

**Steve Mihalchick**

**From:** Ronald R. Rich [rrr@atmrcv.com]  
**Sent:** Monday, November 30, 2009 8:46 AM  
**To:** 'Honorable Steve M. Mihalchick'; 'Richard Hargis'  
**Cc:** 'Bill Storm'; 'Bob Cupit'; bobevans@excelsiorenergy.com; 'Bray Dohrwardt'; 'Bret Eknes'; 'Brodin, Michelle'; 'Burl Haar'; 'Anderson, Edwin A'; 'Carol A. Overland'; 'Charlotte Neigh'; 'Chris Greenman'; 'Christopher Clark'; 'David Moeller'; jshaddix@janetshaddix.com; 'Julia Anderson'; 'Karen Hammel'; 'Kevin Reuther'; 'Maria Lindstrom'; 'Mike Krikava'; 'Ron Gustafson & Linda Castagneri'; 'Ross Hammond'; 'Seltzer, Matthew'; 'Sharon Ferguson'; 'Starns, Byron'; 'Tom Bailey'; TomOsteraas@excelsiorenergy.com; 'William Harrington'; 'Hartinger, Susan'; 'Jack milinovich'  
**Subject:** Inadequate Estimates of Air Emissions in FEIS for Mesaba Energy Project  
**Attachments:** Excelsior Flare Statement.pdf; Flare Manufacturer E-Mails.pdf; Hearing Extension Request.pdf

Judge Mihalchick and Mr. Hargis:

The Final Environmental Impact Statement for the Mesaba Energy Project is inadequate because it significantly underestimates the worst case and average annual criteria and hazardous air emissions. Some of the most serious errors and omissions concern the air emissions from the proposed flaring of gasifier syngas. For flare emissions the FEIS makes three major assumption errors:

1. The assumed "99% destruction" efficiency of the two proposed flares is impossible given the proposed flare design as validated by communication with the flare vendor. A realistic estimate of 87.5% used instead for the proposed design would result in levels of most such air emissions  $(1-0.99)/(1-0.875) = 12.5$  times higher than estimated in the FEIS.
2. There is no allowance made for continual flaring of syngas from the third gasifier that is supposed to act as a standby to improve operational reliability of the facility. The FEIS seems to consider only an overly short and infrequent duration "startup" and "shutdown" period implying that the third gasifier will not operate when the other two are on. This operational mode is unlikely – such gasifiers require significant amounts of time to start and stop and cannot act as a standby if turned off. As a consequence, average annual air emissions will be much higher than estimated.
3. The worst-case air emission scenarios neglect completely the drastic increase in air emissions from the flare stack (or its bypass) during such "unplanned events". Especially when the flares are overwhelmed or are bypassed during such an event. During these "events", a significant local and regional acute hazard can occur because the quantity and concentration of air pollutants released could reach lethal levels. Estimates of such releases need to be included.

Concerning Point 1: At the January 29<sup>th</sup>, 2008 public hearing on the Mesaba Energy Project Draft Environmental Impact Statement (DEIS), I made several comments on environmental issues that were missing or inaccurate. Given hearing time limitations, I focused on one of the more egregious and most significant air emission errors – the woefully under assumed emissions of criteria pollutants from the proposed gasifier flares. I am particularly aware of underreporting of these emissions because a part of my business was (and still sometimes is) monitoring of flare emissions from processes with an almost identical gas composition to the coal gasifier syngas proposed to be flared.

As you may recall at that hearing, I publicly questioned Excelsior about their flare assumptions, particularly how they intended to achieve a "99% destruction" of criteria and hazardous pollutants from the flare without further downstream treatment. Because I know through measurement and using combustion theory that "destruction" (actually only oxidation) of carbon monoxide and other pollutants through the type of flare proposed would typically be about 87.5% at the 40-50% carbon monoxide the gasifier would produce. This percentage number is extremely important because even at 90% instead of the assumed "99%", emissions of carbon monoxide alone would be more than 10 times higher than the values assumed in the DEIS. Other pollutants would be similarly increased.

No representative of Excelsior Energy, the DOE, any of the Mesaba Project consultants or the State of Minnesota could address the question I posed at the hearing. Therefore, you (Judge Mihalchick) ordered Excelsior Energy to provide the information on which their assumption was based. The understanding was that such information was to be provided to me well prior to the close of the 30 day comment period and addressed in the FEIS.

