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Direct Testimony and Schedules
Dean E. Schiro

State of Minnesota
Before the Office of Administrative Hearings
For the Minnesota Public Utilities Commission

*In the Matter of a Petition by Excelsior Energy Inc. for Approval of a Power
Purchase Agreement Under Minn. Stat. § 216B.1694, Determination of Least
Cost Technology, and Establishment of a Clean Energy Technology Minimum
Under Minn. Stat. § 216B.1693*

OAH Docket No. 12-2500-17260-2
PUC Docket No. E6472/M-05-1993

Transmission and Ancillary Services

September 5, 2006

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1 I. INTRODUCTION AND QUALIFICATIONS

2
3 Q. PLEASE STATE YOUR NAME.

4 A. My name is Dean E. Schiro.

5
6 Q. BY WHOM ARE YOU EMPLOYED AND WHAT IS YOUR POSITION?

7 A. I am employed by Xcel Energy Services Inc. as a Transmission Analyst.

8
9 Q. FOR WHOM ARE YOU TESTIFYING?

10 A. I provide testimony on behalf of Northern States Power Company doing
11 business as Xcel Energy ("Xcel Energy" or the "Company").

12
13 Q. PLEASE SUMMARIZE YOUR QUALIFICATIONS AND EXPERIENCE.

14 A. I received my Bachelor's of Electrical Engineering from the University of
15 Minnesota in 1997, with a focus in power systems. From 1994 - 1997, I
16 worked as a student engineer in the Northern States Power Company
17 Transmission Planning Department. From 1997 - 2004 I progressed through
18 the engineering grades to Principal Engineer at Northern States Power
19 Company and then Xcel Energy. In this role, I analyzed the transmission
20 system for operational constraints and created operating guides to maintain
21 system reliability.

22
23 Since 2004, I have worked as a Transmission Analyst evaluating transmission
24 access and cost issues associated with new resource acquisitions. In this
25 capacity, I manage and review studies for determining necessary upgrades for
26 future resource additions and power purchases. I also review the Midwest
27 Transmission Independent System Operator ("MISO") transmission service

1 studies for delivering capacity and energy to our system and represent the
2 Company on several MISO committees that focus on transmission access and
3 expansion. A copy of my resume is provided as Exhibit___(DES-1),
4 Schedule 1.

5 6 II. PURPOSE OF TESTIMONY

7
8 Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

9 A. I evaluated the transmission access and cost issues associated with the 603
10 MW Mesaba Unit 1 plant proposed by MEP-I LLC ("Mesaba 1 LLC") in this
11 proceeding. Mesaba 1 LLC indicates its intent to interconnect this plant to
12 the electric grid from a location in northern Minnesota and transmit it to Xcel
13 Energy's load center in the Twin Cities. Transmission access and delivery
14 costs are important and necessary considerations when evaluating the Mesaba
15 1 LLC Power Purchase Agreement ("Mesaba 1 PPA") and determining the
16 likely total costs of the Mesaba 1 PPA to Xcel Energy. Consequently, Xcel
17 Energy also retained the consulting services of Mr. Richard Gonzalez of
18 Excel Engineering; my testimony complements the testimony of Mr.
19 Gonzalez, which expands on the cost and likely timing of transmission
20 improvements needed to deliver Mesaba Unit 1's output to Xcel Energy's
21 system.

22
23 Q. BASED ON YOUR REVIEW OF MESABA 1 LLC'S PETITION AND TESTIMONY AND
24 YOUR EXPERIENCE, WHAT DO YOU CONCLUDE ABOUT MESABA 1 LLC'S
25 ABILITY TO TRANSMIT MESABA UNIT 1'S OUTPUT TO XCEL ENERGY'S SYSTEM
26 AND THE LIKELY COSTS?

27 A. I conclude that:

- While Mesaba 1 LLC has provided preliminary estimates of transmission upgrades and costs to interconnect Mesaba Unit 1 and deliver its output to Xcel Energy's customers, it has not provided a plan for addressing delivery issues and securing firm transmission services. Mesaba 1 LLC also fails to account for the cost of a variety of ancillary services that will be needed to deliver output to Xcel Energy.
- The costs and time required to implement the required transmission improvements will be significant. Mr. Gonzalez's testimony provides further support for this conclusion.
- There is substantial risk that Xcel Energy may not be able to obtain capacity accreditation for Mesaba Unit 1 in the initial years of the Mesaba 1 PPA term. Not having capacity accreditation for a baseload resource would pose substantial additional costs on our customers.

