

**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 SUPPLEMENTAL REBUTTAL TESTIMONY AND EXHIBITS
OF
EXCELSIOR ENERGY INC. AND MEP-I LLC IN RESPONSE TO THE
TESTIMONY OF THE MINNESOTA POLLUTION CONTROL AGENCY**

ROBERT S. EVANS II

NOVEMBER 22, 2006

1 **EXCELSIOR ENERGY, INC.**

2 **BEFORE THE MINNESOTA PUBLIC UTILITIES COMMISSION**

3 **PREPARED SUPPLEMENTAL REBUTTAL TESTIMONY OF**

4 **ROBERT S. EVANS II IN RESPONSE TO THE MINNESOTA**

5 **POLLUTION CONTROL AGENCY**

6 **Q Please state your name and business address.**

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

10 **Q For whom are you testifying?**

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

13 **Q Have you previously provided testimony in this proceeding?**

14 A Yes. On June 19, 2006, I filed testimony on behalf of Excelsior relating to, among
15 other things, the superior air emissions profile of the Project relative to that of any other
16 conventional coal-fueled electric generating unit in the nation.

17 On October 10, 2006, I filed rebuttal testimony on behalf of Excelsior in response
18 to the Direct Testimony and Schedules of Xcel Energy, Inc. (“Xcel”) witness Roger A.
19 Clarke, the Direct Testimony of Minnesota Power (“MP”) witness Michael G. Cashin,
20 the Direct Testimony of mncoalgasplant.com witness Ronald D. Rich, and the Direct
21 Testimony of MCEA witnesses J. Drake Hamilton and Nancy Lange.

22 On October 31, 2006, I filed surrebuttal testimony on behalf of Excelsior in
23 response to the rebuttal testimony of MCGP witnesses Ronald D. Rich and Edwin M.

1 Anderson, M.D., Minnesota Power witnesses Margaret L. Hodnik, and Department of
2 Commerce witness Eilon Amit, PhD.

3 Scope and Summary

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

5 A The purpose of my supplemental rebuttal testimony is to respond to the testimony
6 of Anne Jackson, filed on behalf of the Minnesota Pollution Control Agency (“MPCA”)
7 on October 31, 2006. In particular, I will address the report attached to Ms. Jackson’s
8 testimony, entitled “Comparison of Nitrogen Oxides, Sulfur Dioxide, Particulate Matter,
9 Mercury and Carbon Dioxide Emissions for IGCC and Other Electricity Generation”
10 (the “Report”).

11 **Q Please summarize your conclusions regarding the testimony and Report of**
12 **Ms. Jackson.**

13 A Much of the information contained in Ms. Jackson’s testimony generally
14 underscores the conclusions of my previous testimony regarding the Project’s
15 “significantly reduced sulfur dioxide, nitrogen oxide, particulate, and mercury emissions
16 from those of traditional technologies” within the meaning of Minn. Stat. § 216B.1694.
17 However, Ms. Jackson’s comparisons between the Project’s emissions and those from
18 traditional technologies require supplemental clarification and correction to ensure that
19 such comparisons are accurately and fairly represented. In making the clarifications and
20 corrections summarized below, I will demonstrate that the Project’s emission profile is
21 superior to every existing or proposed unit discussed in the MPCA Report, which
22 portends significant emission reductions for the Project relative to traditional
23 technologies. The back-up for my calculations is provided in Exhibit ____ (RSE-S1).

1 The clarifications and corrections I will make are as follows:

- 2 • In making its comparison between “generic” coal-fueled electric generating units,
3 U.S. EPA strives to ensure that such comparisons reflect similar operating
4 regimes (for example, the units are designed for baseload service, consume the
5 same type of fuel, and achieve some level of emissions performance U.S. EPA
6 deems appropriate). In this regard, it is reasonable to compare the generic units
7 with one another. However, the circumstances represented by the
8 existing/proposed units, including the Project, reflect use of different fuels,
9 different equipment configurations, unique operating regimes, and different
10 geographical locations making comparisons with the generic units of limited use.
- 11 • U.S. EPA’s published comparisons are made on the basis of pollutant mass
12 emitted per gross megawatt-hour (lb/MWH_{gross}). See “Environmental Footprints
13 and Costs of Coal-Based Integrated Gasification Combined Cycle and Pulverized
14 Coal Technologies,” July 2006, at pages 3-9. Ms. Jackson’s comparisons
15 between the Project and other units are made on the basis of pollutant mass
16 emitted per net megawatt-hour (lb/MWH_{net}). This has the effect of
17 disadvantaging the Mesaba Project’s emissions in comparison to the U.S. EPA’s
18 generic technologies.
- 19 • MPCA’s comparison of the Project’s mercury emissions with those from Sithe
20 Global Energy Desert Rock SCPC (“Desert Rock”) and the SWEPCO Hempstead
21 County USC plant (“HC Plant”) is done in a manner that unfairly and improperly
22 disadvantages the Project.
- 23 • CO₂ emissions for Desert Rock as presented by Ms. Jackson appear to be in error
24 based on statewide estimates of coal quality.