After e-mail requests to you (Judge Mihalchick) I received a letter from Excelsior attached as "Excelsior Flare Statement". The letter admitted to mistakes in emission calculations, but still claimed 99% flare destruction. And attached to the letter was one from the proposed flare vendor (John Zink Company, LLC) along with a contact name (a Mr. Robert Schwartz). In the letter to Excelsior, Mr. Schwartz declared that "he had been provided with information regarding the flares..." and "it was his opinion that flaring efficiency... will be 99% or greater."

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Public Comment on FEIS 4

I wanted to understand on what his opinion was based, especially since his company makes flares primarily for the petrochemical industry, not syngas applications. So I called and left messages for Mr. Schwartz at least twice. Receiving no response, I sent and received the e-mails attached above as "Flare Manufacturer E-Mails". And when I received no response to my final e-mail, I subsequently called Mr. Schwartz who then confirmed: 1, there was no special syngas flare proposed, only standard types from the petrochemical industry; 2, he was unaware if his company had ever built a flare for coal syngas generation; 3, no one in his company had ever measured the destruction efficiency of any of their flares; and 4; there was no technology downstream of the flare or auxiliary burners in the flare (other than a pilot) that would increase destruction levels beyond what a standard flare would perform. He also confirmed that he had only been contacted about the destruction efficiencies after the January 29<sup>th</sup> hearing. I asked him to respond to my e-mail.

After this call, no further communications were received from him or Excelsior. As you may recall I requested a hearing comment period extension (on February 29, 2008 – also attached) as well as an additional hearing to address the many DEIS air emissions inadequacies that could not be addressed in the first. Both were denied.

I have had a chance to review the Mesaba Energy Project Final Environmental Impact Statement (FEIS). Even though the FEIS document took almost two years to produce, and even though Excelsior Energy, Fluor, Conoco-Phillips, the DOE and the State of Minnesota were all aware of my comments (and never satisfactorily addressed them at the time), the flare "99% destruction" issue is not addressed in any way in the FEIS.

The FEIS still states:

**Flares (p. 2-39)**

*"The elevated flares for each phase would be designed for a minimum 99 percent destruction efficiency for CO and H2S."*

As my communication with the flare vendor has determined, there is no basis for such a "99% destruction" statement other than wishful opinion by someone who has not measured or (apparently) even calculated theoretically the value that would actually result. At a 48% CO syngas loading (the presumed operational concentration of CO in the gas sent to the flare) the best that would be achieved is less than 90% destruction, and more likely with the undisclosed high water and CO2 loading lower than 87.5%. That means the FEIS under-discloses air emissions from the flare by a factor of over ten (10) and the flare becomes the single largest air emission source at the plant. This assumption alone renders the FEIS inadequate.

Further, "destruction" in the flare of H2S merely changes its form to sulfur dioxide (SO2) and sulfur trioxide (SO3), and it is unclear from the FEIS if this flare SOx has been consistently included in the SOx totals (only SO2 appears to have been considered anyway – another inadequacy).

Concerning Points 2 and 3:

The FEIS states:

**Flare (Page 2-28)**

*"During unit startup or during short-term combustion turbine outages, an elevated flare at the gasification island would be used to burn off partially combusted natural gas and scrubbed/desulfurized off-specification syngas. Syngas sent to the flare during normal planned flaring events would be filtered, water-scrubbed, and further treated in the AGR and mercury removal systems to remove air contaminants prior to flaring. Flaring of untreated syngas or other streams would only occur as an emergency safety measure during unplanned plant upsets or equipment failures."*

And:

**Flares (Page 2-39)**

*"... The flares would normally be used only to oxidize treated syngas and natural gas combustion products during gasifier startup operations. The flares would also be available to safely dispose of emergency releases from the Mesaba Generating Station during unplanned upset events."*

And:

**Flares (Section 3.3-1)**

*"The primary emission point from either site will be the flare and CTG/HRSG stack".*

And:

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**2.2.5.2 Plant Demonstration and Operations**

*"Although the plant would include three gasification trains (from slurry preparation through dry char removal), only two gasification trains would be required for full output (at 50 percent capacity each). The spare train would normally be in standby service unless maintenance was being performed on one of the gasifier trains."*

Three gasifiers are planned for each phase – two to provide gas to turbines and one to act as a "standby" to improve plant reliably. Throughout the FEIS, minimal startup/shutdown time assumptions are used (apparently at most a total startup-shutdown cycle of 8 hours, 20 times per year). At other times the "standby" gasifier is (apparently) assumed to be off.