Q. HOW HAVE YOU ORGANIZED YOUR TESTIMONY?

A. First, I present my assessment of Mesaba 1 LLC's Petition and Supplemental Testimony regarding the transmission plan. Second, I discuss the potential cost and timing of securing the transmission service needed to deliver Mesaba Unit 1's output to Xcel Energy's system. Third, I outline the process of accrediting capacity and the significant cost risks posed on customers should Mesaba Unit 1 fail to obtain accreditation. Finally, I summarize my conclusions.

III. ADEQUACY OF MESABA 1 LLC'S TRANSMISSION PLAN

Q. WHAT MATERIAL DID YOU REVIEW IN THE PREPARATION OF YOUR TESTIMONY?

1 A. I reviewed Mesaba 1 LLC's filing and paid particular attention to those parts
2 of the filing that pertain to transmission access. Specifically, I reviewed
3 Section IV, Subsection I (Transmission Infrastructure Requirements), as well
4 as the Supplemental Testimony of Stephen D. Sherner. I also reviewed the
5 MISO studies conducted in response to Mesaba 1 LLC's interconnection
6 request. In addition, I reviewed and participated in the drafting of requests
7 for Network Integration Transmission Service for 603 MWs of transmission
8 capacity for both of Mesaba 1 LLC's proposed West and East sites.

9
10 Q. PLEASE DESCRIBE MESABA 1 LLC'S FILING AS IT RELATES TO TRANSMISSION
11 ACCESS AND COSTS.

12 A. Section IV, Subsection I of the Petition discusses transmission infrastructure
13 requirements. The Supplemental Testimony of Stephen D. Sherner provides
14 additional discussion on this portion of Mesaba 1 LLC's filing. For the most
15 part, Excelsior does a reasonable job of laying out the MISO process for
16 interconnection of the Mesaba Unit 1 to the transmission system as well as
17 the process for obtaining firm transmission for delivery of the Mesaba Unit 1
18 output to Xcel Energy's system. But some aspects of the transmission
19 situation need to be more fully described to provide greater understanding of
20 the cost and timing of transmission investments needed to deliver the output
21 to the Xcel Energy system, the options to provide delivery, and the impacts
22 for capacity accreditation if the plant is unable to deliver.

23
24 Q. PLEASE DESCRIBE THE VARIOUS TYPES OF SERVICES AVAILABLE AND THE
25 PROCESS FOR OBTAINING SERVICES TO INTERCONNECT AND DELIVER A
26 GENERATOR TO THE MISO TRANSMISSION SYSTEM.

1 A. MISO's Open Access Transmission and Energy Markets Tariff ("TEM T")
2 provides for several types of services. The first type of service that is
3 important for purposes of Mesaba Unit 1 is "interconnection service," which
4 allows a generator to be connected to the transmission grid. Attachment X of
5 the MISO TEM T governs interconnection service for large generators.

6
7 There are two types of interconnection service. A new power plant can
8 request either Energy Resource Interconnection Service ("ERIS") or Network
9 Resource Interconnection Service ("NRIS"). ERIS allows a generator to
10 connect to the transmission system without obtaining any rights to deliver the
11 output to the transmission system. NRIS allows the facility to deliver the
12 output to the transmission system and to be designated a Network Resource
13 by any Load Serving Entity in MISO.

14
15 Q. WHAT IS REQUIRED TO OBTAIN NRIS?

16 A. MISO requires the facility to pass a deliverability test that demonstrates there
17 is sufficient transmission capacity available to deliver the unit's output within
18 the MISO system. A study assesses the impact of an interconnection facility
19 on transmission facilities. If the output of the proposed facility would result
20 in any component of the transmission grid being loaded above acceptable
21 ratings, the facility does not pass the deliverability test.

22
23 Q. WHAT HAPPENS IF THERE IS INSUFFICIENT TRANSMISSION AVAILABLE TO
24 MEET THE DELIVERABILITY TEST?

