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MPUC Docket No. E-6472-/M-05-1993
OAH Docket No. 12-2500-17260-2

BEFORE THE
MINNESOTA OFFICE OF ADMINISTRATIVE HEARINGS
100 Washington Square, Suite 1700
Minneapolis, Minnesota 55401-2138

FOR THE
MINNESOTA PUBLIC UTILITIES COMMISSION
127 7th Place East, Suite 350
St. Paul, Minnesota 55101-2147

In the Matter of the Petition of Excelsior Energy Inc. and Its Wholly-Owned Subsidiary MEP-I, LLC For Approval of Terms and Conditions For The Sale of Power From Its Innovative Energy Project Using Clean Energy Technology Under Minn. Stat. § 216B.1694 and a Determination That the Clean Energy Technology Is Or Is Likely To Be a Least-Cost Alternative Under Minn. Stat. § 216B.1693

PREPARED REBUTTAL TESTIMONY AND EXHIBITS OF EXCELSIOR ENERGY INC. AND MEP-I LLC

ROBERT S. EVANS II

OCTOBER 10, 2006

EXCELSIOR ENERGY, INC.

BEFORE THE MINNESOTA PUBLIC UTILITIES COMMISSION

PREPARED REBUTTAL TESTIMONY OF

ROBERT S. EVANS II

Q Please state your name and business address.

A My name is Robert S. Evans II. My business address is Excelsior Energy Inc., Crescent Ridge Corporate Center, 11100 Wayzata Boulevard, Suite 305, Minnetonka, Minnesota 55305

Q For whom are you testifying?

A I am testifying on behalf of MEP-I LLC and Excelsior Energy Inc. (collectively "Excelsior"), the developers of the Mesaba Energy Project (the "Project").

Q Have you previously provided testimony in this proceeding?

A Yes. On June 19, 2006, I filed testimony on behalf of Excelsior relating to the human health benefits and significant emission reductions that would be achieved by the Project compared to other solid fuel base load technologies and the nature and quantity of the Project's discharges and products associated with the Project's operations.

I. SCOPE AND SUMMARY

Q What is the purpose of your Rebuttal Testimony in this proceeding?

A The purpose of my rebuttal testimony is to respond to the Direct Testimony and Schedules of Xcel Energy, Inc. ("Xcel") witness Roger A. Clarke, the Direct Testimony of Minnesota Power ("MP") witness Michael G. Cashin, the Direct Testimony of mncoalgasplant witness Ronald D. Rich, and the Direct Testimony of MCEA witnesses

J. Drake Hamilton and Nancy Lange. Each of these witnesses' testimony responds to my Direct Testimony regarding the Mesaba Energy Project. In particular, I will respond to the concerns raised by these respective witnesses about the following matters:

Roger A. Clarke (Xcel Energy)

- The health benefits analysis conducted on behalf of the Mesaba Energy Project by ICF.
- The differences noted between the emissions modeled in the health benefits analysis and emissions Excelsior set forth in the New Source Review Construction Authorization Permit Application to the Minnesota Pollution Control Agency.
- The solid fuel base load facilities Excelsior selected for comparison with the Project.
- The speciation of mercury assumed to emanate from the Project's stacks.
- The viability of geological sequestration opportunities for large scale energy projects.
- The fact that Excelsior analyzes more emission categories than those covered by the Public Utility Commission's Order establishing externality values (Docket No. E999/CI93-583) in quantifying the economic impact of $PM_{2.5}$ emissions.

Michael G. Cashin (MP)

- IGCC's performance in reducing emissions of mercury, sulfur dioxide ("SO_2"), nitrogen oxides ("NO_X"), and particulate matter compared to modern pulverized coal ("PC") technology.

- Whether carbon capture and storage is a realistic option for the Mesaba Project.
- The development of technologies to retrofit existing and new power plants for use of oxygen as a combustion medium instead of air.
- The impacts of the Project on Air Quality-Related Values ("AQRV"), especially visibility impacts on nearby Class I areas.

Ronald R. Rich (mncoalgasplant)

- Whether 30% capture of CO_2 is a reasonable carbon mitigation plan.
- Whether the preferred and alternate sites are in excess of 450 miles and more likely 1,000 miles from suitable sequestration sites.
- Control and mitigation of air emissions from proposed flares.
- Overall plant safety issues.
- Cooling tower emissions.
- Whether Excelsior's site location decision has been affected by failing to consider addition of mercury removal technology for the East Range site and addition of a zero liquid discharge ("ZLD") system for the West Range Site.

J. Drake Hamilton (MCEA)

- Whether carbon capture and sequestration will avoid completely any additional costs associated with future carbon regulations.
- Whether carbon sequestration will ever be a viable option for the Mesaba Energy Project.

- Excelsior's failure to present information about its plan for carbon capture and sequestration.

Nancy Lange (MCEA)

- Whether the impacts and costs associated with implementation of the Clean Air Mercury Rule in Minnesota have been considered.
- Whether the State Total Maximum Daily Load ("TMDL") would preclude emissions of mercury from the Project.

Q Is carbon capture and sequestration by the Mesaba Energy Project a viable option?

A In general, carbon capture and sequestration is expected to be a viable option for the Project at the time the federal government implements regulations instituting a national carbon management program across all economic sectors. Excelsior's Plan for Carbon Capture and Sequestration further discusses this matter and is supported by testimony presented by Excelsior witness Richard Stone.

Q What general observations do you have with respect to other concerns raised by Xcel and MP in this proceeding?

A In general, I have the following observations:

- Information contained in testimony presented by Mr. Clarke and Mr. Cashin underscores Excelsior's position that the overall emissions profile associated with the Project is unrivaled by any conventional coal-fueled steam electric generating technology and clearly provides for significant emission reductions.