The gasifiers proposed by Excelsior and provided by Conoco-Phillips are "proprietary". Information on their assumed startup and shutdown times are not disclosed anywhere in the FEIS. However, similar (but smaller) gasifiers have startup times of 20 hours or more from a "cold" condition, and can't act as a reliable backup unless kept "hot" and producing some level of syngas. While it is possible that syngas from the third gasifier could be used to supply the two turbines and little flaring would occur, this is not what is stated in the FEIS.

The FEIS appears to assume the third gasifier is "off" almost all the time so that the emissions from the flares are very low. And throughout sections 4 and 5, the only measures for "Best Available Control Technology (BACT)" for the flare mentioned is: *"incorporating good flare design; flaring only fully treated syngas."*

Flares are traditionally not even considered pollution control devices by the MPCA. They are considered "safety" equipment. And "good" flare design can't meet the FEIS projected criteria and hazardous air emissions. Table 2.2-11 does not even consider the flare output from the third gasifier. But zero air emissions are not possible in normal "standby service" which requires at least partial operation.

Even Excelsior indicates the air emissions from the flares are very significant during startup and shutdown (an eight-hour "Normal" CO flare emission 0.14 g/s versus a "Startup" eight-hour CO of 336.73 g/s) more than 2,400 times more air emissions than when "Normal". Therefore ignoring flaring during "standby" operation appears to be a major omission from the FEIS. And the "water" scrubbers could not remove any amount of the most significant air emission from the gasifier (CO) or several other air contaminants either.

In addition, estimates of "unplanned upset events" discussed on pages 2-29 and 2-39 are also not included in the air emissions estimates. The "worst case" air emissions would actually occur during "emergency releases" and "overpressure events". The extreme case is an explosion of a gasifier, but this is typically prevented by relief valves and "blow-out" disks. There is no estimate provided as to how often these events will occur, but when they do, flare destruction efficiency would fall drastically – often to nearly zero. A flare simply can't keep up when too much gas flows in too short a period. During those times, concentration of up to 480,000 ppm of CO can be vented. Along with vast amounts of all the other criteria and hazardous pollutants the FEIS claims will be flared to "99% destruction".

On page 4.17-18, Excelsior states that: *"Potential releases of carbon monoxide from the syngas process stream of the gasifiers could result in the longest downwind toxic impact distance. The potential releases may pose a health hazard to plant workers and closest residents to the proposed power plant."*

So it is essential an adequate FEIS disclose a conservative estimate of how often "emergency releases" will occur. The Mesaba FEIS does not even try.

Finally, not a single public comment on the inadequacy of the flare emission assessment was included in the "Public Comments" Section in the FEIS and no substantial correction was made to the wholly inadequate assessment of flare emissions in the DEIS even attempted.

The inadequate and erroneous assessment of the flare air emissions in the FEIS are a very significant and render all other air emissions estimates suspect. I urge you to review the record, find that the Mesaba FEIS is inadequate, and require a more thorough and scientifically-based air emissions assessment.

Thank you.

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11/30/2009



## Ronald R. Rich

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**From:** Ronald R. Rich [rrr@atmrcv.com]  
**Sent:** Friday, February 29, 2008 1:04 PM  
**To:** 'Honorable Steve M. Mihalchick'  
**Cc:** 'Bill Storm'; 'Bob Cupit'; 'bobevans@excelsiorenergy.com'; 'Bray Dohrwardt'; 'Bret Eknes'; 'Brodin, Michelle'; 'Burl Haar'; 'Anderson, Edwin A'; 'Carol A. Overland'; 'Charlotte Neigh'; 'Chris Greenman'; 'Christopher Clark'; 'David Moeller'; 'Ed Anderson'; 'jshaddix@janetshaddix.com'; 'Julia Anderson'; 'Karen Hammel'; 'Kevin Reuther'; 'Maria Lindstrom'; 'Mike Krikava'; 'Ron Gustafson & Linda Castagneri'; 'Ross Hammond'; 'Seltzer, Matthew'; 'Sharon Ferguson'; 'Starns, Byron'; 'Tom Bailey'; 'TomOsteraas@ExcelsiorEnergy.com'; 'William Harrington'; 'Hartinger, Susan'; 'jack milinovich'  
**Subject:** Lack of Excelsior Energy Response on Air Emission Assumptions  
**Follow Up Flag:** Follow up  
**Flag Status:** Completed  
Judge Mihalchick:

As an energy and environmental engineer, president of a company that develops, monitors and controls air emissions from coal-fired power plants, gasifiers and similar processes, and as the representative of the Swan Lake (Itasca County) Association, I also request that a much more thoroughly prepared Draft EIS be submitted with an appropriate comment period, or there be additional time allowed for comment on the Final EIS. I would further request an additional hearing to address environmental issues that could not be addressed in the time allotted previously.