25 A. If the generator being studied fails the deliverability test, MISO allows the
26 customer the option of either making the required system upgrades needed to
27 eliminate the constraints and ensure deliverability, or to change its NRIS

1 request to an ERIS request. Of course ERIS would not be adequate by itself
2 for accreditation because it includes no rights to deliver output, other than on
3 an as-available basis.
4

5 Q. HAS MESABA 1 LLC FILED THE REQUIRED REQUESTS FOR
6 INTERCONNECTION?

7 A. Yes. As explained in the Petition and Testimony, NRIS was requested for
8 both the West and East locations. However, neither unit passed the
9 deliverability test.
10

11 Q. WHY DID MISO DETERMINE THAT THE NRIS REQUEST FAILED THE
12 DELIVERABILITY TEST?

13 A. According to the deliverability study results, the output of Mesaba Unit 1
14 would overload over 30 elements of the transmission network located in
15 multiple states; thus, MISO concluded that the project failed the deliverability
16 test. Based on my review of the results, I believe that obtaining transmission
17 access through this mechanism is highly unlikely.
18

19 Q. WHAT, THEN, IS MESABA 1 LLC'S PLAN FOR SECURING THE NECESSARY
20 TRANSMISSION TO DELIVER MESABA UNIT 1'S OUTPUT TO XCEL ENERGY?

21 A. As described in Mr. Shermer's Testimony, Mesaba 1 LLC is currently
22 evaluating its options and may seek designation from MISO as a Local
23 Capacity Resource, which is accomplished by securing transmission service.
24 However, neither the Petition nor Mr. Shermer's testimony specify how
25 Mesaba 1 LLC plans to secure the transmission services needed to deliver
26 Mesaba Unit 1's output to Xcel Energy's system.
27

1 Q. WHAT ARE THE OPTIONS AVAILABLE FOR SECURING TRANSMISSION SERVICE?

2 A. One option would be for Mesaba 1 LLC to request firm Point-to-Point
3 ("PTP") transmission service from Mesaba Unit 1 to any other location in
4 MISO.

5
6 Q. WOULD A PTP RESERVATION BE AN APPROPRIATE WAY TO PROCEED?

7 A. Not from the perspective of Xcel Energy or our customers. For the
8 following reasons, Mr. Sherner is mistaken in his Testimony (page 7, lines 3-7)
9 when he states that firm PTP transmission service would be neutral to Xcel
10 Energy's customers:

- 11 • Xcel Energy would receive most but not all of the revenues from a
12 PTP reservation, as these revenues are distributed among all utilities
13 located in our MISO pricing zone. Consequently other utilities,
14 including Great River Energy and Southern Minnesota Municipal
15 Power Agency, would receive 10 – 15 percent of the revenues.
- 16 • MISO's current rate design may change when the transition period
17 expires on February 1, 2008. At that time, the rate design could
18 change, making it uncertain what revenues Xcel Energy would receive
19 to offset the costs to Xcel Energy.

20
21 Q. WHAT OTHER MECHANISM WOULD BE AVAILABLE TO OBTAIN TRANSMISSION
22 SERVICE FROM MESABA UNIT 1?

23 A. The TEMT provides that an end-use load can make a request for Network
24 Integrated Transmission Service ("NITS"). On July 19 and August 2, 2006,
25 Xcel Energy made requests to obtain NITS from Mesaba 1 LLC's preferred
26 West and alternate East sites, respectively. MISO's response to these requests

1 has just begun, so the results of the studies and the magnitude of the upgrades
2 and their costs are unknown at this time.

3
4 Q. IS THERE AN ADVANTAGE OF NITS OVER PTP?

5 A. Yes. Since NITS is requested by an end-use load to serve native load, there is
6 no additional annual charge for this service, as there is for PTP. However,
7 obtaining firm transmission in this manner would require installation of the
8 transmission system upgrades necessary to support the reservation. Mr.
9 Gonzalez addresses the cost and timing of those types of upgrades. Xcel
10 Energy and its customers (as the end-use load making the request) would
11 absorb a significant portion of the costs of the upgrades required to obtain
12 NITS service. Minnesota Power and its customers could also absorb a
13 significant portion of these costs.

14
15 Q. COULD MESABA 1 LLC PROCEED WITH A PTP RESERVATION AND THEN
16 LATER CONVERT IT TO A NITS?

17 A. No. Presently MISO does not have a tariff or business practice that would
18 allow a generator or project developer to convert PTP service to NITS.

19
20 Q. BASED ON YOUR REVIEW OF THE AVAILABLE INFORMATION, WHAT IS YOUR
21 ASSESSMENT OF MESABA 1 LLC'S TRANSMISSION PLAN?

22 A. Mesaba 1 LLC appears to have taken appropriate steps to obtain
23 interconnection service. However, it has not provided the specific steps
24 needed to address MISO's denial of Network Resource designation.
25 Therefore, it is unclear whether Mesaba 1 LLC will be able to deliver the
26 output of Mesaba Unit 1 to Xcel Energy's system, when it might be able to do
27 so, or what the costs of delivering the output to Xcel Energy's system will be.