- 1 • The MPCA Report compares the filterable and condensable particulate matter
2 emissions from the Mesaba Plant to only filterable particulate matter emissions
3 for the other facilities in Figure 3, improperly skewing the PM comparison in
4 favor of the other facilities.
- 5 • The Report avoids comparisons of the Project’s emissions to those from the Big
6 Stone II SCPC facility, a plant which would use traditional solid-fuel technology,
7 would serve load in Minnesota, and was discussed both in Minnesota Power
8 witness Cashin’s testimony and my rebuttal testimony. A comparison of the
9 Project’s emissions to a nearby facility employing traditional SCPC technology is
10 relevant and should be included.

11 Comparison of EPA’s Projected “Generic” Plant Emissions to the Emission Limits Proposed in
12 the Project’s Air Permit Application

13 **Q Do you believe it is appropriate to compare emissions from U.S. EPA’s “generic”**
14 **units (based on U.S. EPA’s performance projections) with the emission limits**
15 **proposed in the Project’s application for a New Source Review Construction**
16 **Authorization Permit (the “Air Permit Application”)?**

17 A No. Such comparisons are of little value due to the disparate nature of the units
18 being compared. In addition, comparing the rates presented in the Project’s Air Permit
19 Application with U.S. EPA’s performance projections introduces significant bias.

20 **Q Please explain.**

21 A Ms. Jackson’s testimony accurately notes,
22 “...permit limits represent a maximum allowed emissions level.
23 Limits in air quality permits are based on an expected “worst case”
24 performance level in order that the full range of operations is taken
25 into account. Actual emissions are less than permitted emissions.”
26 MPCA Report, at 2.

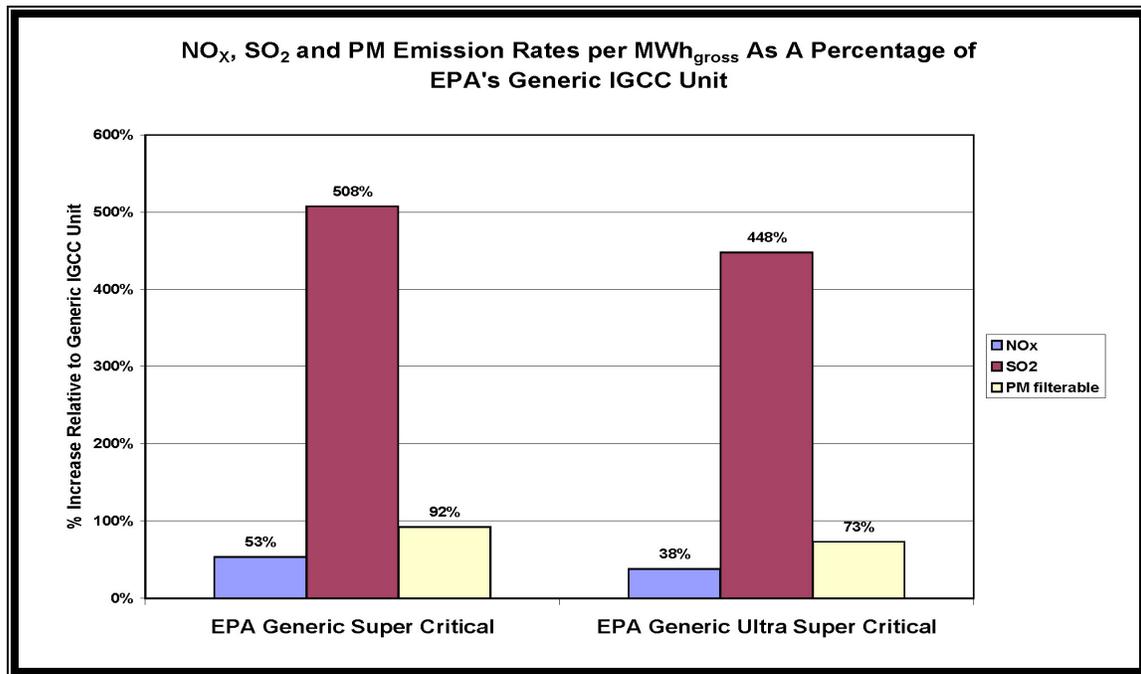
1 As a result, comparing the predicted actual emissions of the generic units to the limits
2 proposed in the Project's Air Permit Application (as is done in Figure 3 of Ms. Jackson's
3 testimony) inappropriately disadvantages the Project.

4 Further, design provisions incorporated into the Project that allow it to gasify a
5 wide range of feedstocks and optimize turbine power output, along with the difference
6 between the Project's actual elevation and the sea level condition assumed for the generic
7 IGCC unit (*see* "Environmental Footprints and Costs of Coal-Based Integrated
8 Gasification Combined Cycle and Pulverized Coal Technologies", July 2006, at pages
9 1-2) result in a lowering of the Project's thermal efficiency relative to the narrowly
10 optimized circumstances characterizing U.S. EPA's generic units. Consequently, the
11 Project would be disadvantaged in every comparison therewith.