- Impacts associated with Air Quality Related Values in Class I areas, including visibility impairment identified through use of models that are known to overpredict such impacts, will be addressed through the normal process of environmental review and permitting.

Q What general observations do you have with respect to other concerns raised by Ronald Rich?

A The design of the Project will comply with all applicable regulations established for the protection/safety of workers, air emissions, wastewater discharges, and with regulations applying to the Emergency Planning and Community Right-to-Know Act. Each of these matters is more appropriately considered in other existing dockets.

Q What general observations do you have with respect to the concerns raised by Nancy Lange?

A The business plan for the Project considers the financial impacts associated with Minnesota's implementation of the Clean Air Mercury Rule. Although the program for the state has not been finalized at this time, Excelsior has assumed that the concepts laid out in EPA's model rule will be applied by the State. Excelsior is prepared to update and revise, as necessary, assumptions upon the State's issuance of its final mercury rule.

Rules/guidelines for implementing the State's Draft TMDL for mercury are only now beginning to be formulated, but are expected to allow for the construction of new sources. Excelsior will participate in any related state proceedings to ensure that the Minnesota Pollution Control Agency is aware of the favorable impact the Project's impact on rapid market penetration of IGCC will have on reducing deposition of mercury inside the State. IGCC's superiority over conventional coal technologies with

respect to mercury capture will be further established upon construction and testing of Mesaba One/Two. Nationwide reductions in mercury releases following the commercial demonstration of IGCC can be expected to further decrease as older conventional coal-fired units are replaced with IGCC power stations instead of newer conventional coal-fired power plants.

Q What concerns have been identified by Mr. Clarke with respect to the health benefits analysis conducted by ICF?

A First, Mr. Clarke suggests that the claimed benefits associated with the operation of the Project, as compared to a supercritical pulverized coal-fired power plant operated in Central Minnesota, are the product of demographic differences between the Iron Range and Central Minnesota, and asserts that such a comparison constitutes a modeling flaw.

Q Do you agree with Mr. Clarke's assertions?

A With respect to his first assertion, to some degree, yes; with respect to his second assertion, no.

Q Please explain your response regarding the first assertion.

A Our intention in conducting the ICF health effects study was to compare impacts modeled for the Project with those from NSP's most likely solid-fuel base load electric generating alternative. The alternative we considered most likely was expansion of NSP's Sherburne County Generating Plant. In fact, the Minnesota Department of Commerce compares the Project to a hypothetical new unit at the Sherburne County Generating Plant (Amit Testimony at 28), apparently because NSP has indicated that an expansion of this generating plant is a likely base-load coal alternative (Northern States

Power Company d/b/a Xcel Energy Base Load Development Process Study and Options, November 23, 2005, at 15, In the Matter of Northern States Power Company d/b/a Xcel Energy's Application for Approval of its 2005-2019 Resource Plan, Docket E002/RP-04-1752). Therefore, our comparison is entirely appropriate as we compared the Iron Range IGCC site, which the Legislature designated in the Innovative Energy Project Statute, with NSP's known, likely site for a supercritical pulverized coal-fueled plant expansion. Our methodology, which carefully follows the approach used by the United States Environmental Protection Agency (U.S. EPA) in its investigations of health benefits associated with implementation of the Clean Air Interstate Rule, represents the state-of-the-art in such benefits assessment. Our findings yield a fair and reasonable comparison of the known, likely sites for the respective plants.

Q Does Mr. Clarke question the data used in the analysis?

A Yes.

Q In what respect.

A Mr. Clarke raises questions regarding the differences between the annual emissions data used as the basis for ICF's health-benefits modeling studies and the annual emissions data reflected in Excelsior's application for a New Source Review Construction Authorization Permit(the "PSD Permit Application").

Q Would you please explain the differences noted by Mr. Clarke?

A Three principal factors contribute to the differences noted by Mr. Clarke. First, the annual emissions used in the ICF analysis assumed a 90% capacity factor. Annual emissions presented in the PSD Permit Application reflect operation of the IGCC Power Station at a 100% capacity factor. Second, at the time the ICF study was conducted, the

capacity of the IGCC Power Station was based on a combustion turbine generator sized at 531 $MW_{(net)}$; annual emissions presented in the PSD Permit Application were based on a combustion turbine manufactured by a different vendor and having a rated capacity of 606 $MW_{(net)}$. Mr. Clarke correctly identified this difference. Third, the emission rates used to calculate annual emissions in the PSD Permit Application were based on the maximum long-term hourly average emission rates expected from each emission unit associated with the IGCC power block (i.e., the combustion turbine generator, the tank vent boiler, and the flare). In one particular instance, i.e., for SO_2, the maximum 30-day rolling average emission rate contained in the PSD Permit Application was increased relative to that used to generate annual emissions that characterized the data set used by ICF. In other instances, maximum long term hourly average emission rates reflected in the PSD Permit Application were lower than those modeled in the ICF health effects study.

Q What was the reason for increasing the maximum SO_2 emission rate presented in the Excelsior's PSD Permit Application?

A Our intent was to present the maximum annual emissions associated with any particular emissions unit. That way, if the company had to change equipment vendors, we would be sure that we could do so without having to revisit all of our ambient air quality modeling studies.