1
2 Q. WHAT TYPE OF INFORMATION WOULD YOU HAVE EXPECTED TO SEE IN A
3 TRANSMISSION PLAN FOR MESABA UNIT 1?

4 A. I would have expected the Testimony to specify if Mesaba 1 LLC intends to
5 fix the 30-plus constraints identified for deliverability in order to be a
6 Network Resource or focus on the Local Capacity Resource path. The plan
7 then should identify the potential transmission upgrades needed for the
8 option chosen. The Petition specifies potential network upgrades needed for
9 delivery to Xcel Energy load, but the Testimony does not indicate if these are
10 still viable options. Finally, the transmission plan should have included a
11 likely timeframe in which these upgrades can be realistically constructed.
12

13 Q. MESABA 1 LLC REPRESENTS THAT XCEL ENERGY IS BETTER POSITIONED
14 THAN IT TO INFLUENCE OTHER AFFECTED TRANSMISSION OWNERS TO UPTAIN
15 THE NECESSARY UPGRADES. DO YOU AGREE?

16 A. No. The transmission interconnection and delivery processes are clearly
17 established by the TEMT. Xcel Energy has no influence over the way in
18 which MISO implements its tariff; clearly, MISO must implement these
19 processes in accordance with that Federal Energy Regulatory Commission-
20 approved tariff. In addition, the interconnection agreement is a three-party
21 agreement between MISO, the project owner (Mesaba 1 LLC), and the
22 transmission owner at the point of interconnection (Minnesota Power). Xcel
23 Energy will not even be a party to that interconnection agreement.
24

25 Q. HAS MESABA 1 LLC PROVIDED THE COST OF ANCILLARY SERVICES FOR
26 MESABA UNIT 1?

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1 A. No. The Petition only states that the ancillary services cost will be
2 comparable to any other base load alternative, but those costs are not
3 quantified.

4
5 Q. DO YOU AGREE WITH THIS CONCLUSION?

6 A. No. I believe that Mesaba Unit 1 needs to quantify its expected ancillary
7 services costs. I do not think it is reasonable to assume that these costs would
8 be comparable to other plants on the system without Mesaba 1 LLC
9 providing further study and support.

10
11 IV. TRANSMISSION TIMING AND COSTS

12
13 Q. IF MESABA 1 LLC IS REQUIRED TO MAKE THE NETWORK UPGRADES AS PART
14 OF THE INTERCONNECTION PROCESS, WOULD MESABA 1 LLC BE DIRECTLY
15 RESPONSIBLE FOR THE COSTS?

16 A. Ultimately, [TRADE SECRET BEGINS TRADE SECRET ENDS].
17 Mesaba 1 LLC may be required to expend capital in support of the
18 transmission projects. However, it would recover these costs thorough
19 transmission credits or cash refunds of 50 percent of its outlays for network
20 upgrades (including interest) paid for by other utility network owners. The
21 unreimbursed outlays would be [TRADE SECRET BEGINS

22
23 TRADE SECRET ENDS].

24
25 Q. PLEASE EXPLAIN.

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1 A. The Mesaba 1 PPA requires that [TRADE SECRET BEGINS

2
3
4
5 TRADE
6 SECRET ENDS]. Ms. Karen Hyde provides additional discussion on this
7 contractual mechanism.
8

9 Q. HOW WOULD THE 50 PERCENT OF NETWORK UPGRADES PAID BY OTHER
10 UTILITIES BE RECOVERED?

11 A. The TEMT provides a structure that reimburses qualified generators directly
12 from the affected transmission-owning utility for 50 percent of the capital
13 provided for network upgrades. Thus, to the extent that Xcel Energy is
14 required to construct network upgrades to its facilities and it chooses to use
15 Mesaba 1 LLC's capital (as allowed by the TEMT), Xcel Energy's ratepayers
16 are ultimately responsible for the 50 percent of the capital that is required to
17 be reimbursed under the TEMT. Other transmission-owning utilities (e.g.,
18 Minnesota Power, Great River Energy) would follow the same process, so
19 their ratepayers would also ultimately be responsible for these costs.
20

21 Q. GIVEN THE [TRADE SECRET BEGINS
22 TRADE SECRET ENDS] AND MISO TEMT, WHO WOULD BE
23 RESPONSIBLE FOR THE \$180 MILLION IN TRANSMISSION SERVICE NETWORK
24 UPGRADE COSTS IDENTIFIED BY MR. GONZALEZ AND THE APPROXIMATELY
25 \$70 MILLION IN INTERCONNECTION COSTS IDENTIFIED BY MESABA 1 LLC?

