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August 4, 2016

VIA E-FILING AND U.S. MAIL

Mr. Daniel P. Wolf
Executive Secretary
MN Public Utilities Commission
121 7th Place East, Suite 350
Saint Paul, MN 55101

Re: In the Matter of the Investigation into Environmental and Socioeconomic Costs Under Minn. Stat. § 216B.2422, Subd. 3
Docket No. E-999/CI-14-643
OAH Docket No. 80-2500-31888

Dear Mr. Wolf:

Enclosed for filing please find the following:

1. Minnesota Large Industrial Group's Reply to Exceptions Filed by Other Parties to the Findings of Fact, Conclusions, and Recommendations of the Administrative Law Judge Regarding Phase II (Criteria Pollutants Track); and

2. Certificate of service with service list.

Please do not hesitate to contact me should you have any questions or concerns.

Very truly yours,

Stoel Rives LLP

Marc A. Al

Encl: 8 hard copies

cc: Service List (via e-filing) (with encl.)

BEFORE THE MINNESOTA PUBLIC UTILITIES COMMISSION

121 Seventh Place East Suite 350
St. Paul, Minnesota 55101-2147

Hon. Beverly Jones Heydinger	Chair
Hon. Nancy Lange	Commissioner
Hon. Dan Lipschultz	Commissioner
Hon. Matthew Schuerger	Commissioner
Hon. John Tuma	Commissioner

In the Matter of the Further Investigation into Environmental and Socioeconomic Costs Under Minn. Stat. § 216B.2422, Subd. 3	MPUC DOCKET NO. E-999/CI-14-643 OAH Docket No. 80-2500-31888

MINNESOTA LARGE INDUSTRIAL GROUP'S REPLY TO EXCEPTIONS FILED BY OTHER PARTIES TO THE FINDINGS OF FACT, CONCLUSIONS, AND RECOMMENDATIONS OF THE ADMINISTRATIVE LAW JUDGE REGARDING PHASE II (CRITERIA POLLUTANTS TRACK)

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The Minnesota Large Industrial Group ("MLIG"), hereby respectfully submits the following reply to the July 15, 2016, exceptions to the Administrative Law Judge's ("ALJ") June 15, 2016, Findings of Fact, Conclusions, and Recommendations (the "Recommendations") regarding Phase II (Criteria Pollutants) filed by Xcel Energy ("Xcel"), the Minnesota Department of Commerce (Division of Energy Resources) ("DOC") and the Minnesota Pollution Control Agency ("MPCA" and jointly with the DOC the "Agencies"), and the Clean Energy Organizations ("CEOs").

INTRODUCTION

This phase of the case begins and ends with the burden of proof. As the CEOs have to eloquently pointed out, "it is inappropriate to insert nonscientific policy judgments into [the] quantification [required by this contested case]."[1] Neither the CEOs, nor the Agencies, nor Xcel met their burden of proof, because each of their experts has failed to make the required proximate-cause connection between $PM_{2.5}$ emission and $PM_{2.5}$ formation from SO_2 and NO_x emitted in Minnesota and human-health damages in an undeniably low-$PM_{2.5}$ ambient-air environment. Similarly, the human-health damages calculations outside of Minnesota do not take this deficiency into consideration, causing a complete lack of proof with respect to the human-health damages. Additionally, and absent a breakout of the remaining (non-health) damages

[1] *See* 7/15/2016 Clean Energy Organizations Exceptions to ALJ's 6/15/2016 Criteria Pollutants Report at 6 (relying on *In the Matter of Quantification of Environmental Costs Pursuant to Laws of Minnesota 1993, Chapter 356, Section 3*, Docket No. E-999/CI-93-583, Order Establishing Environmental Cost Values (January 3, 1997), at 11, n.4).

studied by Dr. Desvousges and Dr. Muller, no evidence as to any admissible damages exists in the record. The MLIG joins the CEOs in requesting that the Commission "return to the record itself" as it considers the quantification question at hand, rather than relying on the ALJ's Findings of Fact, Conclusions, and Recommendations.[2]

If the Commission were to receive additional evidence to cure these deficiencies, any consideration of damages, including health damages and non-health damages such as agricultural, materials, and visibility damages, should be limited to a local geographic scope due the models' inability to reliably estimate national emission dispersions.

ANALYSIS

I. NONE OF THE PROPONENTS OF NEW ENVIRONMENTAL-COST VALUES HAS MET ITS BURDEN OF PROOF

For the constitutional, statutory, and other reasons set forth in detail in its July 15, 2016, Exceptions to the ALJ's June 15, 2016, Criteria Pollutants Findings of Fact, Conclusions, and Recommendations, the MLIG respectfully urged the Commission to reject the ALJ's novel reading of Minn. Stat. § 216B.2422, subd. 3(a) and her conclusion (without citation to authority) that the Legislature did not intend a causal link between emissions and the environmental-cost damages to be quantified by the Commission under that statute.[3] The MLIG further urged the Commission to reject the ALJ's speculation regarding potential future medical advances that may — according to the ALJ and

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2 *See* 7/15/2016 Clean Energy Organizations Exceptions to ALJ's 6/15/2016 Criteria Pollutants Report at 14.

3 *See* 7/15/2016 MLIG Exceptions to ALJ's 6/15/2016 Criteria Pollutants Findings of Fact, Conclusions, and Recommendations at 9-17.

without the benefit of any medical or other evidence in the record — at some point in the future be able to make a connection between primary and secondary $PM_{2.5}$ emissions and health-effects damages in areas where the $PM_{2.5}$ ambient air concentration is below 12 $\mu g/m^3$, where that evidence does not currently exist.[4] Finally, the MLIG in its July 15, 2016, Exceptions sought rejection of the ALJ's Conclusions 54 and 55 on the basis that they lack a factual basis in the record and are, in fact, contradicted by the record.[5] That record shows that there is no reliable connection between exposure to primary and secondary $PM_{2.5}$ and health-effects damages in areas with a chronic $PM_{2.5}$ ambient air concentration below 12 $\mu g/m^3$, such as Minnesota and Wisconsin.[6] It is this chronic

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4 *See* 7/15/2016 MLIG Exceptions to ALJ's 6/15/2016 Criteria Pollutants Findings of Fact, Conclusions, and Recommendations at 65-67.

5 *See* 7/15/2016 MLIG Exceptions to ALJ's 6/15/2016 Criteria Pollutants Findings of Fact, Conclusions, and Recommendations at 21-64.

6 As Dr. McClellan noted in Ex. 443 (November 24, 2015, Dr. McClellan Response to Clean Energy Organizations Information Request No. 6 to Minnesota Large Industrial Group), "the $PM_{2.5}$ (weighted mean) annual values shown for monitoring sites in Wisconsin and Minnesota are remarkably similar." (*Id.* at numbered page 2.) "Moreover, it is important to note that all the $PM_{2.5}$ values, except for the extended Chicago-Metropolitan area (shown within the Wisconsin data), are less than 12 $\mu g/m^3$ …" (*Id.*) "The Chicago-Metropolitan area $PM_{2.5}$ concentration in 2014 was 12.1 $\mu g/m^3$." (*Id.*) In some Minnesota communities, such as, for example, Bemidji, Brainerd, and Marshall, the measured concentrations of $PM_{2.5}$ in 2014 are less than half of the $PM_{2.5}$ NAAQS." (*Id.*) Dr. McClellan provided for example the following EPA data:

(continued)

exposure that is relevant here.[7] Moreover, many cities have chronic ambient air concentrations below even 8 $\mu g/m^3$,[8] which was the lowest reported short-term (*i.e.*, not chronic) data point for any health-damages study.[9] Because the lack of a reliable connection between exposure to primary and secondary $PM_{2.5}$ and health-effects damages in areas with a chronic $PM_{2.5}$ ambient air concentration below 12 $\mu g/m^3$ (there are no studies that go below 8 $\mu g/m^3$ even for short-term exposure) renders the health-effects damages calculations by Drs. Marshall, Muller, and Desvousges invalid, there is no

(continued)

Table 3: **Air Quality Statistics Report**

Geographic Area: Minnesota
Summary: by CBSA
Year: 2014
Exceptional Events: Excluded (if any)
Statistics in red are above the level of the respective air quality standard

CBSA	CO 1-hr 2nd Max	CO 8-hr 2nd Max	NO2 98th %ile	NO2 Ann. Mean	O3 1-hr 2nd Max	O3 8-hr 4th Max	SO2 99th %ile	SO2 24-hr 2nd Max	SO2 Ann. Mean	PM2.5 98th %ile	PM2.5 Wtd. Mean	PM10 24-hr 2nd Max	PM10 Annual Mean	Lead Max 3-mo Avg
Bemidji, MN	.	.	.	.	.	.	.	.	.	16	5.1	.	.	.
Brainerd, MN	.	.	.	.	0.07	0.057	.	.	.	18	5.1	.	.	.
Duluth, MN-WI	1.3	0.8	.	.	0.07	0.057	.	.	.	18	8.4	86	28	0
Fargo, ND-MN	0.5	0.3	34	4	0.07	0.059	3	1	0	17	6.7	72	16	.
La Crosse, WI-MN	.	.	.	.	0.07	0.063	.	.	.	22	8.1	.	.	.
Marshall, MN	.	.	.	.	0.07	0.062	.	.	.	17	5.9	.	.	.
Minneapolis-St. Paul-Bloomington, MN-WI	2.7	1.6	50	16	0.08	0.064	12	5	1	29	10.3	76	25	0.12
Red Wing, MN	.	.	.	.	0.07	0.063	.	.	.	.	.	.	.	.
Rochester, MN	.	.	.	.	0.07	0.062	2	1	1	20	8.2	.	.	.
St. Cloud, MN	.	.	.	.	0.07	0.062	.	.	.	19	6.2	.	.	.
Winona, MN	.	.	.	.	.	.	.	.	.	22	8.3	.	.	.