12 Although it is inappropriate to compare the Project's emissions to U.S. EPA's
13 generic IGCC, SCPC, and USC units, a comparison can be made between the three
14 generic units on the basis that U.S. EPA attempted to provide a consistent design basis
15 between them. Figure RSE-S1 demonstrates that the generic IGCC plant is expected to
16 achieve significantly reduced emissions reductions compared to other generic solid fuel
17 plants.

1

Figure RSE-S1



2

3 **Q Are there other instances where the MPCA Report compares the Project to the U.S.**
4 **EPA's generic units?**

5 **A** Yes. Ms. Jackson compares the Project's thermal efficiency, mercury emissions,
6 and CO₂ emissions to those of the generic units.

7 **Q Do you have the same reservations with respect to these comparisons as with the**
8 **comparisons for SO₂, NO_x and particulate matter emissions noted previously?**

9 **A** With respect to thermal efficiency, no; with respect to mercury and CO₂, yes.

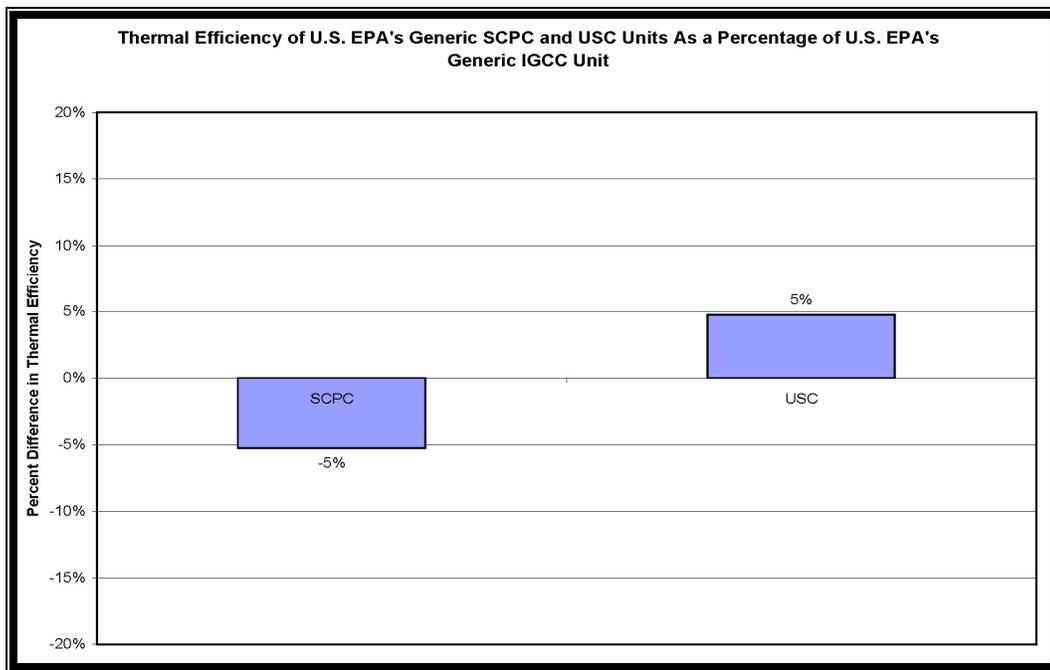
10 **Q Why don't you have reservations with respect to the manner in which thermal**
11 **efficiencies are compared?**

12 **A.** I have no reservations with respect to Figure 2 of Ms. Jackson's testimony, because the
13 thermal efficiency of the generic units is not expressed in terms of the Project's thermal
14 efficiency. In Figure 2, each individual unit type stands on its own and no direct
15 comparability between the Project and the generic units is implied. The graphic simply

1 shows what I have stated previously, that is, the design basis selected by Excelsior as its
2 worst case long term operating condition at a specific location is mismatched with the
3 optimized, sea level design conditions under which the generic units were rated, resulting
4 in a predictable reduction in efficiency.

5 I have provided Figure RSE-S2 below to compare the thermal efficiency of the
6 U.S. EPA's generic SCPC and USC units in terms of the generic IGCC unit. The figure
7 shows that U.S. EPA predicts the generic USC unit will have a slightly higher thermal
8 efficiency than the generic IGCC unit; U.S. EPA predicts the generic SCPC unit will
9 have a slightly lower thermal efficiency.