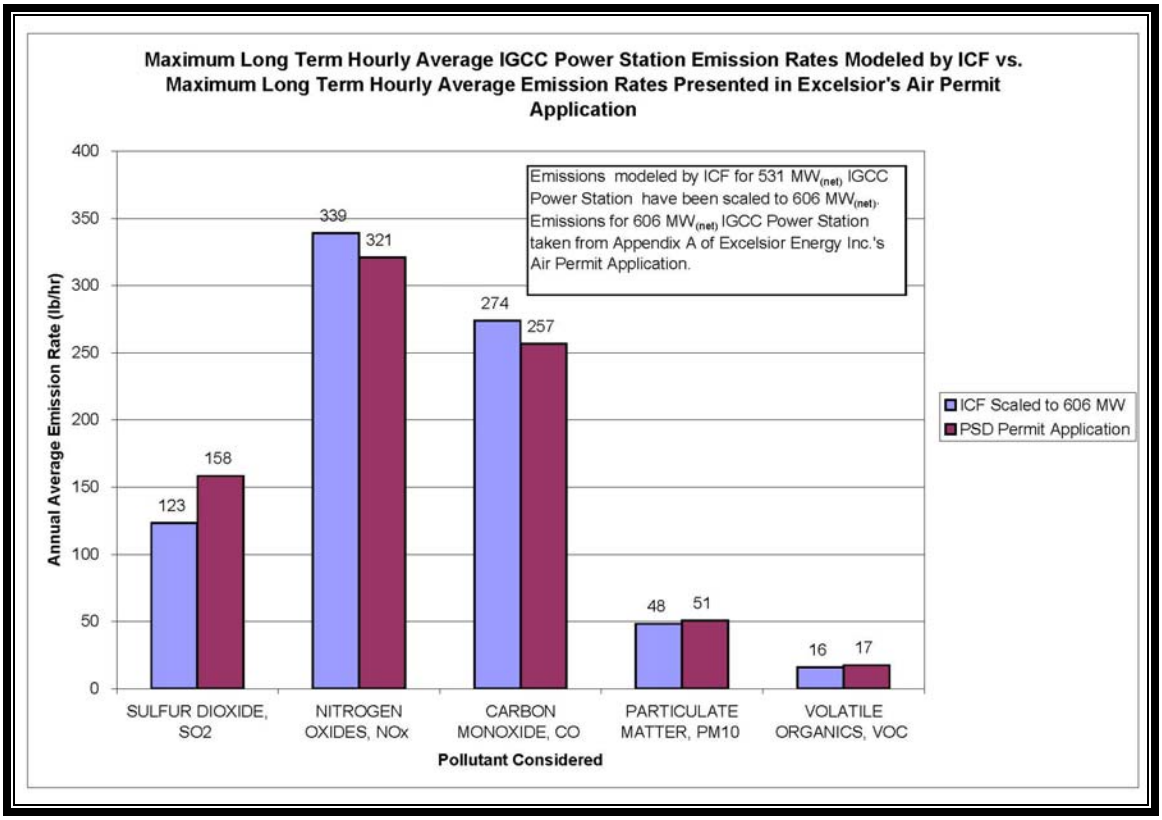
The emission rates for each emissions unit used to produce the maximum annual emissions in the PSD Permit Application reflect the best engineering judgment of our EPC Contractor, Fluor Corporation. Generally, if maximum emission rates are modeled, worst case ambient air quality impacts will be predicted. Selecting equipment with

lower emission rates than the maximum presented in the PSD Permit Application will generally result in lower predicted air quality impacts.

Q How do the hourly average emission rates used in the ICF health benefits modeling study compare to the hourly average emission rates presented in Excelsior's PSD Permit Application?

A Accounting for the increase in capacity from 531 MW(net) to 606 MW(net) and using the 344 day operating schedule contained in the ICF health benefits study, the long term hourly average emission rates for the two cases are presented below in Figure RSE -1.

Figure RSE-1



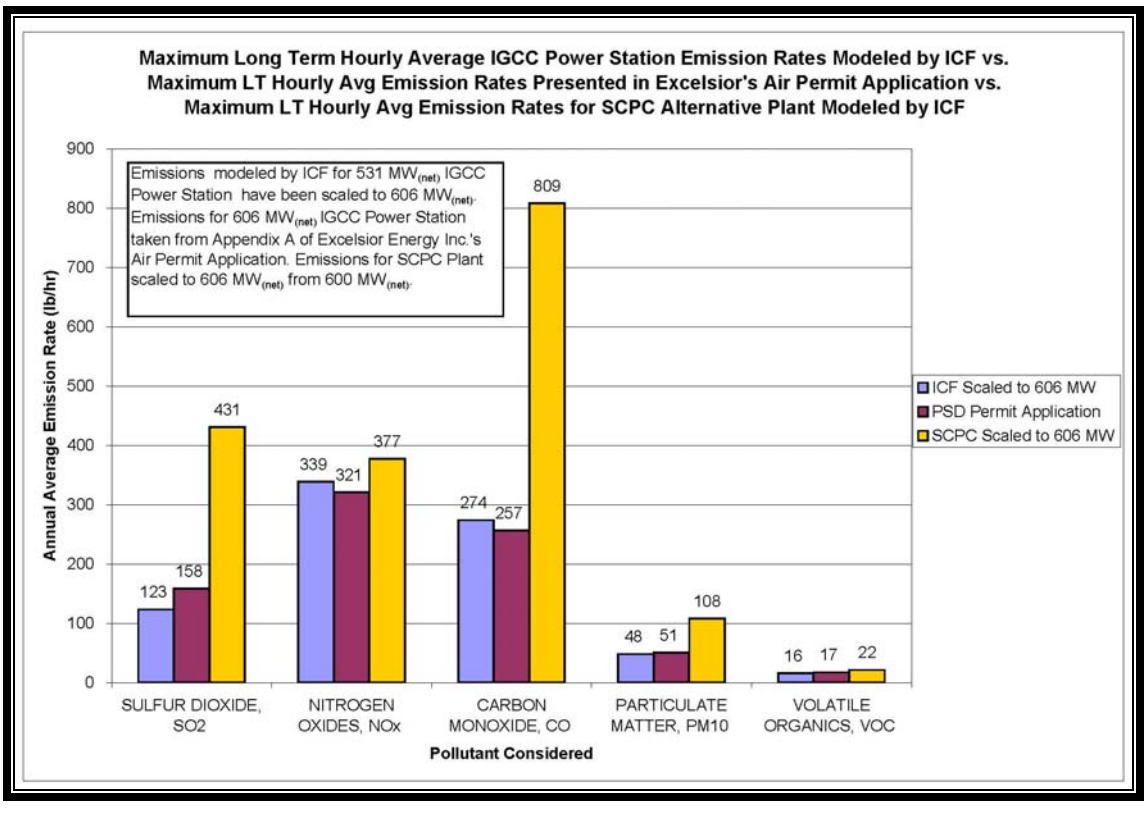
The principal differences between the long term hourly average emission rates modeled by ICF (scaled to 606 $MW_{(net)}$) and the long term hourly average emission rates