(*See* Ex. 443 at numbered page 5.)

7 As set forth in the MLIG's July 15, 2016, Exceptions to the ALJ's June 15, 2016, Criteria Pollutants Findings of Fact, Conclusions, and Recommendations at pages 37 through 30, one must differentiate between chronic exposure (which is the basis for the link between exposure to $PM_{2.5}$ and adverse health effects at lower exposure levels) and short-term data points (which only have a link at much higher exposure levels).

8 *See*, *e.g.*, footnote 6, *supra* and Appendix A (pages 27-35).

9 *See* Ex. 117 at Schedule 3 at 970 (Lepeule).

factual support to quantify health-effects damages. Because Drs. Muller and Desvousges further did not separately set forth the non-health damages portion of their total calculated damages, the MLIG submitted that the Commission is left without a factual record in this proceeding upon which to quantify Criteria Pollutant damages. The Commission's options are to either leave the current values intact, or to order new proceedings. However, adoption of any of the proponents' values is not an option in the absence of proof.[10]

None of the proponents of new environmental-cost damages values has addressed the above issues in any meaningful way, although Xcel Energy has challenged Conclusion 54 of the ALJ's Report and has candidly admitted that "[t]he health studies [on which each Drs. Desvousges, Muller, and Marshall relied for their human-health damages calculations] are simply *not designed to determine health impacts at these low concentration levels* [CAMx predicted an average change in $PM_{2.5}$ concentration of 0.00000198 $\mu g/m^3$ within a 100 mile radius from Minnesota], *which are beyond the measurement or observation capabilities of today's monitors*." [11] In fact, Xcel admitted that the very small concentration changes that can be calculated by computer programs "cannot be measured or observed, may or may not cause health effects, and may or may

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10 *See* 7/15/2016 MLIG Exceptions to ALJ's 6/15/2016 Criteria Pollutants Findings of Fact, Conclusions, and Recommendations at 9-19.

11 *See* 7/15/2016 Xcel Energy Exceptions to ALJ's 6/15/2016 Criteria Pollutions Report at 13-14 (*citing* Ex. 608 (Desvousges Surrebuttal) at 42-44; Hearing Transcript ("Tr. Vol.") 7 at 113-117 (Desvousges); Tr. Vol. 8 at 33-34 (Muller); March 15, 2016, Xcel Initial Criteria-Pollutants Post-Hearing Brief at 55-60) (emphasis in original).

not cause health effects in a linear manner."[12] These admissions support the MLIG's central objection, that on the record before the Commission the proponents of new environmental-cost damages values have simply not met their burden of proof. As stated in the MLIG's July 15, 2016, Exceptions to the ALJ's June 15, 2016, Criteria Pollutants Findings of Fact, Conclusions, and Recommendations, there is at this time and as a result no evidence before the Commission upon which it can make that damages determination.[13]

II. ANY CONSIDERATION OF DAMAGES SHOULD BE LIMITED TO A LOCAL GEOGRAPHIC SCOPE BECAUSE THERE IS NO RELIABLE EVIDENCE TO CALCULATE DAMAGES ON A NATIONAL BASIS

The extraterritorial damages issue, like damages within Minnesota, is a function of downwind damages. Overlooking the lack of actual evidence supporting their damages calculations, the CEOs have argued that "the most important issue for the Commission to get right" is the geographic scope of the damages calculation,[14] and that this "geographic scope issue is not arguably a matter of accounting for uncertainty between studies or setting policy related to the values' uses, as the other questions might be viewed."[15] But the CEO's analysis puts the cart before the horse and overlooks that the Commission's

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12 7/15/2016 Xcel Energy Exceptions to ALJ's 6/15/2016 Criteria Pollutions Report at 14.

13 *See, e.g.*, 7/15/2016 MLIG Exceptions to ALJ's 6/15/2016 Criteria Pollutants Findings of Fact, Conclusions, and Recommendations at 19-21.

14 *See* 7/15/2016 Clean Energy Organizations Exceptions to ALJ's 6/15/2016 Criteria Pollutants Report at 4.

15 *See* 7/15/2016 Clean Energy Organizations Exceptions to ALJ's 6/15/2016 Criteria Pollutants Report at 3.

damages determination must be based on reliable data. If an integrated assessment computer model can reliably predict changes in ambient air concentrations of Criteria Pollutants from various power-plant emissions within a particular geographic area, then one can analyze damages for that particular geographic region. Thus, the first and the most important question is not which damages scope Minn. Stat. § 2156B.2422, subd. 3 can encompass, but whether there is reliable data, provided by a reliable computer model, upon which to base damages pursuant to that environment-cost statute, and what geographic scope such damages model(s) can reliably address. As set forth below in detail, the answer to that question in this proceeding is that only the CAMx model has proven reliable, and Dr. Desvousges — the expert running that model — unambiguously testified that for the purposes at issue here, CAMx is not reliable on a nationwide basis. This testimony compels a conclusion that damages must be limited at this time to the local geographic scope supported by CAMx.

A. The record shows that the ALJ correctly found that InMAP and AP2 are unreliable

The ALJ helpfully described in Finding of Fact 112 of her June 15, 2016, Recommendations the three types of air-quality models commonly used:

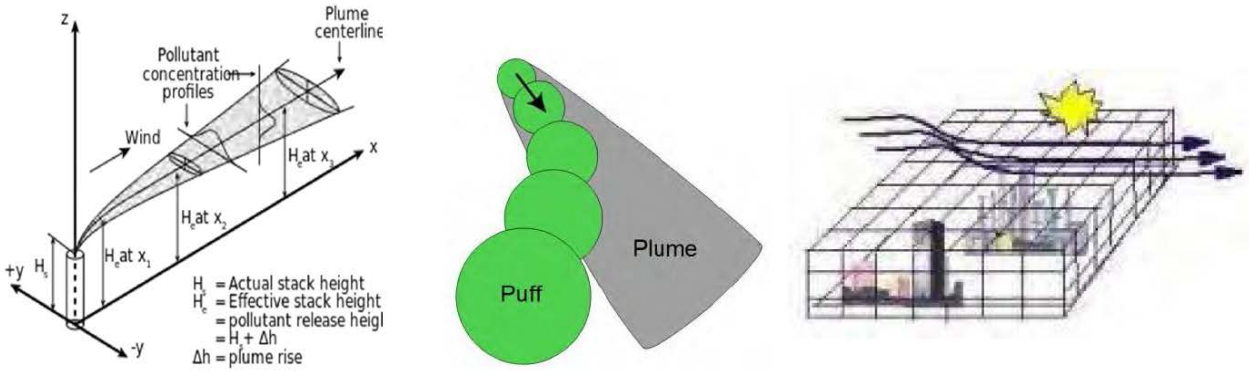
112. Xcel explained that there are three basic kinds of commonly-used air quality models:

> Steady-State Gaussian Plume Models: Lagrangian Plume models assume the instantaneous straight-line transport of emissions from the source to downwind receptors using a single hourly wind speed and direction. The plume has a Gaussian (bell-shaped) distribution of concentrations around the centerline of the plume. The left panel in [the figure below] illustrates the structure of a Plume model. Plume models do not reliably treat chemical transformation. Examples of plume models include AERMOD,

ISC and APEEP.

Non-Steady-State Gaussian Puff Models: Lagrangian Puff models represent a plume as a series of overlapping circular Gaussian puffs that move within a three-dimensional (3-D) wind field over time. This allows the plume to turn with the wind, which a Plume model cannot do as illustrated in the middle panel of [the figure below]. Although Puff models have 3-D wind inputs, each puff can only be transported by a single wind so it has limited ability to simulate transport and dispersion in complex flow fields. Puff models typically have simple representations of chemical transformation because they do not treat photochemical reactions. Examples of Puff models include CALPUFF, SCIPUFF and HYSPLIT.

Photochemical Grid Models (PGMs): Eulerian PGMs divide the region to be modeled into vertically stacked horizontal grid cells and simulate the 3-D movement of pollutants among the grid cells (right panel [of figure below]). PGMs treat emissions from all sources, including sources far upwind (e.g., global sources) through boundary conditions (BCs), so can include detailed photochemical chemical mechanisms that accurately simulate ozone and secondary PM formation. Examples of PGMs include CMAQ and CAMx.



Schematic representation of a Steady-State Gaussian Plume (left), differences in Gaussian Plume and Puff (middle) and Eulerian Photochemical Grid Model (right) air quality modeling techniques.

The ALJ in this proceeding received evidence regarding three computer models: Dr. Marshall, testifying for the CEOs, relied on a brand new and novel reduced-form

program designed by him and others called InMAP.[16] InMAP does not fall within any of the three commonly-used model types set forth above.[17] Dr. Muller relied on AP2, another reduced-form model.[18] AP2 is an updated version of APEEP, a steady-state Gaussian plume model (the first model type described above).[19] Dr. Desvousges relied on CAMx, a full-scale photochemical grid model (the third model type described above).[20]

1. The InMAP model is unreliable

The ALJ found that InMap is not a reasonable, practicable, or the best model to use.[21] The InMAP model uses annual, rather than hourly, meteorological data, which the CEOs have admitted renders InMAP "less realistic than a well-configured CAMx simulation."[22] The Agencies have also shown that prevailing wind directions in

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16 *See* June 15, 2016, Recommendations at 94, Conclusion 8.

17 *See* June 15, 2016, Recommendations at 62, Finding 189 (*citing* Ex. 606 (Desvousges Rebuttal) at 62).

18 Ex. 606 (Desvousges Rebuttal) at 3, 19, 21, 33.

19 *See* June 15, 2016, Recommendations at 10, Finding of Fact 10 (*citing* Ex. 808 (Muller Direct) at 12:13).

20 *See* June 15, 2016, Recommendations at 43, Finding of Fact 112; *id.* at 44, at Finding of Fact 115 (*citing* Ex. 604 (Desvousges Direct), Schedule 3 at 3; *id.* at Finding of Fact 116.