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1 A. Under the TEMT, the \$17 million in direct costs of interconnection would be
2 directly assigned to Mesaba 1 LLC and would not be subject to
3 reimbursement in the Interconnection Agreement;

4 [TRADE SECRET BEGINS

5 TRADE SECRET ENDS]. The \$53 million in network
6 upgrade costs required for interconnection would be 50 percent reimbursed
7 (\$26.5 million) back to Mesaba 1 LLC under the TEMT, with the remaining
8 50 percent (\$26.5 million) not reimbursed by the transmission owner
9 undertaking the network upgrades to support the interconnection (in this
10 case, Minnesota Power). [TRADE SECRET BEGINS

11 TRADE SECRET
12 ENDS]. The \$180 million in network upgrades identified by Mr. Gonzalez
13 would be the responsibility of Xcel Energy as the transmission customer;
14 however, \$77 million of this cost could be borne by Minnesota Power and its
15 retail and wholesale customers.

16
17 Consequently, Xcel Energy and our customers would be responsible for
18 [TRADE SECRET BEGINS TRADE
19 SECRET ENDS] in transmission-related costs associated with Mesaba Unit
20 1: [TRADE SECRET BEGINS

21 TRADE SECRET ENDS] for interconnection of Mesaba
22 Unit 1. The difference in costs could be assigned to Minnesota Power and
23 eventually recovered through its retail and wholesale rates.

24
25 Q. HAVE YOU IDENTIFIED THE RATE IMPACT FOR XCEL ENERGY'S CUSTOMERS
26 DUE TO THESE TRANSMISSION-RELATED COSTS?

1 A. No. Mr. Mark Hervey provides an analysis of the rates impact of the Mesaba
2 1 PPA, which includes these transmission costs.

3
4 Q. BASED ON YOUR EXPERIENCE AND UNDERSTANDING OF MESABA 1 LLC'S
5 PROPOSAL AND ITS OPTIONS FOR SECURING TRANSMISSION SERVICE, CAN YOU
6 OFFER ANY OPINION OF WHAT THE ULTIMATE TIMING AND COST OF THE
7 TRANSMISSION SERVICE NEEDED TO DELIVER MESABA UNIT 1'S OUTPUT TO
8 XCEL ENERGY'S LOAD?

9 A. Yes. At a minimum, high voltage transmission lines would need to be built
10 from the Mesaba Unit 1 to the Twin Cities with a lead-time of at least six to
11 eight years from initial planning to construction.

12
13 To get a better understanding of the facilities needed, Xcel Energy retained
14 Mr. Gonzales to perform a high-level sensitivity of potential costs and
15 timeframes to complete the necessary upgrades to deliver the energy from
16 Mesaba Unit 1 to Xcel Energy's load. We did so both as part of our due
17 diligence to understand the full cost and implications of Mesaba 1 LLC's
18 proposal and to assist the evaluation of the Mesaba 1 PPA, as the costs and
19 availability of transmission are an essential component to determining
20 whether the Mesaba 1 PPA should be approved.

21
22 Q. HAVE YOU REVIEWED THE WORK MR. GONZALEZ PERFORMED IN THIS
23 PROCEEDING?

24 A. Yes. Mr. Gonzalez indicates that the cost to deliver Mesaba Unit 1 to the
25 Xcel Energy system is approximately \$180 million. Mr. Gonzalez also
26 estimates that the needed transmission is not likely to be in service prior to
27 2014.

1
2 Q. WHAT LEVEL OF CERTAINTY DO YOU PLACE ON THESE ESTIMATES?

3 A. Ultimately, only MISO can determine which transmission upgrades will in fact
4 need to be made through the tariff and study process. However, Xcel Energy
5 and other utilities routinely rely on the work of engineers such as Mr.
6 Gonzalez to provide better understanding of the transmission implications of
7 various resource proposals prior to the completion of MISO's work.
8 Engineers such as Mr. Gonzalez are able to perform steady-state powerflow
9 and dynamic stability analysis arising from additions of new generators, as
10 well as considering planned transmission upgrades, to help us evaluate the
11 costs and feasibility of resource options.

12
13 Q. BASED ON THE ANALYSIS PROVIDED BY MR. GONZALEZ, WHAT IS YOUR
14 CONCLUSION REGARDING THE TRANSMISSION ISSUES ASSOCIATED WITH
15 MESABA 1 LLC'S PETITION?