presented in Excelsior's PSD Permit Application are for SO_2, NO_X, and carbon monoxide ("CO"). In the case of SO_2, the PSD Permit Application emission rates exceed by 35 pounds per hour those modeled by ICF. For NO_X and CO, the emission rates modeled by ICF exceed those contained in the PSD Permit Application by 18 and 17 pounds per hour, respectively.

Q How do these emission rates compare to the emission rates ICF modeled for the supercritical pulverized coal-fueled electric generating station?

A The emission rates for two cases shown in Figure RSE-2 and the rates modeled for the supercritical pulverized coal-fueled electric generating station are shown below in Figure RSE-2.

Figure RSE-2



Q Do the differences in hourly emission rates shown between the scenario modeled by ICF in the benefits study for the IGCC Power Station and the comparable emissions presented in Excelsior's PSD Permit Application lead you to believe that the general conclusions of the ICF benefits study would be altered if the values from the permit were used?

A No. The differences between the two sets of IGCC numbers are relatively small compared to the differences between the IGCC and the alternative SCPC plant, and the latter difference is the basis for the benefits estimated by ICF. Furthermore, the 35 pound per hour deficit between the hourly SO_2 emissions modeled is partially offset by the 18 pounds per hour increase in NO_X emissions, both emissions being precursors to fine particulate matter. The 17 pound per hour difference (the discrepancy between the sum of the hourly SO_2 and NO_X emissions modeled by ICF and the sum of the hourly SO_2 and NO_X emissions provided in the permit application) compared to the 329 pound per hour difference between the combined hourly SO_2 and NO_X emissions for the SCPC plant and the combined hourly SO_2 and NO_X emissions for Mesaba One represents a 5% difference. This is not considered sufficient to warrant concern over the general conclusions of the ICF benefits modeling, as attested to by Excelsior witness Baxter Jones.

Q Were there other concerns that were presented with respect to ICF's modeling analysis?

A. Yes. Mr. Clarke suggests that the emission rates modeled by Excelsior for the supercritical pulverized coal-fueled electric generating plant alternative located in

Central Minnesota do not reflect the most highly controlled SCPC or CFB units that have recently been proposed or permitted.

Q Please address Mr. Clarke's concerns regarding the emission rates that were chosen to be indicative of the hypothetical new supercritical pulverized coal-fueled electric generating station located in Central Minnesota near Becker.

A Mr. Clarke suggests that some circulating fluidized bed boiler ("CFB") plants that have been proposed have significantly lower emission rates for some criteria pollutants than those used for the hypothetical SCPC plant modeled by ICF. Table 1 of Mr. Clarke's testimony compares the emission rates for the proposed South Heart Power Project, a lignite-fueled CFB, to the emission rates modeled by ICF.

Q Is a lignite-fueled CFB plant a "traditional" technology?

A No. Generally, pulverized coal boiler technologies are considered "traditional."

Q Do you believe the South Heart Power Project is a reasonable comparison plant for a new unit that would be located in Minnesota?

A No. The South Heart Air Permit Application provides information showing that the heat rate of the South Heart Plant is 10,960 Btu per kilowatt-hour ("Class I Area PSD Increment Assessment and Results" From the Air Permit Application for South Heart Coal LLC's South Heart Power Project, submitted to North Dakota Department of Health, March 2006, Page 2-4). Due to the low efficiency of this lignite-fueled, mine mouth plant and the prohibitive costs of lignite transportation, a lignite CFB is not a viable candidate in Minnesota.

Q Do you have other concerns regarding the comparison made by Mr. Clarke?

A Yes. Comparing emission rates between plants having similar heat rates is appropriate; however, for units having significantly different heat rates, as in this case, a comparison of mass emissions is required, including CO_2 emissions. Table RSE-1 is presented below to establish the mass emission rate comparisons in pounds per hour for all units scaled to 606 $MW_{(net)}$ capacity.

Table RSE-1

Emission	ICF Modeled Rate for Mesaba (lb/hr)	Mesaba Project PSD Permit Application (lb/hr)	ICF SCPC Plant (lb/hr)	CFB South Heart (lb/hr)
Sulfur dioxide, SO_2	123	158	431	259
Nitrogen oxides, NO_x	339	321	377	598
Carbon monoxide, CO	274	257	809	996
Particulate matter, PM_{10}	48	51	108	153
Volatile organics, VOC	16	17	22	17
CO_2 (not modeled, but provided for information)	Not Applicable	616 tons/hour	618[a] tons/hour	720[a,b] tons/hour

[a]Does not include CO_2 produced as by product of limestone injection or wet limestone scrubbing.