21 *See* June 15, 2016, Recommendations at 94, Conclusion 8.

22 *See* June 15, 2016, Recommendations at 64, Finding of Fact 196. The ALJ's conclusion that "the Agencies demonstrated by a preponderance of the evidence that it is reasonable to make annual estimates of O_3 and $PM_{2.5}$ values, as opposed to daily estimates, for the purposes of developing inputs to calculate the mortality concentration responses" (*see* Recommendations at 95, Conclusion 14), is not erroneous as stated, but would be erroneous if the ALJ intended to approve the calculation of the annual estimates based on annual weather patterns. As the (continued)

Minnesota are significantly different in the warmer months of the year than in the colder months, leading to very different emission patterns, and rendering hourly, rather than annualized, meteorological data critical for a reliable emission-deposit-location determination.[23] For example, "[a]lthough sulfate is formed all year around, most is formed in the warmer months of the year. Prevailing winds during this period are from the Southeast. … Ammonium nitrate is formed in the winter, when prevailing winds are from the West and Northwest."[24] As a result of InMAP's use of annual, rather than hourly, meteorological data and unknown other issues in the model, InMAP significantly skews changes in ambient air concentrations to the (populated) east, leading to significant

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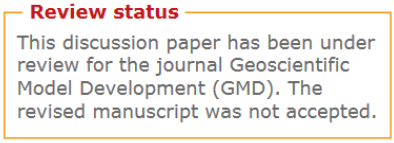
(continued)

Agencies admit in their July 15, 2016, Exceptions to the ALJ's June 15, 2016, Criteria Pollutants Report, "the chemical transport modeling for the State of Minnesota's Regional Haze State Implementation Plan … has shown significant impacts of $PM_{2.5}$ in Minnesota from emission sources in other states …[and] [i]mpacts can vary significantly based on meteorology during a particular year." (*See* 7/15/2016 Agencies Exceptions to 6/15/2016 ALJ Report at 6.) Accordingly, using outdated meteorological data or relying on annual, rather than hourly, weather patterns is erroneous and leads to false results. It should be noted in this regard that AP2 relies on meteorological data from 1990, emissions data from 2011, and an air-quality dispersion model developed more than 40 years ago, and that it uses highly simplified chemical transformation algorithms. (*See, e.g.*, Ex. 606 (Desvousges Rebuttal) at 5.)

23 *See Minnesota Regional Haze SIP Minnesota Technical Support Document* (MPCA 2009) at 15 (published at https://www.regulations.gov/document?D=EPA-R05-OAR-2010-0037-0004, and cited at 7/15/2016 Agencies Exceptions to 6/15/2016 ALJ Report at 6 and in footnote 6).

24 *See Minnesota Regional Haze SIP Minnesota Technical Support Document* (MPCA 2009) at 15 (published at https://www.regulations.gov/document?D=EPA-R05-OAR-2010-0037-0004, and cited at 7/15/2016 Agencies Exceptions to 6/15/2016 ALJ Report at 6 and in footnote 6).

overestimation in externality values.[25] There is further no record evidence that the InMAP model has been peer-reviewed,[26] and the InMAP model has no "history of being relied upon in other settings for purposes analogous to the present proceeding."[27] In fact, while Dr. Marshall and his team submitted an article about InMAP for publication in the "Discussions" section of the journal *Geoscientific Model Development*, that journal's web site warns:[28]



The journal *Environmental Science and Technology* similarly did not accept a paper about the InMAP model.[29]

Importantly, InMap does not assess the interactions between SO_2 and NO_x as the emissions are exhausted in the stack, but models their effects separately.[30] The ALJ has rightfully found this separate modeling "particularly troublesome."[31] Dr. Desvousges has cogently testified that separate modeling renders a model unreliable and leads to an

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25 *See* June 15, 2016, Recommendations at 101, Conclusion 43 (*citing* Ex. 606 (Desvousges Rebuttal) at 29).

26 *See* June 15, 2016, Recommendations at 94, Conclusion 9.

27 *Id.*

28 *See* http://www.geosci-model-dev-discuss.net/gmd-2015-223/ (last visited August 2, 2016).

29 Ex. 608 (Desvousges Surrebuttal), Schedule 1 at 8 (CEO Response to Xcel Energy IR No. 6).

30 *See, e.g.*, CEOs' March 15, 2016, Initial Criteria-Pollutants Post-Hearing Brief at 32 n. 8 (admitting that InMap does not assess the interactions between SO_2 and NO_x).

31 *See* June 15, 2016, Recommendations at 101, Conclusion 44 (discussing AP2).

overstatement of damages:[32]

135:20 [Q] If you are modeling SO_2 and NO_x independently, what
135:21 impact does that have?
135:22 A I think when you model these things independently,
135:23 and I'm going to give you my economics explanation
135:24 of this, all right, so I'm not a chemist. But to me
135:25 as an economist what I understand is going on here
136:1 is that this -- if you do it independently, you've
136:2 got two -- you've got both sulfates and nitrates
136:3 that come out of the stack. And if you assume
136:4 independently, these two things -- you're going to
136:5 do a calculation that's going to say, oh, well,
136:6 these sulfates are going to bind with ammonium in
136:7 the atmosphere and it's going to produce some of the
136:8 things that go into $PM_{2.5}$. But nitrates, if you do
136:9 it independently you're also assuming that the
136:10 nitrates are going to be bonding with that same
136:11 ammonium that's out there. And there's only a
136:12 certain amount of ammonium that's out there so that
136:13 as a result of that, if you just do it independently
136:14 I think what the assumption is is that you're going
136:15 to end up with an overstatement because you've
136:16 overstated the amount of chemical combination that
136:17 can take place.
136:18 You know, it's like -- you know, I like
136:19 to bake, all right. And so it's like, you know, if
136:20 I've got a recipe and I'm sitting there and I've got
136:21 two cups of almond flour and I'm trying to make this
136:22 paleo banana bread. I can't, you know, if I'm going
136:23 to do that, that's fine, but I don't have those same
136:24 two cups of flour to make a whole lot of these
136:25 really nice cookies that I also like to make.
137:1 There's only two cups of flour to go around.
137:2 So that's what I think is going on here.
137:3 So you can't make an assumption that this is
137:4 available to you.

Based on these considerations, the ALJ appropriately rejected reliance on InMAP.[33]

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[32] Tr. Vol. 7 at 135:20-137:4 (Desvousges).

Xcel Energy has shown visually how InMAP's unreliability leads to an overstatement of damages, rendering it unsuitable for application in this proceeding. While the full photochemical grid model CAMx shows secondary $PM_{2.5}$ emissions radiating out fairly evenly from Xcel's Sherco coal-fired electricity-generating plant located in Becker, Minnesota (Fig. 3a of Exhibit 608 (Desvousges Surrebuttal)), the same cannot be said for InMAP (Figs. 3d and 3e of Exhibit 608):[34]

[Figure on next page.]

(continued)

33 *See* June 15, 2016, Recommendations at 94, Conclusions 8-12.

34 *See* Ex. 609 (Desvousges Surrebuttal) at 23 (CAMx), 26-27 (InMAP).

Figure 3a. CAMx Annual Average Secondary $PM_{2.5}$ Concentrations due to 3,508.2 TPY NO_X Emissions from the Sherco EGU in Sherburne County.

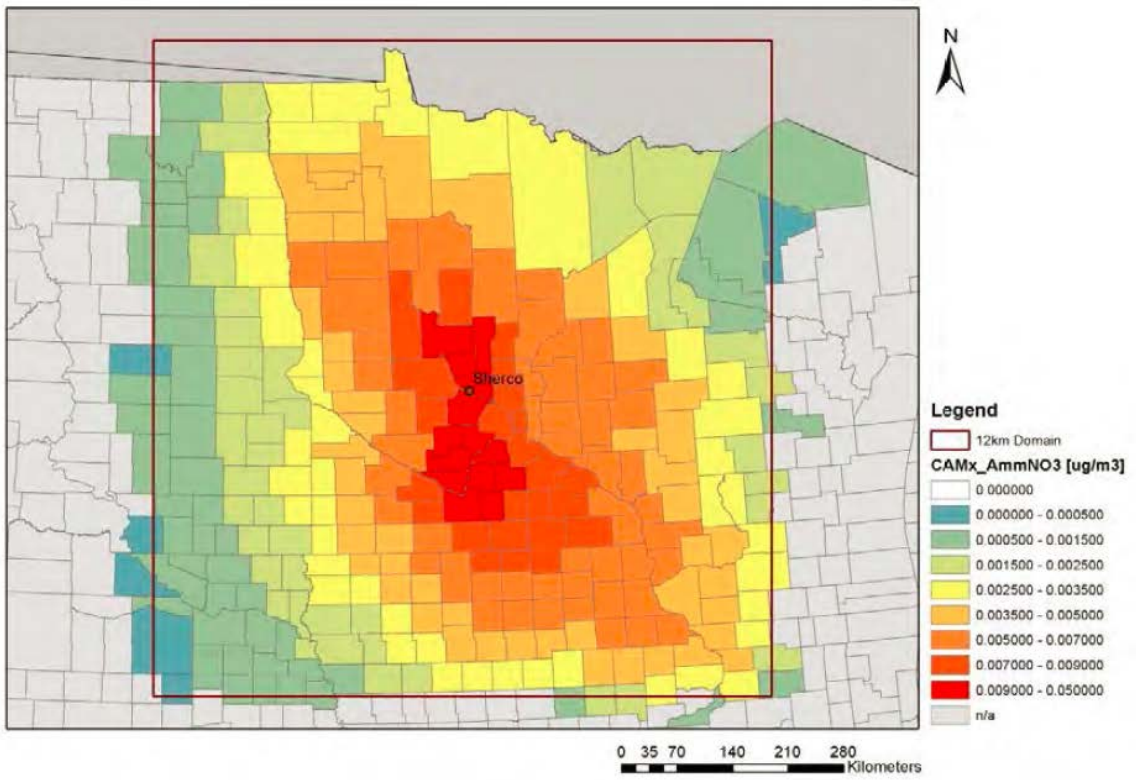


Figure 3d. InMAP Annual Average Secondary $PM_{2.5}$ Concentrations due to 3,508.2 TPY NO_X Emissions from the actual Sherco EGU in Sherburne County.