10 **Figure RSE-S2**



11
12 **Q How do the thermal efficiencies of the Pending Projects included in the MPCA**
13 **Report compare with one another?**

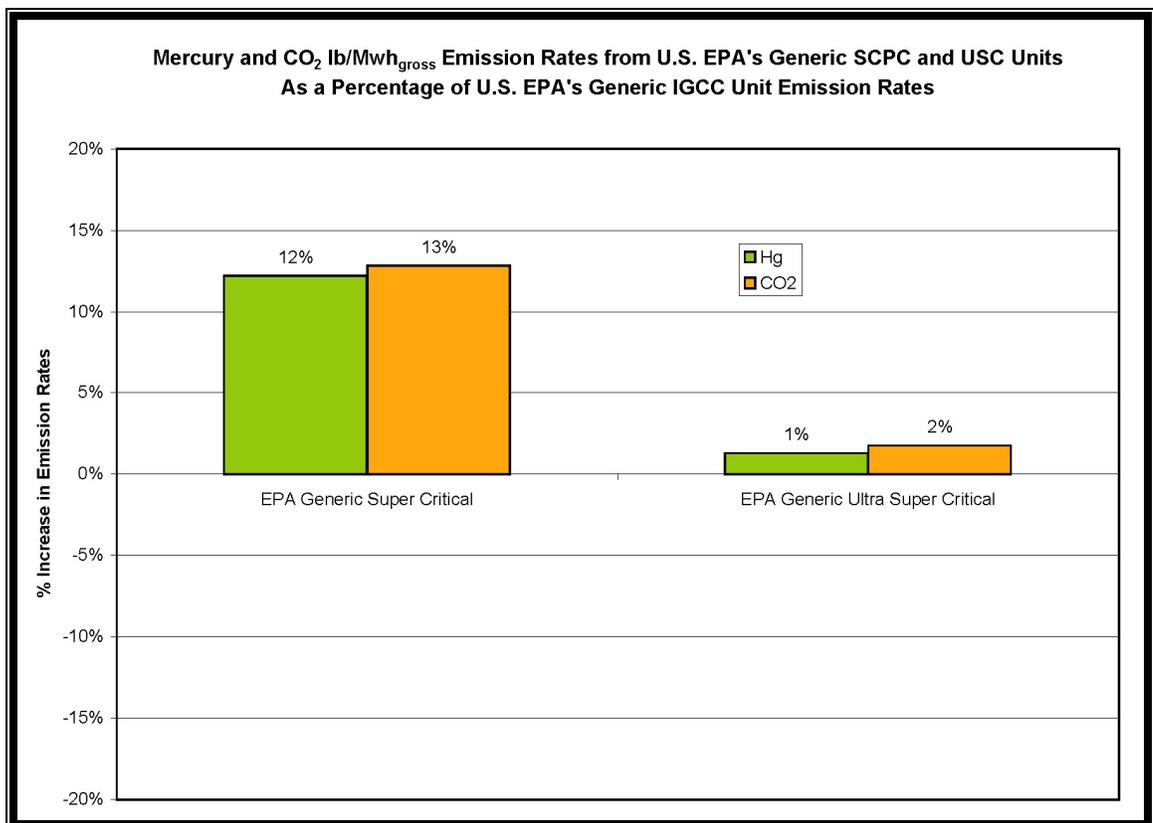
14 **A** The comparison of the thermal efficiencies for the Project, the existing unit with
15 BACT controls, Desert Rock, and HC Plant (hereafter collectively referred to as the

1 “Pending Projects”) are appropriately portrayed in Figure 1 of Ms. Jackson’s testimony.
2 In this more appropriate comparison, that is, permitted condition to permitted condition,
3 the Project stands out as having the highest efficiency of the Pending Projects.

4 **Q What should be done to eliminate your concerns with respect to the manner in**
5 **which the MPCA Report portrays the Project’s emissions of mercury and CO₂?**

6 **A** For the previous reasons mentioned, one should compare U.S. EPA’s generic
7 SCPC and USC units in terms of the generic IGCC unit and display the results of the
8 comparison apart from the Pending Projects. I have done this and show the resulting
9 generic unit comparisons for mercury and CO₂ in Figure RSE-S3.

10 **Figure RSE-S3**



11

1 Comparison of Project's Mercury and CO₂ Emission Rates to Those of the Other Pending
2 Projects

3 **Q Do you have any concerns with respect to the manner in which the MPCA Report**
4 **portrays the Pending Project's emissions of mercury and CO₂?**

5 **A.** Yes. To eliminate them I would begin by comparing the Pending Projects on the
6 same basis as U.S. EPA performed the generic comparisons in their July, 2006 report
7 "Environmental Footprints and Costs of Coal-Based Integrated Gasification Combined
8 Cycle and Pulverized Coal Technologies". As noted previously, U.S. EPA's comparisons
9 were based on lbs/MWh_{gross}¹ and Ms. Jackson has characterized emissions from the
10 Pending Projects in terms of lbs/MWh_{net}. Second, I would revise the mercury emission
11 rate for the HC Plant to reflect the mercury emission limit proposed in the HC Plant's
12 permit application. Whereas the MPCA Report calculates the Project's mercury emission
13 rate from the limit proposed in its Air Permit Application, the MPCA Report calculates
14 mercury emissions from the HC Plant based on U.S. EPA's predicted mercury emissions
15 for the generic USC unit rather than the HC Plant's proposed permit limits. This is not a
16 valid comparison, especially since the air permit application for the HC Plant proposes an
17 emission rate for mercury.