[b]Based on an emission factor of 218.8 lb CO_2/MMBtu provided in B.D. Hong and E. R. Slatick, "Carbon Dioxide Emission Factors for Coal," in Energy Information Administration, *Quarterly Coal Report,,January-April 1994*, DOE/EIA-0121(94/Q1) (Washington, DC, August 1994), pp. 1-8). The other hourly CO_2 emissions totals noted in the table are bases on the carbon content of the fuel and its heating value.

It is interesting to note that the sum of the hourly fine particulate matter emission precursors (i.e., SO_2 and NO_X) for the SCPC plant (808 pounds per hour) is less than the sum of these two criteria pollutants for the South Heart CFB plant (857 pounds per hour), and also that the PM_{10} emission rate is also lower for the modeled SCPC plant.

Therefore, beyond the fact that this CFB unit would not likely be considered a viable alternative for a new plant to be sited in Minnesota, the premise that its emissions might lead to substantially reduced health impacts is not defensible without substantiating evidence. Finally, the emissions of CO_2 are significantly increased above those from either the IGCC or SCPC plants ICF modeled for Minnesota.

Q What other comparisons have been made to call into question the SCPC plant that was modeled by ICF?

A Both Mr. Clarke and Mr. Cashin refer to advances being made in SCPC technology that could reduce emissions of SO_2 and NO_X beyond the levels ICF modeled for the SCPC plant in Central Minnesota. In support of this, Mr. Clarke identifies two recently proposed SCPC plants, namely Desert Rock and Calaveras Lake. Mr. Cashin references new information pertaining to the revised (and lower) heat rate expected from the Big Stone II plant (a supercritical plant located in South Dakota), such improved projections directly reducing the plant's emissions relative to previous estimates published in the facility's PSD Permit Application.

Q Please comment on the appropriateness of comparisons to the Desert Rock and Calveras Lake Power Stations.

A While it is true that the emission rates proposed for the Desert Rock and Calaveras Lake SCPC plants are lower than those modeled by ICF in the health benefits modeling study, this is because the serious air quality issues where these plants are located require extraordinary emission control measures – using advanced technologies - that would be considerably more expensive than those required for an SCPC plant at a site distant from such areas.

The Calaveras Lake Station is located in Bexar County, about 15 to 20 miles from the center of San Antonio, Texas. Bexar County is on the brink of 8-hr ozone non-attainment (already violated; not yet declared) and has entered into an agreement with the EPA to form an Early Action Compact ("EAC") to achieve attainment & avoid declaration (see http://www.tceq.state.tx.us/implementation/air/sip/sa.html). The Calaveras Station is being built by CPS Energy, a member of the EAC. CPS plants are by far the largest NO_X point sources in Bexar County. The State Implementation Plan includes major retrofits to existing CPS plants and requires that emissions from new facilities be offset.

These issues, in addition to the location of the facility in a major upscale metropolitan area, would dictate the inclusion of more stringent controls than those otherwise required. The Desert Rock Plant is located in the Northwest corner of New Mexico on Navajo Nation land near the Four Corners. This is an area of the country known for its scenic vistas across large geographical areas, the protection of which is complicated by numerous combustion sources that operate in the area. The protection of those scenic vistas mandates the use of the most technologically advanced, stringent NO_X and SO_2 controls available. It is clear that the siting pressures operative in the case of the Desert Rock plant are not be applicable for Central Minnesota and therefore the significantly higher costs of these controls would not be justified, as they would make the facility more expensive than Mesaba without any benefits over Mesaba. Therefore, we continue to believe the rates used by ICF in the analysis are appropriate.

Q Please comment on the appropriateness of comparisons to the Big Stone II Power Station.

A First, the net plant heat rate cited by Mr. Cashin for Big Stone Unit II (i.e., 9,000 Btu/kWh) was taken from the July 20, 2006 testimony of the Associate General Counsel of Ottertail Power Company. This heat rate differs from the 9,095 heat rate used by Jeffrey J. Greig in testimony presented on October 2, 2006 as Prefiled Supplemental Direct Testimony in the Matter of the Application to the Minnesota Public Utilities Commission for a Route Permit for the Big Stone Transmission Project.(OAH No. 12-2500-17037-2, MPUC Dkt. No. CN-05-619 and OAH No. 12-2500-17038-2, MPUC Dkt No. TR-05-1275). The stated net heat rate of 9,095 Btu/kWh appears on page 7, line 2 of Mr. Greig's written testimony and in Table 1 of the document he sponsored entitled "Revised Analysis of Baseload Generation Alternatives" dated October 2, 2006.

Q Who is Mr. Greig?

A. Mr. Greig is Burns & McDonnell's overall Project Manager in charge of preparing the updated evaluation of base load generating alternatives for Ottertail Power Company and others subsequent to the increase in costs of the Unit (provided in earlier planning analyses).

Q Do you believe Mr. Greig's testimony concerning the net heat rate for Big Stone Unit II should be used to describe Big Stone Unit II in place of the net heat rate referenced in testimony provided by Mr. Cashin?

A. Yes. Mr. Greig is employed by the engineering firm used by the project proponents to prepare, among many other documents, the PSD Permit Application for Big Stone Unit II.

Q Why are you focused on correcting what appears to be a small change?

A The proponents of the Big Stone Unit II project have recently announced changes to the fundamental performance characteristics of Big Stone Unit II (notably the increase in the unit's net capacity from 600 MW to 630 MW and the reduction in the Unit's net heat rate to 9,095 Btu/kWh) that must be fully understood in order to ensure that any emissions comparisons between Big Stone Unit II and Mesaba One/Two are made on a similar basis.