I base this request on:

1. My review and understanding of the DEIS and the numerous undisclosed and unsubstantiated assumptions apparent in the DEIS made by Excelsior, their consultants and their vendors regarding air emissions from Mesaba I.
2. The possible confusion between emission totals in the DEIS and the draft air permit application concerning Mesaba I alone and Mesaba I and II together which alone may have resulted in half the actual emissions being undisclosed for some pollutants.
3. The seemingly evasive and inadequate responses to my specific and general questions concerning air emission assumptions provided by Excelsior, their consultants and their vendors at the Jan. 29<sup>th</sup>, 2008 public hearing for Mesaba I and Mesaba II in Taconite over which you presided. This lack of response wasted valuable participant questioning time and prevented any hope of proper evaluation of the numerous assumptions made concerning Mesaba I and II that I had intended to address.
4. My experience in receiving what should have been a simple follow-up request at that hearing that you allowed (thank you) concerning one significant air emission assumption of the Mesaba I and II -- that from the gasifier safety flares. I still have not received an proper numerically or monitoring verified answer to that line of questioning as promised by Excelsior. They provided the vendor name and told us at the hearing that that vendor used "models" or "data" to determine performance. That vendor has provided only his "opinion", followed by questioning of my knowledge, and now silence. I can only conclude that Excelsior has through ignorance or intent underrepresented the actual air emissions of CO by a factor of 10 to 20. This amount is so significant as to call into question the entire EIS process.
5. There are many other possibly inadequate assumptions that need to be questioned and possible addressed and for which time and an additional hearing should be provided.

In the interests of the citizens of Minnesota, please provide an extension and an additional hearing.

Respectfully Submitted,

Ronald R. Rich  
President  
Atmosphere Recovery, Inc.

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**From:** Anderson, Edwin A [mailto:EAnderson@bigforkvalley.org]  
**Sent:** Friday, February 29, 2008 10:06 AM  
**To:** Honorable Steve M. Mihalchick

11/27/2009

**Cc:** Bill Storm; Bob Cupit; bobevans@excelsiorenergy.com; Bray Dohrwardt; Bret Eknes; Brodin, Michelle; Burl Haar; Carol A. Overland; Charlotte Neigh; Chris Greenman; Christopher Clark; David Moeller; Ed Anderson; jshaddix@janetshaddix.com; Julia Anderson; Karen Hammel; Kevin Reuther; Maria Lindstrom; Mike Krikava; Ron Gustafson & Linda Castagneri; Ron Rich; Ross Hammond; Seltzer, Matthew; Sharon Ferguson; Starns, Byron; Tom Bailey; TomOsteraas@ExcelsiorEnergy.com; William Harrington; Hartinger, Susan  
**Subject:** DOC response to CAMP's questions

Judge Mihalchick,

I appreciate the recent responses to my questions from the Department of Commerce. Some of the Draft EIS comments submitted by Citizens Against the Mesaba Project are now posted on the DOC website; however they are still not complete. Original comments, first submitted to the DOC after the DEIS, are still not posted. In addition, Mr. Storm's communication still does not answer the following questions.

1. When will the complete CAMP comments be posted?
2. Have any CAMP DEIS comments been submitted to your honor as part of the siting and routing docket? If so, which comments?
3. Why have the CAMP comments been listed under my name as an individual? The documents were clearly submitted on behalf of Citizens Against the Mesaba Project, and I request that this be changed to reflect the work of the many individuals who participated in preparing these comments.
4. Will Mr. Storm review the DEIS comments submitted by CAMP and post those that were missed, or is it necessary CAMP to do this review and identify the original comments that are not posted?

The request for additional time for review of the Final EIS was made because the Draft EIS failed to incorporate many substantive scoping comments made by agencies such as the MPCA and DNR as well as the public. For instance, the MPCA comments on the DEIS are in part identical to the scoping comments because the original agency comments were not thoroughly addressed in the DEIS. Some of CAMP's comments on the DEIS are identical to our scoping comments for the same reason. Now we potentially have a substantially different project proposal which will affect many aspects of the project's impacts. CAMP's concern is that the project cannot be considered properly and thoroughly evaluated until at least the agency experts have had adequate time to review the new proposals.