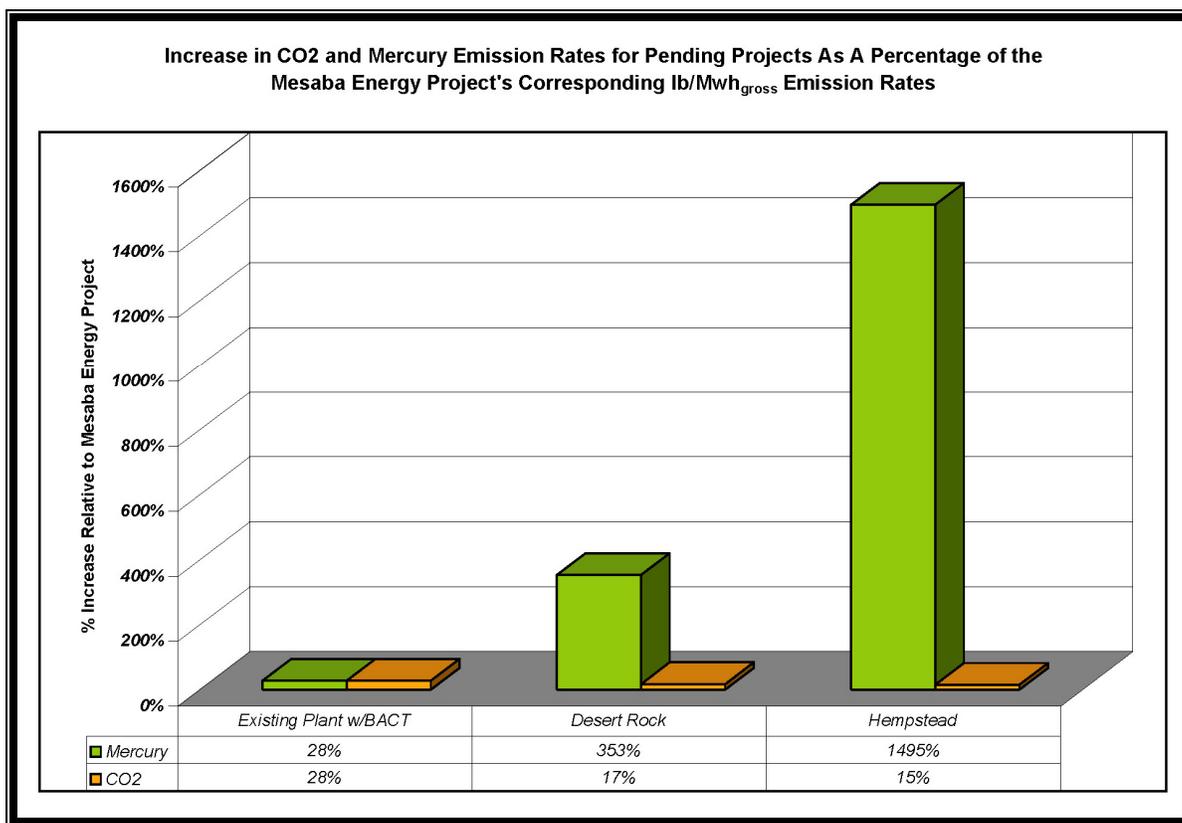
18 Third, I would revisit and correct the CO₂ emission rate for Desert Rock as its
19 emission factor of 199.29 lb/MMBtu, (as cited in the MPCA Report) appears to be
20 unrealistically low. According to the Energy Information Administration ("EIA"), the
21 average CO₂ emission factor for subbituminous coal mined in the state of New Mexico is

¹ In personal communication with Sikander Khan (Work Assignment Manager for U.S. EPA's "Environmental Footprints and Costs of Coal-Based Integrated Gasification Combined Cycle and Pulverized Coal Technologies" report ["Footprints Report"]) on November 21, 2006, Mr. Khan stated the basis for selecting lbs/MWh_{gross} as the basis for comparison in the Footprints Report was that this basis is used in the most recent update of the New Source Performance Standards for Electric Utility Steam Generating Units (*see* 40 CFR 60 Subpart Da).

1 208.8 lb/MMBtu². Even states with primarily bituminous coal, which typically has lower
 2 CO₂ lb/MMBtu emission rates than subbituminous coal, are seldom found to be below
 3 201 lb/MMBtu. Therefore, it seems unlikely that Desert Rock, which burns
 4 subbituminous coal, could be as low as presumed in the MPCA Report.

