year. So, a portion of their capacity margin in the year an addition is installed may be needed to serve additional load growth in a subsequent year or years.

V. WIND CAPACITY ACCREDITATION

Q: MCEA witnesses Schlissel and Sommer provide much discussion in their testimony about capacity credit for wind. Does MAPP or its affiliated organizations assign or accredit capacity values to wind energy?

A: Yes. We accredit wind energy capacity based on actual output of the particular wind machine or machines being accredited. Typically, multiple wind units are grouped together and metered at a common substation bus. These grouped units are usually accredited together as a wind farm, receiving a single rating for the farm in total. A single wind turbine could also be accredited in MAPP, following the same rules and procedures. Doing it either way (looking at one unit individually or multiple units together as a farm) provides the same accreditation result.

Q: How is wind capacity accreditation determined?

A: MAPP Members calculate capacity values using procedures specified in the MAPP General Reserve Sharing Pool (GRSP) handbook to determine Monthly Net Capability for Variable Capacity Generation. They then use those results to apply to MAPP for accreditation. These are the same procedures MAPP uses for other variable sources including solar and run-of-river hydro facilities.

The procedures are detailed, but in simple terms the monthly accredited value is based on the actual output of the specific wind unit during that month, correlated with the four-hour period surrounding the utility's peak load period for that month. In this manner, the unit is assigned an accreditation value for each month of the year. These monthly, after-the-fact values continue to be updated in accordance with actual experience with performance of the unit in its wind regime, correlated with the timing of the utility's monthly peak demands up to ten years of data for each month.

Q: Was this process used to determine the wind energy installed capacity figures you provided earlier in your rebuttal testimony for MAPP-US and MAPP-Canada?

A: Yes.

Q: Although wind machines are assigned their own unique monthly accreditation based on their actual performance, what are the typical ranges of accreditation that MAPP is seeking in the wind units reported by Members to-date?

A: The results vary depending on wind machine performance, the wind regime in which the machine is located, and the timing of each utility's peak demand. Consequently, we are seeing values between 5% and 20% (accredited capacity divided by nameplate capacity, expressed as a percentage) for the MAPP Summer Season (including the months of May through October), and 10% to 35% for the Winter Season (November through April).

Q: Why are the Summer Season values lower than Winter Season values?

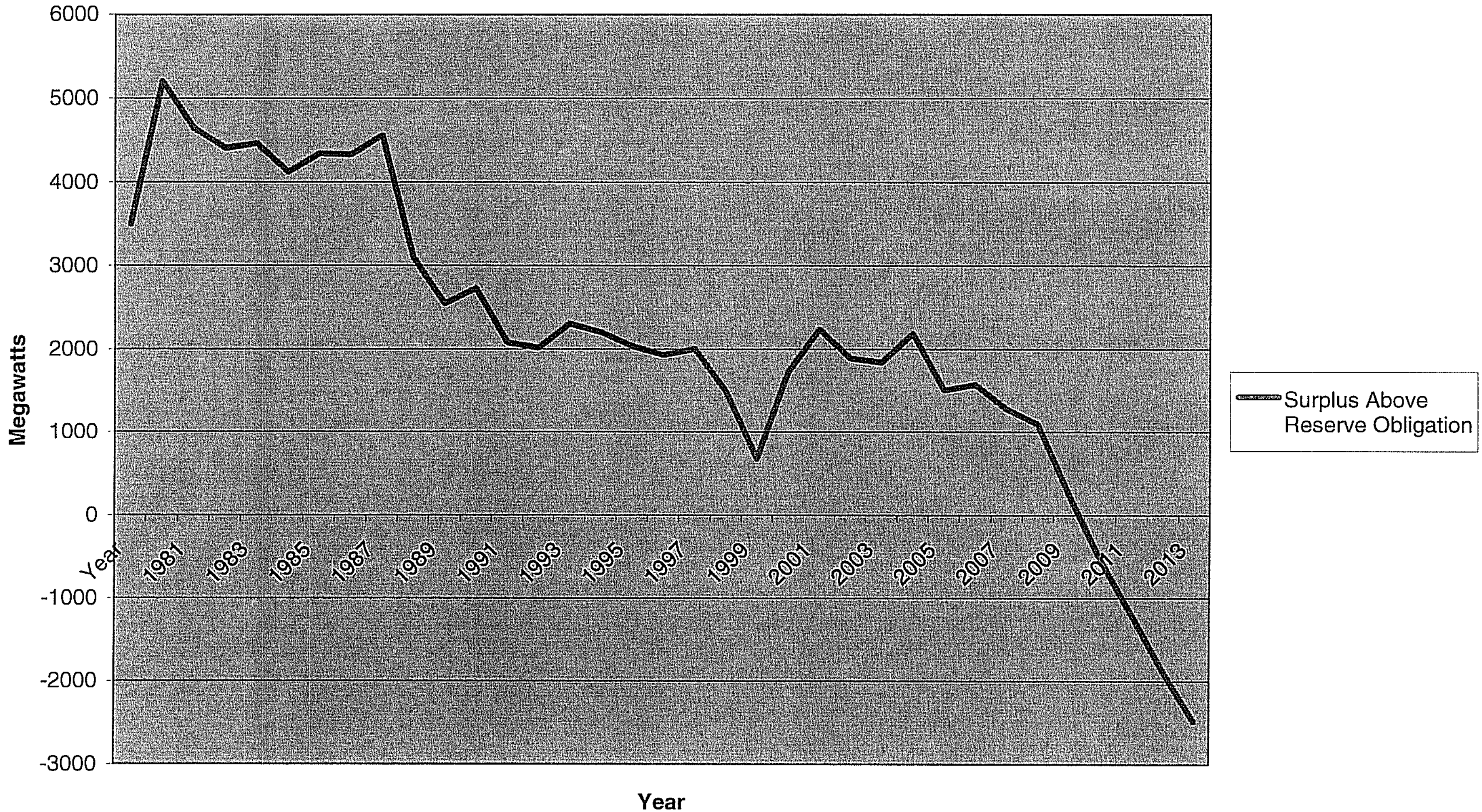
A: Taken as whole, MAPP Members demands peak during the Summer Season, primarily due to building space-conditioning (air conditioning) electric loads that build during extended hot weather spells lasting several consecutive days. MAPP has not done a detailed study to determine the causes of why wind energy accreditation values are lower in the Summer Season than in the winter. It may be windier in the winter, or there may be a better correlation of wind output with the utilities' winter peak demands.