Q What prompted the change in Big Stone Unit II's rated net capacity from 600 MW to 630 MW?

A. According to the October 2, 2006 testimony of Mr. Mark Rolfes, Project Manager for Ottertail Power Company (see Applicant's Exhibit 32, page 8), "the design review now suggests that a unit approximately 5% larger than what the original estimate was based on will result in greater plant efficiencies." Mr. Rolfes goes on to say that the capacity increase from 600 MWnet to 630 MWnet had to do with changing the design specification for the Unit from the "1% day" to "more average site conditions."

Q How does this information affect any comparison of emissions between Big Stone Unit II and Mesaba One/Two?

A The emissions data for Mesaba One/Two presented previously in this proceeding are based on conditions yielding conservatively high heat rates analogous to the circumstances referenced by Mr. Rolfes in his Big Stone Unit II testimony. Just as Mr. Rolfes recommends changes to reflect "more average site conditions," a more accurate comparison of emissions between Big Stone II and Mesaba One/Two would be obtained using the performance characteristics reflecting site average conditions for

Mesaba One/Two instead of the "worst case" characteristics used to generate emissions presented in the Mesaba One/Two PSD Permit Application.

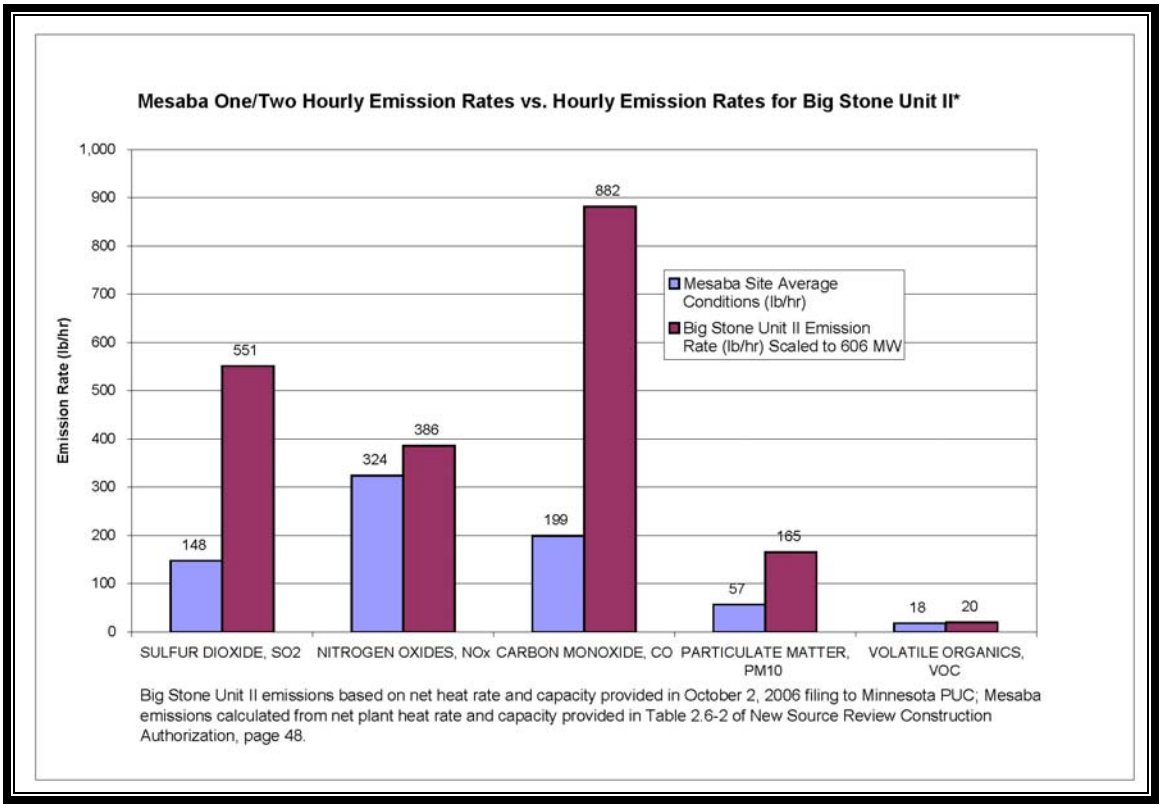
Q What net plant heat rate and capacity would you use to compare emissions from Mesaba One/Two with those from Big Stone II?

A I would use the site average characteristics (i.e., the 38°F case) referenced in Table 2.6-2 for the preferred PRB-1 feedstock contained in the Mesaba One/Two PSD Permit Application, the values of which for net capacity and net plant heat rate are 606 MW and 9,391 Btu/kWh, respectively.

Q Please compare the emissions from Big Stone Unit II with the emissions calculated using the more appropriate performance characteristics identified for Mesaba One/Two.

A The comparison between the hourly emissions based on site average conditions is provided in Figure RSE-3.

Figure RSE-3. Mesaba vs. Big Stone II Hourly Emissions Scaled to 606 MW_{net} Capacity



Q What is the point you are trying to make in the comparison presented in Figure RSE-3?

A In his direct testimony beginning at page 6, Mr. Cashin implies that today's supercritical units like Big Stone II have lower heat rates than that stated for Mesaba One/Two. Further, Mr. Cashin states: "The best comparison between the two technologies are [sic] the projected values for the Big Stone II project that will also be using PRB fuel and had an original heat rate projection of 9,369 Btu/Kwh." Although Mr. Cashin is talking about efforts to significantly improve the CO_2 footprint, it is disingenuous to extol the capabilities of today's supercritical technologies for removing one component and trivialize the significant difference in criteria pollutant emissions that is evident in Figure RSE-3. In his direct testimony at page 4, line 14, Mr. Cashin states that "Minnesota Power's analysis and research indicates that IGCC is potentially

slightly favorable to modern PC in terms of reductions of mercury, SO_2, and NO_X emissions reductions…While there may be slightly improved performance on these emissions with IGCC the benefit should not be overstated."