Based on the inadequate performance of the DOC/DOE incorporating scoping comments into the Draft EIS, CAMP has no confidence that a thorough and complete Final EIS will be created without additional agency and public input. This is why CAMP is renewing the request that either a more thorough Draft EIS be submitted with an appropriate comment period, or there be additional time allowed for comment on the Final EIS.

Ed Anderson, Co-Chair  
Citizens Against the Mesaba Project

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11/27/2009

**Ronald R. Rich**

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**From:** Ronald R. Rich [rrr@atmrcv.com]  
**Sent:** Tuesday, February 26, 2008 1:56 PM  
**To:** 'Schwartz, Bob'  
**Cc:** 'Charlotte Neigh'; 'Carol A. Overland'; '#P.A.B\_Large\_US\_ODS'  
**Subject:** RE: Additional Flare Information for the Mesaba IGCC Units

Bob:

Thank you for your response. I did not overlook the hydrogen content (which would tend to lower the LFL as you indicate) nor the CO<sub>2</sub>, and water vapor content (which would raise the LFL and is also present in the gasifier). And all systems we have ever measured have had a hydrogen content that allowed higher destruction efficiencies than pure CO alone. However, none has ever exceeded 95% destruction.

No one from Mesaba, Fluor or Conoco-Phillips to my knowledge has publicly disclosed the H<sub>2</sub>, CO<sub>2</sub>, and H<sub>2</sub>O content in their gasifier. Especially during startup and shutdown when hydrogen levels are lowest. They have only disclosed the CO content in response to my questions ("in the high 40's" percentage) – which was not corrected when I used 48% as "typical". IGCC CO concentration (from public data) appears to range from 30% to 60% on startup.

So, in the absence of data, I assumed any H<sub>2</sub> LFL reduction and any CO<sub>2</sub> and H<sub>2</sub>O LFL increase together would approximate the 12.5% LFL of 100% CO.

If you have additional data, I would really appreciate receiving it. Especially since no comparable flare exhaust we have ever measured has exceeded 95% destruction even in the presence of substantial excess H<sub>2</sub> (60% H<sub>2</sub>, 30% CO 10% N<sub>2</sub>, H<sub>2</sub>O, and CO<sub>2</sub>).

Thank you again.

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**From:** Schwartz, Bob [mailto:bob.schwartz@johnzink.com]  
**Sent:** Tuesday, February 26, 2008 1:16 PM  
**To:** Ronald R. Rich  
**Cc:** Charlotte Neigh; Carol A. Overland; #P.A.B\_Large\_US\_ODS  
**Subject:** RE: Additional Flare Information for the Mesaba IGCC Units

Re: Excelsior Energy, Inc., Mesaba IGCC Flare

Dear Mr. Rich:

We are in receipt of your email of February 25, 2008 regarding the performance of referenced flare. From the information contained in your email it appears that you have focused on CO in your analysis. In so doing, you have overlooked the very substantial amount of hydrogen present in the gases to be flared. Hydrogen, with its very wide flammability limits, plays an important role in the combustion performance of the IGCC flare. The lack of organic chemical constituents is of no consequence; the hydrogen will initiate burning and contribute to the efficiency level given in our letter of February 13, 2008.

Sincerely yours,

Robert Schwartz  
Senior Technical Specialist

11/27/2009

John Zink Company, LLC

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**From:** Ronald R. Rich [mailto:rrr@atmrcv.com]  
**Sent:** Monday, February 25, 2008 2:51 PM  
**To:** Schwartz, Bob  
**Cc:** 'Charlotte Neigh'; 'Carol A. Overland'  
**Subject:** Additional Flare Information for the Mesaba IGCC Units

Mr. Schwartz:

I called you last week and previous week too concerning which model flare you proposed to use for the Mesaba IGCC project and how such a flare would achieve 99% reduction of what is a primarily (48%+) carbon monoxide (CO) gas discharge containing CO<sub>2</sub> and some hydrogen and with no organic chemical constituents. Both times I left messages, and I have not heard back from you.

As I said in the messages, I am interested because my company manufactures specialized gas analyzers (that have been used to measure flare discharges from processes (containing between 10% to 27% carbon monoxide) and we have never measured CO destruction efficiencies that high (always between 87% and – rarely - 95%). Since the lower flammability limit of the IGCC CO would be greater than 12.5%; I would not expect destruction efficiency to exceed 87.5% for a flare in their application. If it did, I would be interested in applying your technology to other CO emitting applications.