5 I have addressed my first, second, and third concerns and show in Figure RSE-S4
 6 the lb/MWh_{gross} emission rates results for mercury and CO₂ for each of the Pending
 7 Projects as a percentage increase relative to the Project's lb/MWh_{gross} emission rates.
 8 Figure RSE-S4 reflects EIA state average CO₂ emission factors.

9 **Figure RSE-S4**



10

² See http://www.eia.doe.gov/cneaf/coal/quarterly/co2_article/co2.html.

1 Particulate Matter Comparisons Between the Pending Projects

2 **Q Is there any other clarification you would like to make prior to comparing the**
3 **Project's emission rates for SO₂, NO_x, and particulate matter with the other**
4 **Pending Projects on the basis of U.S. EPA's terms (that is, lb/MWh_{gross})?**

5 A Yes. The Project's particulate matter emission rate, as depicted in Figure 3 of the
6 MPCA Report, includes filterable and condensable particulate matter, whereas the
7 emission rates for the Pending Projects include only filterable particulate matter. In order
8 to provide a valid comparison, both filterable and condensable particulate matter
9 emissions from the other Pending Projects must be compared with Project's combined
10 particulate matter emissions.

11 **Q. Have you obtained estimates of the other Pending Project's filterable and**
12 **condensable particulate matter emissions?**

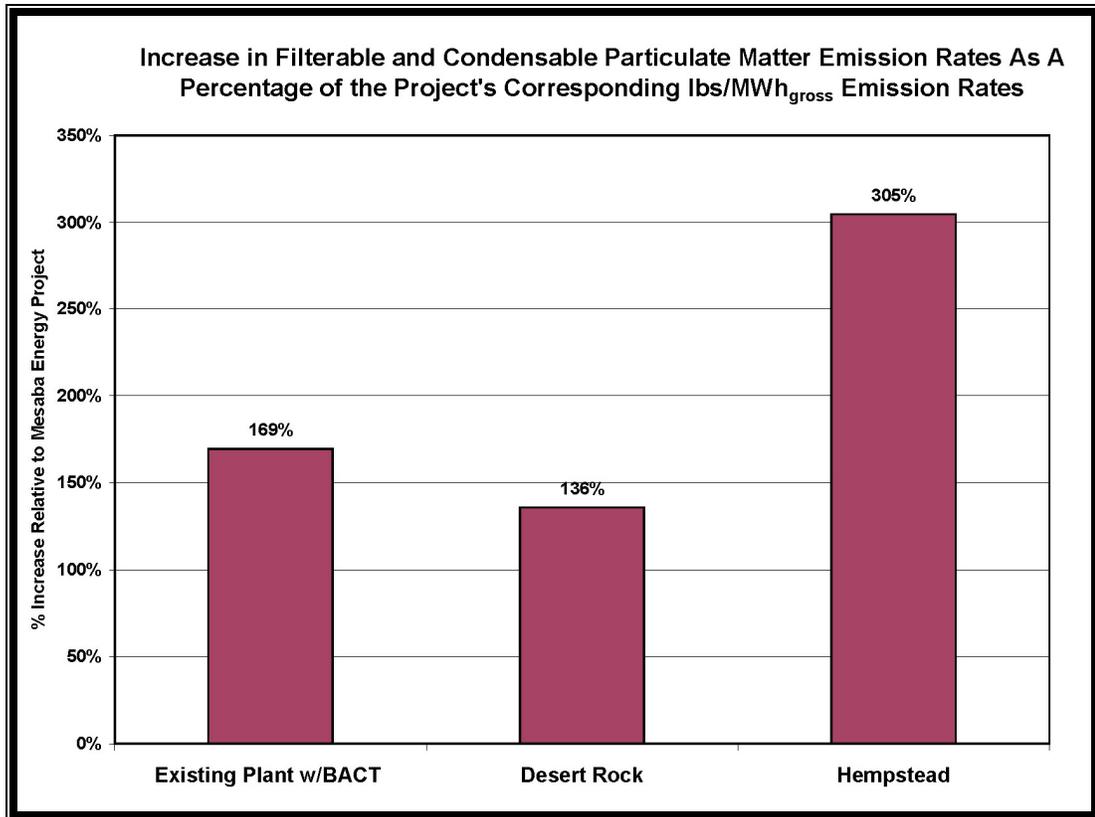
13 A Yes. The air permit applications for Desert Rock and the HC Plant specify total
14 particulate matter emissions in addition to filterable particulate matter emissions, and the
15 following graphs reflect those emission rates. The permit application for the existing
16 plant with BACT controls specifies only filterable particulate matter. The Desert Rock
17 air permit application provides a basis for estimating total particulate matter emissions
18 based on filterable emissions:

19 "Because PM10 includes condensable particulate matter and PM does not include
20 condensable particulate matter, PM10 emissions are higher than PM emissions."
21 (p. 3-4). The application goes on to say, "Inclusion of the condensable fraction is
22 anticipated to double the particulate emission rate for coal-fired boilers." (p. 4-
23 20).