However, our empirical experience says that summer peak demands happen on hot, muggy, and windless days. So, from a probability perspective, wind energy is relatively less available when the summer MAPP system peaks need it most. Bryan Morlock addresses the distribution of wind energy throughout the year in more detail in his rebuttal testimony.

Q: Does this conclude your testimony?

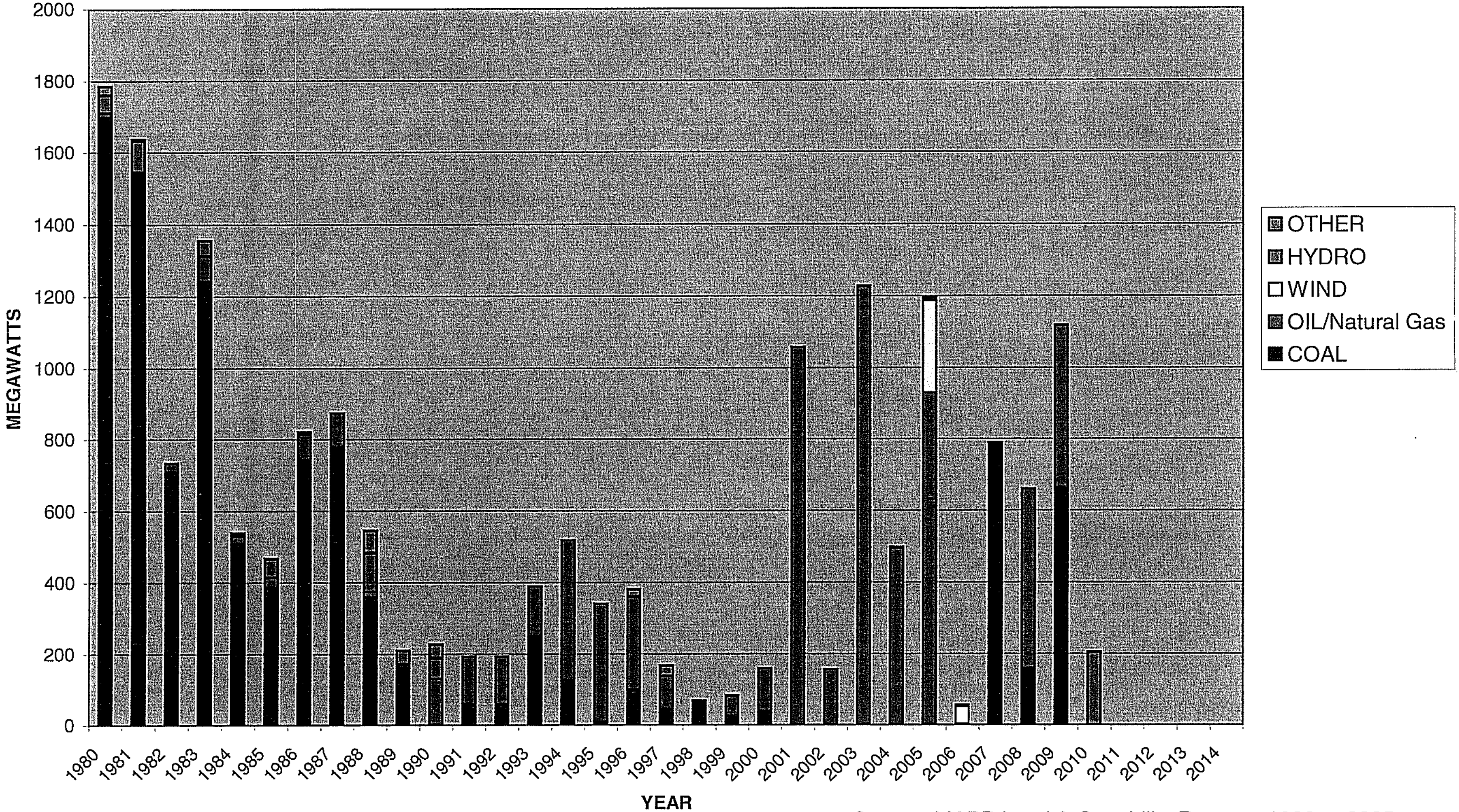
A: Yes it does.

MAPP-U.S. Reserve Margins without Big Stone Unit II
1980-2005 Actuals
2006-2014 Projected



5198

MAPP Committed and Proposed Generation Additions
by Fuel Type
Summer Season, 1980 to 2014



Source: MAPP Load & Capability Reports, 1980 to 2005

5190

EXHIBIT
APPLICANTS' EXHIBIT 50-B