Q Do you agree with Mr. Cashin that there is only "slightly improved performance on these [mercury, SO_2 and NO_X] emissions with IGCC"?

No. Figure RSE-3 speaks for itself. In choosing Big Stone II to represent the "best comparison between the two technologies," Mr. Cashin underscores the superior environmental performance of IGCC. Once conventional technologies begin to approach the overall environmental performance of IGCC, of which its unmatched emission profile is only one such indicator, one should then start to seriously examine the difference between IGCC and conventional technologies CO_2 emissions. As shown in Figure RSE-3, today's "best comparison" falls significantly short of this mark. The difference cannot be casually disregarded as unimportant because NO_X and SO_2 are precursors of fine particulate matter.

Q Please address Mr. Cashin's other remarks regarding the difference between IGCC and PC technologies' abilities to reduce emissions of mercury, SO_2 and NO_X.

A At page 5 of his direct testimony, Mr. Cashin states "Because the differential between IGCC and PC technologies' ability to reduce emissions for mercury, SO_2 and NO_X is relatively small, in terms of actual emissions compared to uncontrolled emissions, the most important benefit that could come out of IGCC technology could be an answer for major carbon emission reduction through sequestration." The statement, as it applies to the removal of mercury, SO_2 and NO_X, is carefully crafted to discount

the significant reductions apparent in Figure RSE-3. By qualifying the reductions in terms of "actual emissions compared to uncontrolled emissions," Mr. Cashin is avoiding the fact that what comes out the stack is important. If this was not the case, there would be no basis for Mr. Cashin's opening remarks that Minnesota Power's "announced plans for major mercury, sulfur dioxide (SO_2), particulate [sic], and nitrogen oxide [sic] (NO_X) emission reductions...help to underscore our appreciation for today's and tomorrow's environmental policy realities" and the statement would be considered hypocritical.

Q Mr. Cashin states at page 5, line 16 of his direct testimony that "an IGCC plant in Northeastern Minnesota has no realistic opportunity for carbon capture and storage." Do you agree with his statement?

A No. Excelsior is presently engaged in efforts to identify options for managing its CO_2, including a study we are undertaking with EERC and the Plains CO_2 Reduction ("PCOR") Partnership. The effort being undertaken in this regard is described further in the testimony of Mr. Edward Steadman of EERC and in Excelsior's Plan for Carbon Capture and Sequestration ("CCS Plan").

Although we agree that local options for sequestering CO_2 are limited in Northern Minnesota, the opportunity for sequestering CO_2 in oil fields or saline formations via pipeline cannot be dismissed as unrealistic. Excelsior's CCS Plan attached to the testimony of Excelsior witness Richard Stone, includes a summary of the economic analysis applied by Excelsior in arriving at this conclusion.

Q Please provide the main points from the economic analysis Excelsior has conducted.

A. The main points are as follows:

- Carbon capture and sequestration ("CCS") activities to-date have demonstrated the commercial viability of long distance CO_2 transport via pipeline and recovery of petroleum via EOR
- IGCC represents the most economical approach available today for coal-fired power plants to begin accomplishing CCS
- 30% capture of CO_2 by the Project represents the most likely initial opportunity for demonstrating CCS via IGCC
- To support construction of a pipeline, there must first be in place enhanced oil recovery opportunities and/or rules implementing a carbon managed economy via a market-based emission trading system must be in place
- Subsequent units of the Project scheduled for development across the Iron Range would allow for the improved economic performance of the CCS program

Q How does Excelsior's CCS Plan address the claims of Mr. Cashin, Mr. Clarke, Mr. Rich, and Mr. Hamilton that CCS is not feasible for the Mesaba Energy Project?

A The CCS Plan demonstrates that CCS opportunities for the Project cannot be dismissed out of hand on the sole basis of the Project's distance from a sequestration site. In fact, the Plan documents that many CO_2 sequestration projects (via enhanced oil recovery) have occurred at sites greater than 200 miles distant from the CO_2 source.

Q Please address Mr. Cashin's reference to air permit issues, found in his direct testimony at page 8, line 11.

A The issue raised by Mr. Cashin namely, visibility in Class I areas (defined in Section 162(a) of the Clean Air Act), is common in air permitting processes for sources

within 300 km of such locations. Excelsior is currently involved in discussions with governmental authorities having jurisdiction over Air Quality Related Values in Voyageurs National Park (VNP) and the Boundary Waters Canoe Area Wilderness (BWCAW), both Class I areas within 74 miles (120 km) and 61 miles (98 km), respectively, of the West Range site. We expect to resolve any issues with respect the Project's modeled impacts on VNP and the BWCAW in the course of these discussions.

Q Please address Mr. Cashin's comments regarding the expected performance of mercury removal technologies to be used on conventional pulverized coal power plants compared to the technology to be employed at the Project?

A In his direct testimony at page 5, line 2, Mr. Cashin states that the capability of conventional coal-fired PC power plants equipped with emerging mercury control technology to control such emissions is about equivalent to that of IGCC. This may prove to be true (if 90% removal is the target), but the measures that must be taken at such facilities which fire subbituminous coals (to which most such plants in the state are limited) are less proven and are expected to be more expensive to achieve than the same level of control associated with use of the activated carbon beds to be employed on the Project. Cleaning mercury from large volumes of stack gases in conventional coal settings is much more difficult than cleaning mercury from the fuel as is the case in IGCC facilities.