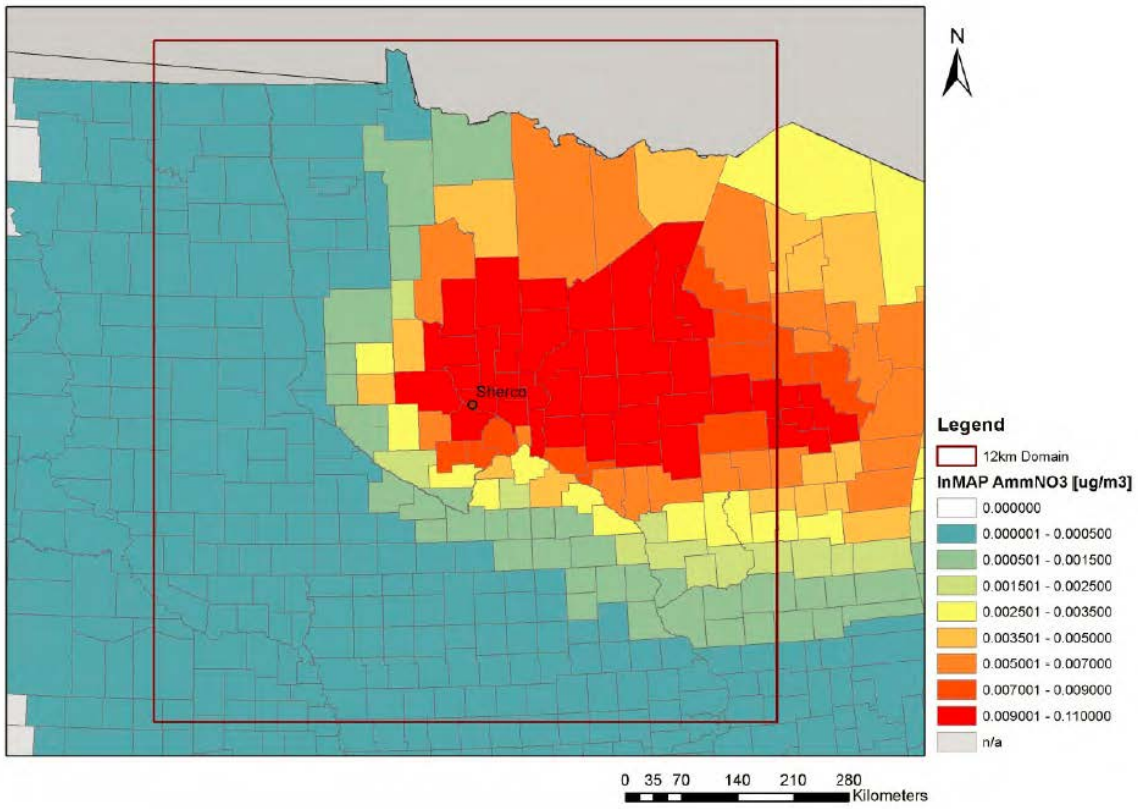
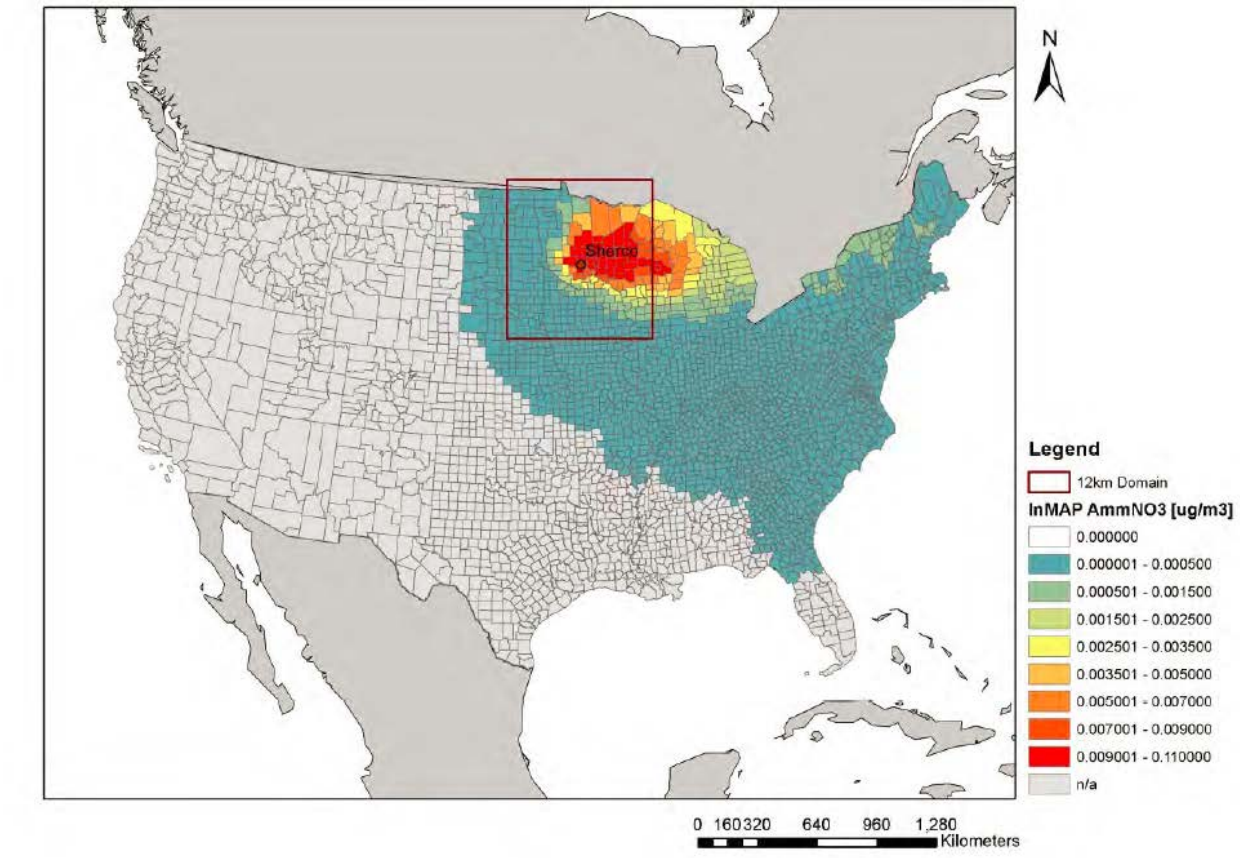


Figure 3e. InMAP Annual Average Secondary $PM_{2.5}$ Concentrations across the Continental U.S. due to 3,508.2 TPY NO_X Emissions from the actual Sherco EGU in Sherburne County.



Because the emissions exposure is multiplied by the population in the area receiving the emissions, which in turn is multiplied by a value of statistical life,[35] InMAP's skewing exposure to higher-population areas on the East Coast greatly increases the damages numbers.

Based on all of the issues addressed above, the ALJ correctly concluded that InMAP suffered from "significant departures from the more typical reduced form

[35] *See* CEOs' March 15, 2016, Initial Post-Hearing Criteria Pollutants Brief at 10-11.

models" and that "the CEOs did not show, by a preponderance of the evidence, that InMAP is a reliable reduced form model."[36] Importantly, other than a summary protest, the CEOs do not even dispute this finding.[37]

2. The AP2 model is unreliable

Similarly, the ALJ held that the Agencies' reliance on the AP2 model was not justified.[38] Specifically, the ALJ found that there is insufficient evidence in the record to show that AP2 "can reliably predict CP externality values across the continental U.S."[39] Furthermore, Xcel Energy has shown that AP2's conclusions are utterly unreliable. A visual comparison between the full photochemical grid model CAMx and the reduced-form AP2 model is telling. The first figure below again shows secondary $PM_{2.5}$ emissions radiating out fairly evenly from Xcel's Sherco plant in Becker, Minnesota (Fig. 3a of Exhibit 608 (Desvousges Surrebuttal)), but the AP2 results (Figs. 3b and 3c of Exhibit 608)[40] contradict everything that is known about atmospheric dispersion and chemistry: the random, sporadic results skip Sherburne County, where the plant is

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36 *See* June 15, 2016, Recommendations at 94 at Conclusion 12. *See also id.* at Conclusions 9-11.

37 *See* 7/15/2016 Clean Energy Organizations Exceptions to ALJ's 6/15/2016 Criteria Pollutants Report at 28 (protest limited to a single statement that "both Drs. Marshall and Muller offered ample record evidence to show that their models are accurate and useful for the task at hand" although InMAP and AP2 reflect very different dispersion patterns and environmental-cost damages. Whatever else may be said, both cannot be equally reliable if their answers are so different.)