24 In the absence of any data regarding the emission rate of condensable particulate matter
25 at the existing plant with BACT controls, the presumed emission rate of filterable and
26 condensable particulate matter is conservatively estimated to be 1.5 times that of

1 filterable particulate matter. Figure RSE-S5 shows the other Pending Projects filterable
2 and condensable particulate matter emission rates in terms the percentage increase from
3 the Project's filterable and condensable particulate matter emission rate expressed in
4 terms of $\text{lb}/\text{MWh}_{\text{gross}}$.

5 **Figure RSE-S5**



6

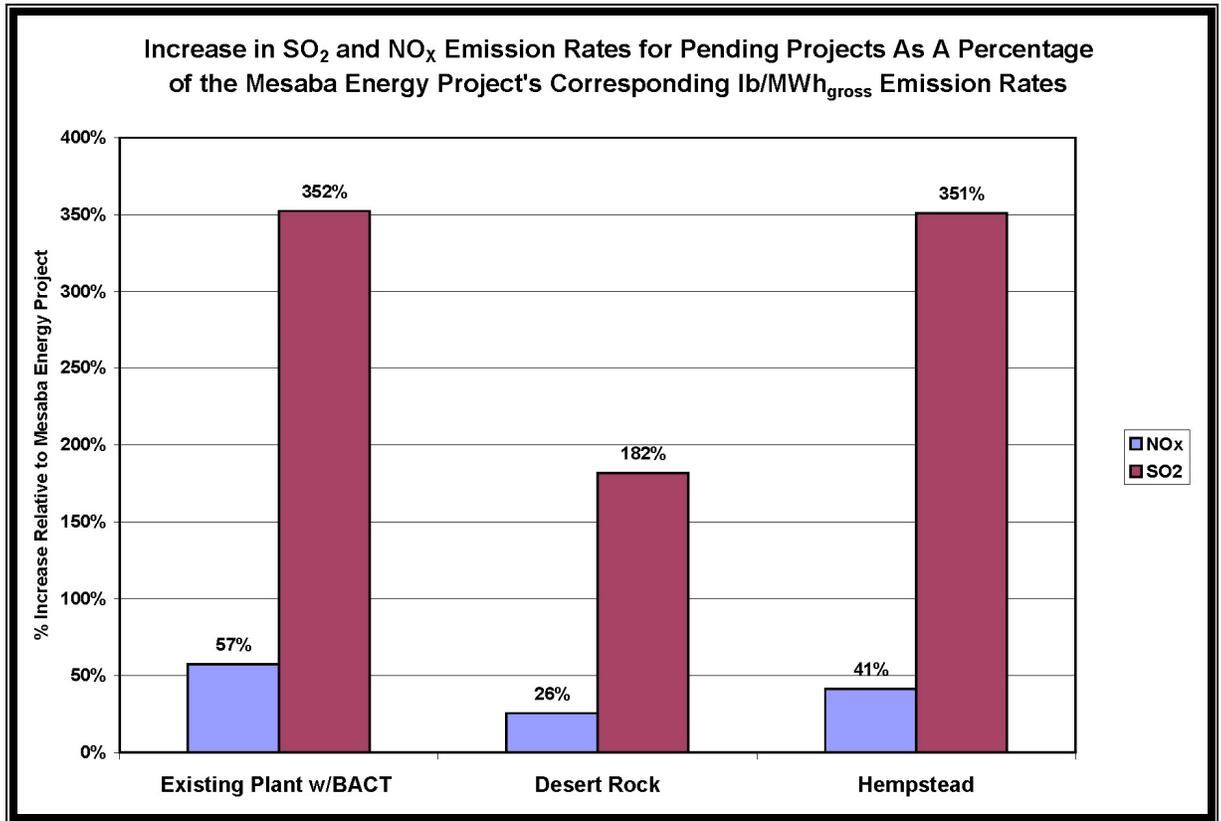
7 SO₂ and NO_x Comparisons Between the Pending Projects

8 **Q Please provide the Pending Projects' emission rates in terms of the basis U.S. EPA**
9 **specified in their July, 2006 report "Environmental Footprints and Costs of Coal-**
10 **Based Integrated Gasification Combined Cycle and Pulverized Coal Technologies".**

11 **A** I have prepared Figure RSE-S6 in order to complete the Pending Projects' comparisons
12 of SO₂ and NO_x emission rates in terms of $\text{lbs}/\text{MWh}_{\text{gross}}$.