I will be commenting on Thursday concerning assumed flare destruction efficiency, including my company findings, so would be very appreciative if you would share sufficient information on what you are proposing for Mesaba and why it is your opinion you can achieve such a high destruction efficiency of a primarily CO mixture with only a flare.

Thank you.

11/27/2009

## MEMORANDUM

TO: Mr. Ron Rich

FROM: Robert S. Evans II  
Excelsior Energy Inc.

RE: Flare Design Information  
MEP I/II Air Permit Application  
OAH Docket No. 12-2500-17512-2  
MPUC Docket No. E-6472/GS-06-668

DATE: February 13, 2008

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Dear Mr. Rich:

During the Power Plant Siting Act contested case hearings on January 29, 2008 you expressed special interest in matters related to flare operations, specifically "...where [Excelsior] get[s] a number of 99 percent reduction"<sup>1</sup> for carbon monoxide destruction efficiency. Through Fluor, Excelsior has contacted John Zink Company LLC – the flare vendor – and requested that the company provide its assurance that a properly designed flare combusting syngas (with the expected characteristics provided in Table 2.6-3 of Excelsior's application for a Part 70/New Source Review Construction Authorization Permit, [the "Air Permit Application"]) could operate with a 99 percent destruction efficiency. The attached letter from Mr. Robert Schwartz of John Zink to Mr. John Ruud of Fluor Enterprises provides such assurance.

The one-hour and eight-hour average carbon monoxide emissions identified in Appendix A, Exhibit A-4 of the Air Permit Application reflect the 99 percent destruction efficiency and have been used in Excelsior's near-field ambient air quality modeling study (see page 135, Table 7.2-3 in the Air Permit Application). The modeled impacts of flare emissions on ambient carbon monoxide concentrations at the West Range Site and the comparison of such impacts to the ambient air quality standards are provided in the Air Permit Application on page 153, Table 7.7-1 (by mistake, the row showing the modeled 8-hour average ambient carbon monoxide concentration was left out of Table 7.7-1; for this averaging period, the highest predicted concentration of carbon monoxide<sup>2</sup> due to operation of Mesaba One and Mesaba Two is 329  $\mu\text{g}/\text{m}^3$ , the background concentration is 3,000  $\mu\text{g}/\text{m}^3$ , the total impact is 3,329  $\mu\text{g}/\text{m}^3$ , and the ambient air quality standard is 10,000  $\mu\text{g}/\text{m}^3$ ). The results show that even assuming a very conservative background concentration (i.e., ambient carbon monoxide concentrations monitored at urban locations in Minneapolis/St. Paul), the predicted ambient carbon monoxide concentrations are significantly below the corresponding ambient air quality standards.

We hope this information addresses your question and concerns.

Sincerely,



Bob Evans  
V.P. Environmental Affairs

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<sup>1</sup> Mesaba Energy Project, OAH Docket No. 12-2500-17512-2, MPUC Docket No. E-6472/GS-06-668, Contested Case Hearings, Transcript of Public Hearings, Volume I, page 53, line 21.

<sup>2</sup> The highest second high concentration at any point in the modeling domain is the concentration used for assessing compliance with ambient air quality standards.

International Headquarters  
P.O. Box 21220  
Tulsa, Oklahoma 74121-1220  
918/234-1800

February 13, 2008

Fluor Corporation  
3 Polaris Way  
Aliso Viejo, CA 92698

Re: Excelsior Energy, Inc. Flare Performance

Attn: Mr. John Ruud, Director, Process Engineering

Dear Mr. Ruud:

I am Robert Schwartz, a Senior Technical Specialist with John Zink Company, LLC, a supplier of flare equipment. A prime focus of my work for the past 41 years has been the design and performance of flares and flare systems. I have been asked to opine on the projected performance of flares serving the proposed Excelsior integrated gasification combined cycle (IGCC) power plant.

I have been provided with information regarding the flares to be utilized on the Excelsior project including Table 2.6-3 of the project air quality permit application which sets forth the ranges of composition of the flared gas. The most prominent component gases are hydrogen, carbon monoxide, and carbon dioxide.

Based on my understanding of the flared gas stream, the John Zink flare burner to be utilized and my experience with flare performance, it is my opinion that the flaring efficiency (destruction of carbon monoxide and other waste gas constituents) will be 99% or greater.

Sincerely yours,



Robert Schwartz  
Senior Technical Specialist  
John Zink Company, LLC