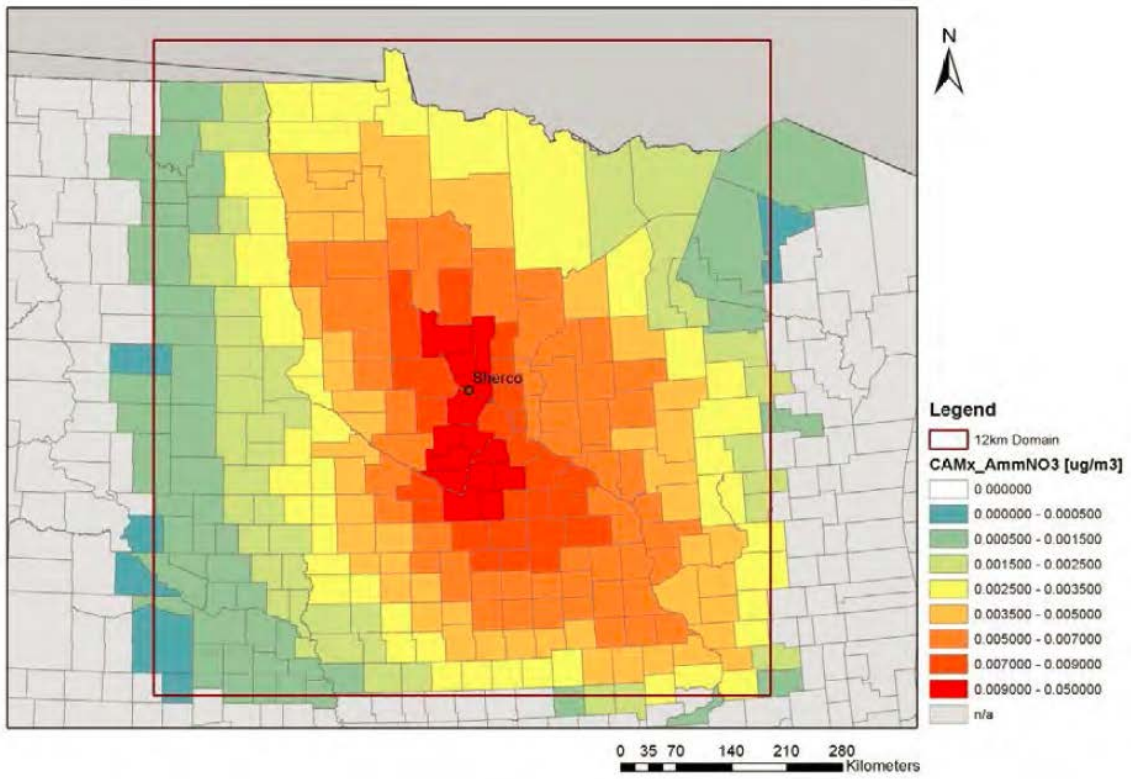
38 *See* June 15, 2016, Recommendations at 95-97, Conclusions 15, 18, 20-23; *see also id.* at 99-100, Conclusion 37 ("…the Agencies relied on skewed data.").

39 *See* June 15, 2016, Recommendations at 101, Conclusion 43.

40 *See* Ex. 609 (Desvousges Surrebuttal) at 23 (CAMx), 24-25 (AP2).

located, as well as the majority of all Minnesota counties, but predict emission deposits in heavily-populated Los Angeles County, California:[41]

Figure 3a. CAMx Annual Average Secondary $PM_{2.5}$ Concentrations due to 3,508.2 TPY NO_X Emissions from the Sherco EGU in Sherburne County.



41 *See* Xcel March 15, 2016, Initial Criteria-Pollutants Post-Hearing Brief at 35; *see also* Ex. 608 (Desvousges Surrebuttal) at 21-32.

Figure 3b. AP2 Annual Average Secondary $PM_{2.5}$ Concentrations due to 3,508.2 TPY NO_X Emissions from the actual Sherco EGU in Sherburne County

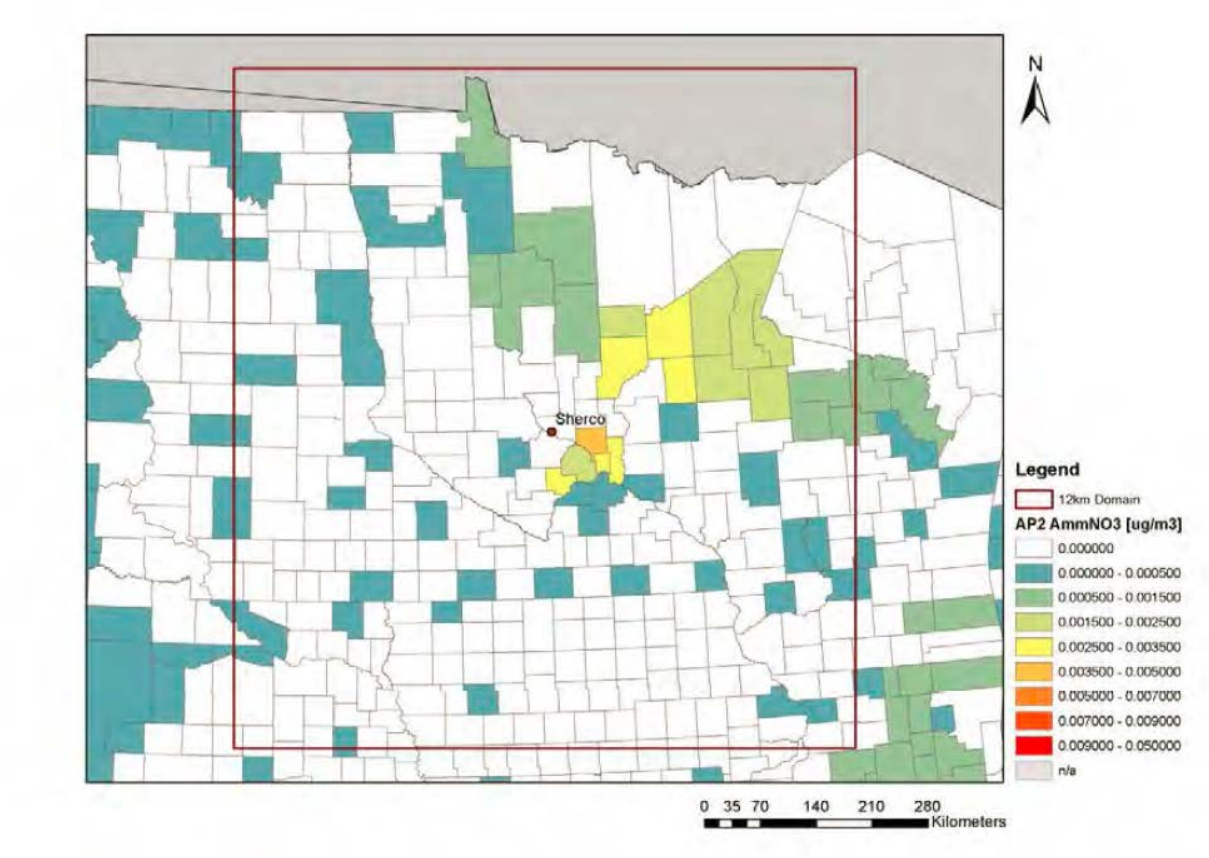
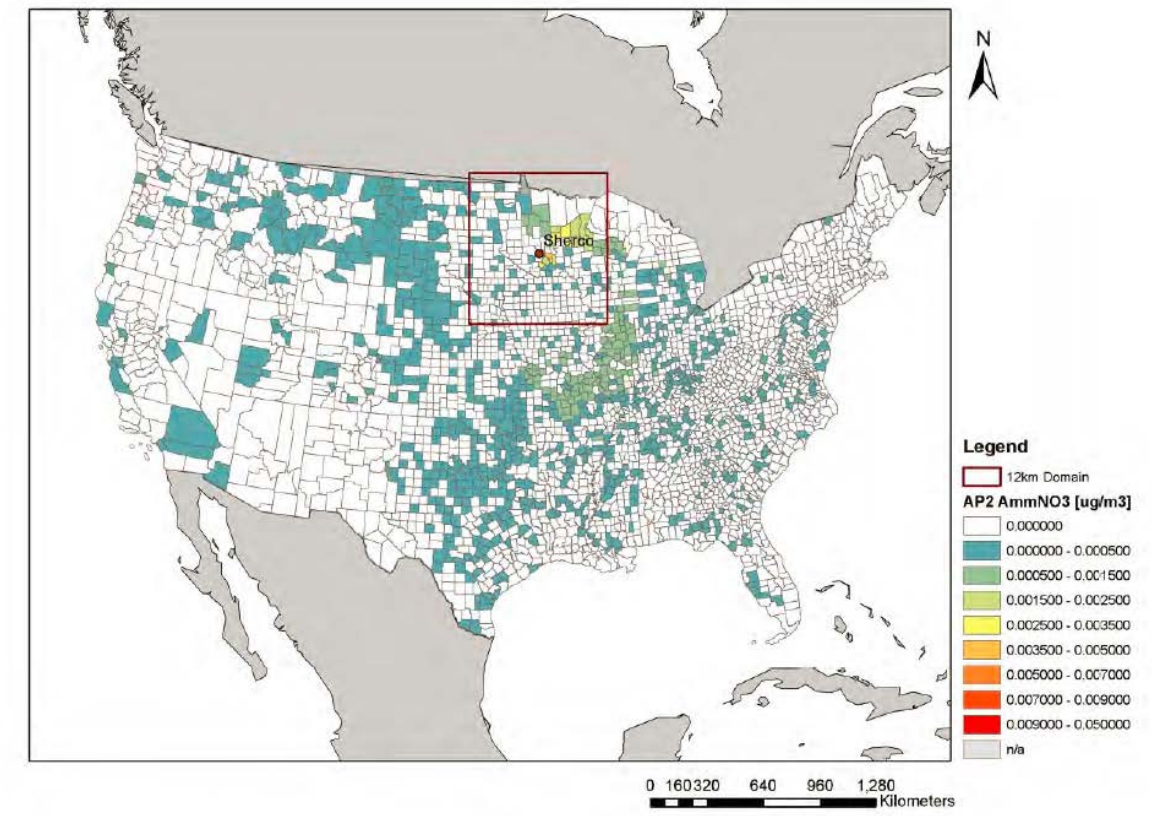


Figure 3c. AP2 Annual Average Secondary $PM_{2.5}$ Concentrations across the Continental U.S. due to 3,508.2 TPY NO_X Emissions from the actual Sherco EGU in Sherburne County.