1

Figure RSE-S6



2

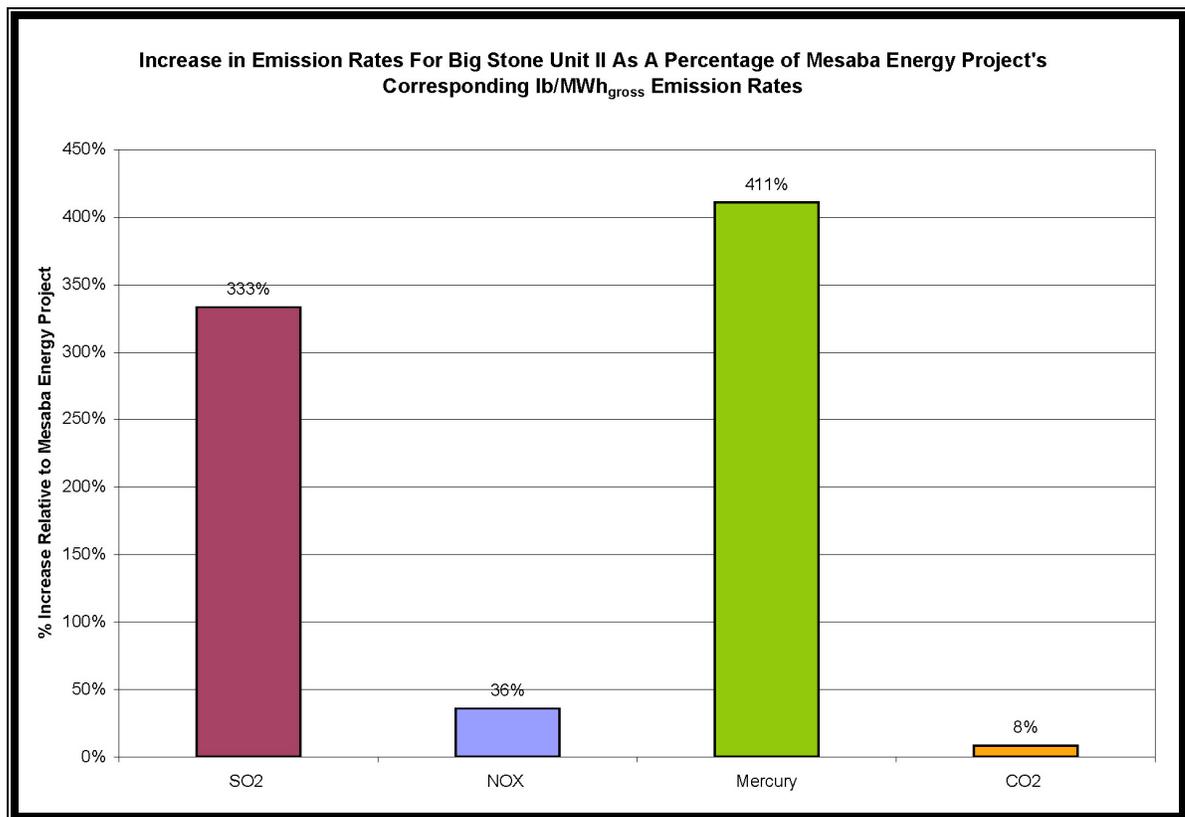
3 Comparison to Proposed Upper Midwest SCPC Plant

4 **Q The MPCA Report discussed Big Stone Unit II (“BSU-II”), but did not produce the**
 5 **unit’s emissions profile because of “very recent announced project changes and**
 6 **pending amendments to its air emissions permit.” Has Excelsior compared the**
 7 **Project’s SO2, NOX and particulate matter emission rates (in terms of lb/MWh_{gross})**
 8 **to recently announced changes to BSU-II?**

9 **A** Yes, we believe so. Figure RSE-S7 is based on updated information presented as
 10 part of the BSU-II Proponents’ testimony filed on October 2, 2006 with the Minnesota
 11 Public Utilities Commission (see Table 1 of the document sponsored by Jeffrey J. Greig
 12 entitled “Revised Analysis of Baseload Generation Alternatives” as part of the October 2,
 13 2006 Prefiled Supplemental Direct Testimony in the Matter of the Application to the

1 Minnesota Public Utilities Commission for a Route Permit for the Big Stone
2 Transmission Project (OAH No. 12-2500-17037-2, MPUC Dkt. No. CN-05-619 and
3 OAH No. 12-2500-17038-2, MPUC Dkt No. TR-05-1275). Among other things, Table 1
4 of Mr. Grieg's testimony includes a revised net plant heat rate of 9,095 Btu/kWh and
5 emissions rates for SO₂, NO_x, CO₂ and mercury. In the absence of a value for the gross
6 output of Big Stone Unit II, the U.S. EPA ratio of net:gross power for the generic
7 supercritical unit was used (541MW_{gross}:500 MW_{net}) and applied to the net power
8 output of 630 MW, resulting in a gross power output of 682 MW.

9 **Figure RSE-S7**



10
11 **Q Please summarize your supplemental rebuttal testimony?**

12 **A** The overall emissions profile characterizing the Mesaba Energy Project is
13 superior to every other existing or proposed conventional coal-fueled project that has

1 been offered as part of the record pertaining to the docket under which this testimony is
2 filed.

3 **Q Does this conclude your supplemental rebuttal testimony?**

4 **A Yes.**

Exhibit _____ (RSE-S1)