Q Please address Mr. Clarke's concern (reflected in his response to the question posed on page 9, line 19 of his direct testimony and in his statement at page 11, line 14) that the mercury analysis conducted by ICF was flawed because the IGCC and SCPC plants were sited in different geographical locations?

A The response to this concern is the same as that stated earlier in response to Mr. Clarke's concern over the $PM_{2.5}$ modeling conducted by ICF. The modeling studies are based upon the reasonable and appropriate premise that Xcel's most likely alternative to the Project would be located in Central Minnesota.

Q Please address the concerns Mr. Clarke raises on pages 10 and 11 of his direct testimony respecting the speciation of mercury that was assumed for the Mesaba Energy Project and the scenarios modeled by ICF.

A First, Mr. Clarke correctly states that the test results obtained from the Wabash River Coal Gasification Repowering Project represent the basis for assuming 100% of the mercury emitted from the Mesaba Energy Project is in its elemental state. ICF stated this assumption at page 2-9 of Exhibit D attached to Excelsior's Petition filed in December 2005. I disagree with Mr. Clarke's assertion that due to the limited data from IGCC units, and the fact that bituminous coal was gasified at Wabash (as opposed to Excelsior's plan to use subbituminous coal as its preferred feedstock) Excelsior should conduct model runs assuming that some fraction of the Project's mercury emissions will be emitted in a speciated form.

Q Why do you disagree?

A First, the aqueous-based syngas scrubbing system used in the Project's E-Gas™ technology will act to scrub any speciated mercury present in the syngas exiting the gasifier. Second, if the bituminous coal used at Wabash River yields only elemental mercury, it would be unreasonably conservative to conduct the modeling proposed by Mr. Clarke. This is because there are higher concentrations of chlorine known to be present in bituminous coal, and mercury has a tendency to react with chlorine under

certain circumstances to create ionized mercury species. Thus, the production of such species is a far more likely scenario at Wabash River than at the Project where subbituminous coal with lower concentrations of chlorine is the preferred feedstock. Also, Wabash River has no activated carbon bed to clean the synthesis gas prior to its reaching the combustion turbine generator, while the design for the Project incorporates this feature. In short, Wabash River represents a conservative basis from which to reasonably assume all mercury emitted from Mesaba One/Two will be in the elemental form.

Q In his direct testimony at page 12, line 19, Mr. Clarke states his concern that the Commissioner's Order establishing externality values "only allows for a qualitative discussion of $PM_{2.5}$ (as it does for mercury), but does not establish a value or allow the unilateral development of a new externality value." Do you agree with this statement?

A No. The health effects quantified with regard to the formation of $PM_{2.5}$ are completely unrelated to the SO_2 damages on which the externality values in the Externality Hearings were based. The health benefits modeling conducted by ICF and the quantification of externalities are justified on the grounds that impacts of fine particulate matter on human health is a socioeconomic concern. In its May 3, 2001 Order Updating Externality Values and Authorizing Comment Periods on CO_2, $PM_{2.5}$, and Application of Externality values to Power Purchases (Docket No. E-999/CI-00-1636), the Commission provided the following guidance for undertaking future assessments of socioeconomic costs:

> The Commission agrees with those who noted that socioeconomic effects include a broad spectrum of impacts, may be beneficial and

> harmful at the same time, may be internalized partially or totally, may affect different community groups in different ways, are fact-specific, and change with each alternative.
>
> In these circumstances, the Commission finds it more prudent (and actually more supportive of the policy to take socioeconomic costs into account in resource decisions) to leave it to those involved in individual resource proceedings to identify and build a record to establish the types of socioeconomic harms or benefits associated with the particular resource options under consideration. Establishing a framework or list of categories of socioeconomic costs to consider for each individual docket or project would do little, as a practical matter, to advance anyone's claim that a particular resource option actually had a specific impact.
>
> In sum, the Commission finds that attempting to establish generic socioeconomic costs or even a list of socioeconomic categories as a framework for future examination of socioeconomic issues is not a practical or reasonably productive use of regulatory resources. Socioeconomic impacts are varied and case-specific. Socioeconomic benefits would have to be offset against costs, immeasurably complicating any attempt to quantify impacts. In these circumstances, the current practice of considering socioeconomic impacts qualitatively in individual proceedings remains appropriate.
>
> ***This decision, of course, does not discourage parties in individual cases from providing evidence that quantifies the benefit or detriment of a particular means of energy-generation.*** The Commission is simply not inclined to expend regulatory resources attempting to do, in advance of specific cases, what would be at best a very small part of the statutory obligation regarding socioeconomic impacts. [Emphasis added]

Excelsior has followed the Commission's guidance in building a quantitative record (regarding a type of socioeconomic harm) which differentiates the health effects associated with the Project and those associated with a super critical pulverized coal plant located in Central Minnesota. The only reason that a socioeconomic externality factor for mercury could not be derived was the difficulty of quantifying mercury impacts across the broad geographical range that such impacts occur. For fine particulate matter, the methodology is established and the data were available from which to quantify impacts.

Q Do you find the argument Mr. Clarke makes at Page 13, line 9 of his testimony persuasive?

A No. The fact that a SCPC or CFB might someday be able to achieve an emissions profile and match the environmental performance by the Project is not persuasive, because to accomplish such facility improvements an SCPC or CFB unit would incur costs in excess of IGCC's costs, as well as significant increases in heat rate. At the same time, IGCC costs will be decreasing due to the learning curve associated with constructing more plants and decreasing their associated heat rate. In short, the attempt to achieve equivalent environmental performance using conventional PC technologies will only yield further economic divergence between IGCC and SCPC, with IGCC representing the low cost option.

Q Does this conclude your rebuttal testimony?

A Yes.