The CAMx results are as expected: the highest secondary $PM_{2.5}$ concentrations are distributed fairly evenly around the Sherco source in all wind directions (north, south, east, and west) and diminish as a function of distance. Concentration changes are predicted in every Minnesota county. The AP2 results are demonstrably wrong.[42] Furthermore, as with InMAP, AP2's separate modeling of SO_2 and NO_x emissions in the stack grossly overstates secondary $PM_{2.5}$ formation; a "particularly troublesome"

[42] *See* Ex. 608 (Desvousges Surrebuttal) at 21-32.

deficiency according to the ALJ.[43]

It is finally noteworthy that the EPA has limited use of reduced-form models such as AP2 to 50 kilometers from the source,[44] and that AP2 (and InMAP) appears to create significantly higher damages outside of Minnesota than within Minnesota. While the Agencies argue in their July 15, 2016, Exceptions to the ALJ's June 15, 2016, Criteria Pollutants Report that "the Agencies recommend that the Commission find that the reduced-form model, and specifically AP2, is a suitable tool for the job at hand, and that the Commission not adopt Conclusion of Fact No. 44,"[45] they offer no evidence to overcome any of the above objections to AP2 and without record evidence cannot overcome Dr. Desvousges' testimony that AP2 and InMAP "yield questionable results that should not be relied on for the establishment of externality values in this docket."[46] Based on the record before the Commission, AP2 cannot be relied upon for any damages evaluation in this case, whether local or statewide.[47] Use of AP2 for national damages

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43 *See supra* at pages 11-12; *see also* June 15, 2016, Recommendations at 101, Conclusion 44.

44 *See, e.g.*, Ex. 604 at 10:11-13; Tr. Vol. 7 at 56:8-15.

45 *See* 7/15/2016 Agencies Exceptions to 6/15/2016 ALJ Report at 11.

46 Ex. 604 at 10:16-19.

47 The MLIG joins Xcel in taking exception to the ALJ's Recommendation 4(b), which suggests that the Commission use AP2 to calculate values despite the ALJ's conclusion that "[t]he Administrative Law Judge concludes that neither the CEOs nor the Agencies have proved by a preponderance of the evidence that their respective InMAP or AP2 models can reliably predict CP externality values across the continental U.S.," (*see* Recommendations at 101, Conclusion 43), and the ALJ's conclusion that "the Agencies have failed to demonstrate by a preponderance of the evidence that the AP2 model … generally performs at the (continued)

calculations is equally out of the question.

B. CAMx's reliability has a local geographic limit as applied

Dr. Desvousges used CAMx for a limited geographic scope, and rejected the use of CAMx for national damages calculations resulting from the emission of primary $PM_{2.5}$ and the formation of secondary $PM_{2.5}$. While the EPA used CAMx for analysis under the Cross-State Air Pollution Rule ("CSAPR"),[48] Dr. Desvousges testified it is not appropriate to employ CAMx on a national scale for this proceeding. Dr. Desvousges explained that there is a difference between the way CAMx was used by the EPA in the CSAPR process and the way the model is used here. "What EPA [was] looking at [in the CSAPR process] [was] trying to predict various changes in air emissions that would happen under different regulatory scenarios,"[49] whereas in this proceeding the end result must be accurate externality values based on a combination of factors that already have

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(continued)

highest standards of the performance goals … and generally performs at adequate standards of the performance criteria when compared to real ambient [air] monitor data available from the EPA." (*See* Recommendations at 96, Conclusion 20.) The MLIG agrees with Xcel that "[u]sing an inaccurate model to estimate damage values from a large number of source locations would not give the Commission any better or more useful information. On the contrary, this approach would just yield a greater amount of unreliable information." (*See* 7/15/2016 Xcel Energy Exceptions to ALJ's 6/15/2016 Criteria Pollutions Report at 42; *see also id.* at 24 ("adding more source locations does not improve the quality of AP2 or InMAP modeling results or make them more useful — inaccurate information simply does not get better if there is more of it.".)

[48] Tr. Vol. 8 at 68:5-9.

[49] Tr. Vol. 7 at 61:15-62:9 (Desvousges).

an inherent uncertainty in each factor.[50] As Xcel pointed out in its July 15, 2016, Exceptions, "small errors in wind speed or direction will have escalating impacts as the modeling distance increases from the source. This is especially true for models that rely on steady-state Gaussian plumes, such as AP2, but also applies to other reduced-form models as well as photochemical grid models."[51] Dr. Desvousges accordingly credibly testified that the uncertainty already present in the damages calculations for Minnesota and a 100 mile rectangular grid around Minnesota, even using the complex CAMx photochemical grid model, becomes significantly greater as the distance from the source increases.[52] Accordingly, EPA's correct use of CAMx for the CSAPR analysis has no relevancy to endorsing CAMx, or any other model, for national calculations of the sort made here, and Dr. Desvousges correctly limited application of CAMx for the purposes of this proceeding to a local geographic scope.[53]

In the absence of reliable national data, the MLIG respectfully submits that nationwide consideration of damages is "impractical" as that term has been defined for use in these proceedings. As much as "there is no valid reason to support [the use of]

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50 Tr. Vol. 7 at 61:15-62:9 (Desvousges).

51 *See* 7/15/2016 Xcel Energy Exceptions to ALJ's 6/15/2016 Criteria Pollutions Report at 12 (*citing* Ex. 608 (Desvousges Surrebuttal) at 46).

52 *See, e.g.*, Tr. Vol. 8 at 68:5-9 (CSAPR); Ex. 609 at at 35:8-14, 45:26-46:2; Tr. Vol. 7 at 61:15-62:9 (Desvousges); *id.* at 115:2-116:6, 133:24-134:13, and 135:16-18.

53 MLIG Initial Criteria-Pollutant Post-Hearing Brief at 48-49.

deliberately inaccurate values,"[54] there is also no valid reason to support the use of data that is known to be wrong or as to the reliability of which there is grave doubt. As ALJ Klein so aptly recognized in 1996, it is not practicable for the Commission to establish values for pollutants for which there is just not enough data in this record to establish a value.[55] Thus, any consideration of damages, including agricultural, materials, and visibility damages, should be limited to a local geographic scope due to the significant uncertainties and unreliability of national-scope calculations by the models.[56]

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54 CEOs' March 15, 2016, Initial Criteria-Pollutants Post-Hearing Brief at 25.

55 *See* Ex. 305 (March 22, 1996, Findings of Fact, Conclusions, Recommendation and Memorandum (ALJ Allan W. Klein), Docket 93-583) at 10, Finding of Fact 29.

56 The CEOs on page 12 of their July 15, 2016, Exceptions to the ALJ's June 15, 2016, Criteria Pollutants Report reference that environmental "impacts need not be in Minnesota so long as the power is generated for use here." It is correct to note that the Commission previously determined that environmental-cost impacts need not be in Minnesota to be considered for purposes of the quantification that is at issue in this contested case proceeding (subject to proof of such harm and reciprocity). However, the statement touches on the scope of application of those values, and specifically application in the 200 mile area outside of Minnesota referenced on page 23 of the CEO's July 15, 2016, Exceptions. On July 2, 1997, on reconsideration, the Commission modified its January 3, 1997, Order in response to extra-territoriality concerns raised *inter alia* by the State of North Dakota with respect to a similar 200-mile area, based on principles of comity. (*In the Matter of the Quantification of Environmental Costs Pursuant to Laws of Minnesota 1993, Chapter 356, Section 3,* Order Affirming in Part and Modifying in Part Order Establishing Environmental Cost Values (Jul. 2, 1997)).

In contrast to the 1997 proceeding, this matter has not meaningfully addressed to which generation facilities the environmental-cost values can or should be attached. In keeping with the Commission's Order Reopening Investigation and Convening Stakeholder Group to Provide Recommendations for Contested Case Proceeding, Docket No. E-999/CI-00-1636 at 5 (Feb. 10, 2014) ("The Commission will not, as a part of this investigation, reexamine its earlier decision not to apply the CO_2 environmental cost values to facilities in North Dakota"), the (continued)

III. MISCELLANEOUS ERRORS IDENTIFIED BY THE AGENCIES

The MLIG agrees with the Agencies that the errors in the ALJ's Findings of Fact 1, 206, and 221, and in the ALJ's Conclusion 3(a), identified on pages 12 and 13 of the Agencies' July 15, 2016, Exceptions to the ALJ's June 15, 2016, Criteria Pollutants Report should be corrected as set forth therein.

CONCLUSION

At the outset of this proceeding, the MLIG urged the Commission and the Administrative Law Judge to proceed in this proceeding in a statistically sound, evidence-based approach;[57] an approach which has been embraced by the other parties.[58]

(continued)

MLIG respectfully submits that this issue does not need to be resolved in this proceeding, and urges the Commission to not include a geographic-application scope in its decision. Omitting an application scope leaves for another day the need to address issues of comity, as well as the potential impact of the dormant commerce clause and federal preemption issues such as those addressed in *State of North Dakota v. Heydinger*, ___ F.3d. ___, 2016 WL 3343639, 2016 U.S. App. LEXIS 10810 (Jun. 15, 2016) in conjunction with Minn. Stat. § 216H.02 (a part of Minnesota's Next Generation Energy Act). Omitting an application scope further avoids the need to address the reciprocity issues raised by Dr. Gayer. (*See* Ex. 400 & Ex. Ex. 401.)

57 Tr. Vol. 6 at 24.

58 *See, e.g.*, CEOs' March 15, 2016, Initial Criteria-Pollutants Post-Hearing Brief at 17, 18, 19, 27, 29, 31; Agencies' Initial Criterial Pollutants Post-Hearing Brief at 2 ("reliable"), 3 ("accurate" and "reliable"), 12 ("accurate"), 13 ("credible results"), 17 ("reliable" and "accurate"), 19-20 ("accurate"), 26-39 (model performance testing), 41, 43 ("credible"), 56 ("decision needs to be supported by the evidence"); March 15, 2016, Xcel Initial Criteria-Pollutants Post-Hearing Brief at 1 ("externality values should be based on the best and most accurate method…"), 6 (methodology must *inter alia* "[d]evelop the most accurate and credible estimates for use in Minnesota for $PM_{2.5}$, SO_2, and NO_x environmental values" and "[u]se sound scientific and economic models").