16 A. At this time, it is unclear whether and how Mesaba Unit 1's output would be
17 delivered to Xcel Energy's system. However, based on my knowledge of the
18 MISO processes, the transmission grid, and Mr. Gonzalez's analysis, I believe
19 the cost of securing such service would be significant and would affect the
20 price paid by our customers. In addition, because Mesaba Unit 1 would
21 require significant new upgrades to the transmission system, it is unlikely that
22 firm service would be obtained until 2014.

23
24 **V. ACCREDITATION**

25
26 Q. WHAT IS THE IMPORTANCE OF SECURING ACCREDITED CAPACITY?

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1 A. As a member of the Mid-Continent Area Power Pool ("MAPP") Generation
2 Reserve Sharing Pool ("GRSP"), Xcel Energy is obligated to maintain
3 sufficient accredited capability to cover our load plus our reserve capacity
4 obligation. MAPP standards govern the accreditation process, one
5 requirement of which is firm transmission service from the generator to the
6 load. Capacity that is not accredited cannot be used to satisfy our capacity
7 obligations, and MAPP imposes significant financial consequences on utilities
8 that fail to meet these obligations.

9
10 Q. WHY IS THIS ISSUE OF ACCREDITATION IMPORTANT IN THIS PROCEEDING?

11 A. If Mesaba 1 LLC only proceeds with its current request for ERIS and does
12 not develop any plan to secure transmission rights for firm delivery of its
13 power to Xcel Energy, it would only be able to deliver energy using the
14 existing capacity of the transmission system on an as-available basis. This
15 status would provide no assurance that the it would be able to deliver to Xcel
16 Energy when our customers need the energy, and the plant would not be
17 MAPP accredited.

18
19 Q. WHAT ARE THE IMPLICATIONS FOR XCEL ENERGY IF MESABA UNIT 1 IS NOT
20 ACCREDITED BY THE MAPP GRSP?

21 A. The capacity from Mesaba Unit 1 would not contribute toward Xcel Energy's
22 minimum capacity requirements. We would therefore need to secure
23 additional accredited capacity to ensure our MAPP obligations are met. This
24 could result in having to [TRADE SECRET BEGINS

25
26 TRADE SECRET
27 ENDS].

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1
2 Q. PLEASE ELABORATE.

3 A. The [TRADE SECRET BEGINS

4
5
6
7 TRADE SECRET ENDS], in my opinion,
8 constructing a generator without a thorough investigation and plan to develop
9 the associated transmission is extremely problematic. The commercial
10 availability of the generating unit should coincide with the necessary upgrades
11 to obtain delivery service either through NRIS or firm transmission service.

12
13 VI. CONCLUSION

14
15 Q. PLEASE SUMMARIZE YOUR TESTIMONY.

16 A. Mesaba 1 LLC seeks approval of the Mesaba 1 PPA without having a plan for
17 delivering the output to Xcel Energy as purchaser. I believe the costs and
18 timing of securing the needed transmission service will be significant, as there
19 are significant risks and substantial costs that customers will bear. Further,
20 [TRADE SECRET BEGINS

21 TRADE SECRET ENDS] even in the
22 event the generating plant does not receive MAPP accreditation. While there
23 are options for securing transmission service, the net costs of these options
24 are likely to be significant and the service may be unavailable before 2014.

25
26 Q. DOES THIS CONCLUDE YOUR TESTIMONY?

27 A. Yes, it does.

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EDUCATION

Bachelor's of Electrical Engineering 1997
University of Minnesota

EMPLOYMENT

Xcel Energy and formerly Northern States Power Company

2004 – present	Transmission Analyst, Transmission Access
2003 – 2004	Principal Engineer, Real Time Planning
2001 – 2003	Senior Engineer, Real Time Planning
1998 – 2001	Specialty Engineer, Operations Analysis
1997 – 1998	Engineer, Operations Analysis
1994 – 1997	Student Engineer, Transmission Planning

COMMITTEE PARTICIPATION

2006	Technical Review Committee – 2006 MN Wind Integration Study
2004 – present	MISO AFC Working Group
2004 – present	MISO Planning Subcommittee
2004 – present	MISO Expansion Planning Working Group
2005 – 2006	MISO Generation Deliverability Task Force
2004	MISO Transmission System Operations Working Group
2004	MAPP Planning Subcommittee
2004	MAPP Planning Standards Development Working Group
1997 – 2004	Northern MAPP Operations Review Working Group

LICENSURE

Registered Professional Engineer in the State of Minnesota