The MLIG submitted that the outcome of this proceeding should be based on empirical evidence, sound analysis, that it should avoid undue speculation, and that it should be respectful of Minnesota and Minnesota commerce and industry.[59]

As stated in the introduction, this phase of the case begins and ends with the burden of proof. Neither the CEOs, nor the Agencies, nor Xcel can meet their burden of proof, because each of their experts has failed to make the required proximate-cause connection between $PM_{2.5}$ emission and $PM_{2.5}$ formation from SO_2 and NO_x emitted in Minnesota and human-health damages in a low-$PM_{2.5}$ ambient-air environment, as testified to by Dr. McClellan and recognized by the EPA and the State of California based on epidemiological literature and studies. Similarly, the other parties' human-health damages calculations outside of Minnesota do not take this deficiency into consideration, causing a complete lack of proof with respect to the human-health damages. Additionally, and absent a breakout of the remaining (non-health) damages studied by Drs. Desvousges and Muller, no evidence as to any admissible damages exists in the record of this proceeding.

If the Commission were to receive additional evidence regarding the currently-missing data, any consideration of damages — including health damages and non-health damages such as agricultural, materials, and visibility damages — should be limited to a local geographic scope due the models' inability to reliably estimate national emission dispersions, as testified to by Dr. Desvousges. Acceptance of a national geographic

[59] Tr. Vol. 6 at 24.

scope would accordingly be neither statistically sound nor based upon reliable evidence.

Respectfully submitted,

STOEL RIVES LLP

Dated: August 4, 2016

s/ Marc A. Al

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ATTORNEYS FOR THE MINNESOTA LARGE INDUSTRIAL GROUP

APPENDIX A

The data below is copied from Ex. 443 at numbered pages 5 through 11:

Table 1:

Air Quality Statistics Report

Geographic Area: Minnesota
Summary: by CBSA
Year: 2012
Exceptional Events: Excluded (if any)
Statistics in red are above the level of the respective air quality standard

CBSA	CO 1-hr 2nd Max	CO 8-hr 2nd Max	NO2 98th %ile	NO2 Ann. Mean	O3 1-hr 2nd Max	O3 8-hr 4th Max	SO2 99th %ile	SO2 24-hr 2nd Max	SO2 Ann. Mean	PM2.5 98th %ile	PM2.5 Wtd. Mean	PM10 24-hr 2nd Max	PM10 Annual Mean	Lead Max 3-mo Avg
Brainerd, MN	.	.	.	.	0.07	0.062	.	.	.	16	4.6	.	.	.
Duluth, MN-WI	1.6	1	.	.	0.08	0.063	.	.	.	22	6.3	50	21	0.01
Fargo, ND-MN	0.6	0.4	34	5	0.07	0.063	4	1	0	23	7.5	92	21	.
La Crosse, WI-MN	.	.	.	.	0.08	0.069	.	.	.	22	8.2	.	.	.
Marshall, MN	.	.	.	.	0.07	0.067	.	.	.	20	7.3	.	.	.
Minneapolis-St. Paul-Bloomington, MN-WI	3.4	1.5	57	11	0.08	0.068	16	4	1	34	10.4	70	25	0.11
Red Wing, MN	.	.	.	.	0.07	0.065	.	.	.	.	.	.	.	.
Rochester, MN	.	.	.	.	0.08	0.069	.	.	.	19	7.8	.	.	.
St. Cloud, MN	.	.	.	.	0.07	0.064	.	.	.	20	8.4	.	.	0.01

Get detailed information about this report, including column descriptions, at http://www.epa.gov/airquality/airdata/ad_about_reports.html#con

AirData reports are produced from a direct query of the AQS Data Mart. The data represent the best and most recent information available to EPA from state agencies. However, some values may be absent due to incomplete reporting, and some values may change due to quality assurance activities. The AQS database is updated daily by state, local, and tribal organizations who own and submit the data. Please contact the appropriate air quality monitoring agency to report any data problems. <http://www.epa.gov/airquality/airdata/ad_contacts.html>

Readers are cautioned not to rank order geographic areas based on AirData reports. Air pollution levels measured at a particular monitoring site are not necessarily representative of the air quality for an entire county or urban area.

This report is based on monitor-level summary statistics. Air quality standards for some pollutants (PM2.5 and Pb) allow for combining data from multiple monitors into a site-level summary statistic that can be compared to the standard. In those cases, the site-level statistics may differ from the monitor-level statistics upon which this report is based.

Source: U.S. EPA AirData <http://www.epa.gov/airdata>
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Table 2: **Air Quality Statistics Report**

Geographic Area: Minnesota
Summary: by CBSA
Year: 2013
Exceptional Events: Excluded (if any)
Statistics in red are above the level of the respective air quality standard

CBSA	CO 1-hr 2nd Max	CO 8-hr 2nd Max	NO2 98th %ile	NO2 Ann. Mean	O3 1-hr 2nd Max	O3 8-hr 4th Max	SO2 99th %ile	SO2 24-hr 2nd Max	SO2 Ann. Mean	PM2.5 98th %ile	PM2.5 Wtd. Mean	PM10 24-hr 2nd Max	PM10 Annual Mean	Lead Max 3-mo Avg
Brainerd, MN	.	.	.	.	0.07	0.06	.	.	.	15	4	.	.	.
Duluth, MN-WI	4.6	1.5	.	.	0.07	0.059	.	.	.	19	7.7	59	24	0
Fargo, ND-MN	0.8	0.3	36	4	0.07	0.059	4	1	0	18	7.2	62	16	.
La Crosse, WI-MN	.	.	.	.	0.07	0.061	.	.	.	18	8.3	.	.	.
Marshall, MN	.	.	.	.	0.07	0.066	.	.	.	21	7.3	.	.	.
Minneapolis-St. Paul-Bloomington, MN-WI	3.3	2.5	45	13	0.08	0.067	15	15	1	23	10.2	70	27	0.11
Red Wing, MN	.	.	.	.	0.07	0.062	.	.	.	.	.	.	.	.
Rochester, MN	.	.	.	.	0.07	0.064	.	.	.	21	8.7	.	.	.
St. Cloud, MN	.	.	.	.	0.07	0.061	.	.	.	22	6.4	.	.	0

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
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Page 1 of 1

Table 3:

Air Quality Statistics Report

Geographic Area: Minnesota
Summary: by CBSA
Year: 2014
Exceptional Events: Excluded (if any)
Statistics in red are above the level of the respective air quality standard

CBSA	CO 1-hr 2nd Max	CO 8-hr 2nd Max	NO2 98th %ile	NO2 Ann. Mean	O3 1-hr 2nd Max	O3 8-hr 4th Max	SO2 99th %ile	SO2 24-hr 2nd Max	SO2 Ann. Mean	PM2.5 98th %ile	PM2.5 Wtd. Mean	PM10 24-hr 2nd Max	PM10 Annual Mean	Lead Max 3-mo Avg
Bemidji, MN	.	.	.	.	.	.	.	.	.	16	5.1	.	.	.
Brainerd, MN	.	.	.	.	0.07	0.057	.	.	.	18	5.1	.	.	.
Duluth, MN-WI	1.3	0.8	.	.	0.07	0.057	.	.	.	18	8.4	86	28	0
Fargo, ND-MN	0.5	0.3	34	4	0.07	0.059	3	1	0	17	6.7	72	16	.
La Crosse, WI-MN	.	.	.	.	0.07	0.063	.	.	.	22	8.1	.	.	.
Marshall, MN	.	.	.	.	0.07	0.062	.	.	.	17	5.9	.	.	.
Minneapolis-St. Paul-Bloomington, MN-WI	2.7	1.6	50	16	0.08	0.064	12	5	1	29	10.3	76	25	0.12
Red Wing, MN	.	.	.	.	0.07	0.063	.	.	.	.	.	.	.	.
Rochester, MN	.	.	.	.	0.07	0.062	2	1	1	20	8.2	.	.	.
St. Cloud, MN	.	.	.	.	0.07	0.062	.	.	.	19	6.2	.	.	.
Winona, MN	.	.	.	.	.	.	.	.	.	22	8.3	.	.	.

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
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Table 4a:

Air Quality Statistics Report

Geographic Area: Wisconsin
Summary: by CBSA
Year: 2012
Exceptional Events: Excluded (if any)
Statistics in red are above the level of the respective air quality standard

CBSA	CO 1-hr 2nd Max	CO 8-hr 2nd Max	NO2 98th %ile	NO2 Ann. Mean	O3 1-hr 2nd Max	O3 8-hr 4th Max	SO2 99th %ile	SO2 24-hr 2nd Max	SO2 Ann. Mean	PM2.5 98th %ile	PM2.5 Wtd. Mean	PM10 24-hr 2nd Max	PM10 Annual Mean	Lead Max 3-mo Avg
Appleton, WI	.	.	.	.	0.09	0.077	.	.	.	25	8.6	.	.	.
Baraboo, WI	.	.	.	.	0.09	0.073	.	.	.	23	10.1	39	12	.
Beaver Dam, WI	0.6	0.4	.	.	0.09	0.078	6	2	0	26	8.9	44	15	.
Chicago-Naperville-Joliet, IL-IN-WI	4	1.9	70	22	0.12	0.093	108	22	3	31	11.5	153	31	0.13
Duluth, MN-WI	1.6	1	.	.	0.08	0.063	.	.	.	22	6.3	50	21	0.01
Eau Claire, WI	.	.	.	.	0.08	0.068	.	.	.	23	8.1	40	17	.
Fond du Lac, WI	.	.	.	.	0.1	0.079	.	.	.	.	.	.	.	.
Green Bay, WI	.	.	.	.	0.11	0.086	72	14	2	28	9.6	.	.	.
Janesville, WI	.	.	.	.	0.09	0.08	.	.	.	.	.	.	.	.
La Crosse, WI-MN	.	.	.	.	0.08	0.069	.	.	.	22	8.2	.	.	.
Madison, WI	.	.	.	.	0.09	0.074	.	.	.	27	9.4	36	16	.
Manitowoc, WI	.	.	9	2	0.1	0.088	.	.	.	.	.	.	.	.
Milwaukee-Waukesha-West Allis, WI	.	.	45	12	0.11	0.093	21	6	1	30	10.9	47	23	.
Minneapolis-St. Paul-Bloomington, MN-WI	3.4	1.5	57	11	0.08	0.068	16	4	1	34	10.4	70	25	0.11

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This report is based on monitor-level summary statistics. Air quality standards for some pollutants (PM2.5 and Pb) allow for combining data from multiple monitors into a site-level summary statistic that can be compared to the standard. In those cases, the site-level statistics may differ from the monitor-level statistics upon which this report is based.

Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: November 18, 2015

Table 4b:

Air Quality Statistics Report

Geographic Area: Wisconsin
Summary: by CBSA
Year: 2012
Exceptional Events: Excluded (if any)
Statistics in red are above the level of the respective air quality standard

CBSA	CO 1-hr 2nd Max	CO 8-hr 2nd Max	NO2 98th %ile	NO2 Ann. Mean	O3 1-hr 2nd Max	O3 8-hr 4th Max	SO2 99th %ile	SO2 24-hr 2nd Max	SO2 Ann. Mean	PM2.5 98th %ile	PM2.5 Wtd. Mean	PM10 24-hr 2nd Max	PM10 Annual Mean	Lead Max 3-mo Avg
Platteville, WI	.	.	.	.	.	.	.	.	.	22	9.1	.	.	.
Racine, WI	.	.	.	.	0.11	0.09	.	.	.	.	.	.	.	.
Sheboygan, WI	.	.	.	.	0.11	0.093	.	.	.	.	.	.	.	0.1
Watertown-Fort Atkinson, WI	.	.	.	.	0.09	0.078	.	.	.	.	.	.	.	.
Wausau, WI	.	.	.	.	0.08	0.069	.	.	.	.	.	.	.	.
Whitewater, WI	.	.	.	.	0.1	0.077	.	.	.	.	.	.	.	.

Get detailed information about this report, including column descriptions, at http://www.epa.gov/airquality/airdata/ad_about_reports.html#con

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This report is based on monitor-level summary statistics. Air quality standards for some pollutants (PM2.5 and Pb) allow for combining data from multiple monitors into a site-level summary statistic that can be compared to the standard. In those cases, the site-level statistics may differ from the monitor-level statistics upon which this report is based.

Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: November 18, 2015

Table 5a

Air Quality Statistics Report

Geographic Area: Wisconsin
Summary: by CBSA
Year: 2013
Exceptional Events: Excluded (if any)
Statistics in red are above the level of the respective air quality standard

CBSA	CO 1-hr 2nd Max	CO 8-hr 2nd Max	NO2 98th %ile	NO2 Ann. Mean	O3 1-hr 2nd Max	O3 8-hr 4th Max	SO2 99th %ile	SO2 24-hr 2nd Max	SO2 Ann. Mean	PM2.5 98th %ile	PM2.5 Wtd. Mean	PM10 24-hr 2nd Max	PM10 Annual Mean	Lead Max 3-mo Avg
Appleton, WI	.	.	.	.	0.08	0.067	.	.	.	22	8	.	.	.
Baraboo, WI	.	.	.	.	0.07	0.063	.	.	.	16	7.1	31	11	.
Beaver Dam, WI	0.9	0.3	.	.	0.08	0.067	9	2	0	18	7.9	35	14	.
Chicago-Naperville-Joliet, IL-IN-WI	2.7	1.4	64	21	0.09	0.075	73	17	4	27	11.3	121	39	0.1
Duluth, MN-WI	4.6	1.5	.	.	0.07	0.059	.	.	.	19	7.7	59	24	0
Eau Claire, WI	.	.	.	.	0.07	0.06	.	.	.	20	7.3	52	19	.
Fond du Lac, WI	.	.	.	.	0.08	0.065	.	.	.	.	.	.	.	.
Green Bay, WI	.	.	.	.	0.08	0.068	76	13	2	22	7.7	.	.	.
Janesville, WI	.	.	.	.	0.07	0.067	.	.	.	.	.	.	.	.
La Crosse, WI-MN	.	.	.	.	0.07	0.061	.	.	.	18	8.3	.	.	.
Madison, WI	.	.	.	.	0.07	0.067	8	4	1	23	9.3	29	16	.
Manitowoc, WI	.	.	9	2	0.09	0.073	.	.	.	.	.	.	.	.
Milwaukee-Waukesha-West Allis, WI	.	.	50	10	0.09	0.07	23	5	1	25	10	38	17	.
Minneapolis-St. Paul-Bloomington, MN-WI	3.3	2.5	45	13	0.08	0.067	15	15	1	23	10.2	70	27	0.11

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: November 18, 2015

Table 5b

Air Quality Statistics Report

Geographic Area: Wisconsin
Summary: by CBSA
Year: 2013
Exceptional Events: Excluded (if any)
Statistics in red are above the level of the respective air quality standard

CBSA	CO 1-hr 2nd Max	CO 8-hr 2nd Max	NO2 98th %ile	NO2 Ann. Mean	O3 1-hr 2nd Max	O3 8-hr 4th Max	SO2 99th %ile	SO2 24-hr 2nd Max	SO2 Ann. Mean	PM2.5 98th %ile	PM2.5 Wtd. Mean	PM10 24-hr 2nd Max	PM10 Annual Mean	Lead Max 3-mo Avg
Platteville, WI	.	.	.	.	.	.	.	.	.	19	8.9	.	.	.
Racine, WI	.	.	.	.	0.08	0.066	.	.	.	.	.	.	.	.
Sheboygan, WI	.	.	.	.	0.09	0.078	.	.	.	.	.	.	.	0.11
Watertown-Fort Atkinson, WI	.	.	.	.	0.08	0.069	.	.	.	.	.	.	.	.
Wausau, WI	.	.	.	.	0.07	0.063	.	.	.	.	.	.	.	.
Whitewater, WI	.	.	.	.	0.07	0.067	.	.	.	.	.	.	.	.

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: November 18, 2015

Table 6a:

Air Quality Statistics Report

Geographic Area: Wisconsin
Summary: by CBSA
Year: 2014
Exceptional Events: Excluded (if any)
Statistics in red are above the level of the respective air quality standard

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Appleton, WI	.	.	.	.	0.08	0.07	.	.	.	24	8.6	.	.	.
Baraboo, WI	.	.	.	.	0.08	0.064	.	.	.	21	7.8	28	10	.
Beaver Dam, WI	0.4	0.4	.	.	0.08	0.071	6	4	0	27	8.5	30	12	.
Chicago-Naperville-Joliet, IL-IN-WI	5.3	1.9	67	21	0.09	0.076	53	12	2	31	12.1	93	46	0.15
Duluth, MN-WI	1.3	0.8	.	.	0.07	0.057	.	.	.	18	8.4	86	28	0
Eau Claire, WI	.	.	.	.	0.07	0.061	.	.	.	21	8.2	.	.	.
Fond du Lac, WI	.	.	.	.	0.08	0.067	.	.	.	.	.	.	.	.
Green Bay, WI	.	.	.	.	0.08	0.066	79	16	3	26	9.1	.	.	.
Janesville, WI	.	.	.	.	0.08	0.072	.	.	.	.	.	.	.	.
La Crosse, WI-MN	.	.	.	.	0.07	0.063	.	.	.	22	8.1	.	.	.
Madison, WI	.	.	.	.	0.08	0.069	10	4	1	25	9.3	41	18	.
Manitowoc, WI	.	.	6	1	0.07	0.066	.	.	.	.	.	.	.	.
Milwaukee-Waukesha-West Allis, WI	1.2	0.7	53	16	0.09	0.074	27	8	1	30	10.5	53	19	.
Minneapolis-St. Paul-Bloomington, MN-WI	2.7	1.6	50	16	0.08	0.064	12	5	1	29	10.3	76	25	0.12

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Generated: November 18, 2015

Table 6b:

Air Quality Statistics Report

Geographic Area: Wisconsin
Summary: by CBSA
Year: 2014
Exceptional Events: Excluded (if any)
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Platteville, WI	.	.	.	.	.	.	.	.	.	22	8.1	.	.	.
Sheboygan, WI	.	.	.	.	0.08	0.072	.	.	.	.	.	.	.	0.09
Watertown-Fort Atkinson, WI	.	.	.	.	0.08	0.071	.	.	.	.	.	.	.	.
Wausau, WI	.	.	.	.	0.07	0.064	.	.	.	.	.	.	.	.
Whitewater, WI	.	.	.	.	0.09	0.073	.	.	.	.	.	.	.	.

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: November 18, 2015

CERTIFICATE OF SERVICE

I, Marc A. Al, hereby certify that I have this day served a true and correct copy of the following document via electronic filing to all persons indicated on the attached service list:

> Minnesota Large Industrial Group's Reply to Exceptions Filed by Other Parties to the Findings of Fact, Conclusions, and Recommendations of the Administrative Law Judge Regarding Phase II (Criteria Pollutants Track)

In the Matter of the Investigation into Environmental and Socioeconomic Costs Under Minn. Stat. § 216B.2422, Subd. 3
PUC Docket No. E-999/CI-14-643
OAH Docket No. 80-2500-31888

Dated this 4th day of August, 2016

/s/ Marc A. Al
Marc A. Al

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Daniel P	Wolf	dan.wolf@state.mn.us	Public Utilities Commission	121 7th Place East Suite 350 St. Paul, MN 551012147	Electronic Service	Yes	OFF_SL_14-643_Official CC Service List