From: Medina, Dayana
Location: R6-ConfRm-South-10O15/R6---10th-Floor
Importance: Normal
Subject: Call with LDEQ to Discuss Baton Rouge Redesignation and 1-hour SO2
Start Date/Time: Thur 9/10/2015 6:00:00 PM
End Date/Time: Thur 9/10/2015 8:00:00 PM
R6 Comments on Proposed SO2 SIP St. Bernard_Final.pdf
Baton Rouge Redesignation EPA Comments.pdf

Agenda
Louisiana - EPA Conference Call
September 10, 2015, 1 - 3 p.m.

Conference call-in number 866-299-3188, code Ex. 6 - Personal Privacy

1. Introductions

2. Baton Rouge Redesignation (1:05 - 2:00 pm)
   - Discussion of LDEQ's draft responses to redesignation request/SIP
   - Next steps/Action items

3. SO2 Attainment SIP for St. Bernard Parish (2:05 - 3:00 pm)
   - Discussion of LDEQ's draft responses to the proposed SO2 Attainment SIP
   - Next steps/Action items

To: Clark, David[CLARKD@adeq.state.ar.us]; Snyder, Erik[snyder.erik@epa.gov]
Cc: McCorkle, Mark[MAC@adeq.state.ar.us]; Montgomery, William[Montgomery@adeq.state.ar.us]
Sent: Fri 5/5/2017 3:18:51 PM
Subject: RE: Call In Details - Prognostic Met Data (Thursday, April 6th @ 1:00 PM)

David,

We did receive the report and have passed along the document to HQs.

Thanks,

Ashley

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From: Clark, David [mailto:CLARKD@adeq.state.ar.us]
Sent: Friday, May 05, 2017 10:03 AM
To: Mohr, Ashley <Mohr.Ashley@epa.gov>; Snyder, Erik <snyder.erik@epa.gov>
Cc: McCorkle, Mark <MAC@adeq.state.ar.us>; Montgomery, William <Montgomery@adeq.state.ar.us>
Subject: FW: Call In Details - Prognostic Met Data (Thursday, April 6th @ 1:00 PM)

Erik & Ashley,

Can you please confirm for me that the below email made it to you?

David

David W. Clark, M.S.

Epidemiologist

Air Division – Planning & Air Quality Analysis Branch
Arkansas Department of Environmental Quality

5301 Northshore Drive

North Little Rock, AR. 72118

U.S.A.

Voice: 501 682-0070

Fax: 501 682-0753

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Passcode: Ex. 6 - Personal Privacy #

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From: Snyder, Erik
Sent: Mon 5/8/2017 12:16:18 PM
Subject: RE: Call In Details - Prognostic Met Data (Thursday, April 6th @ 1:00 PM)

We can use my call in number. **Ex. 6 - Personal Privacy**

I am still waiting confirmation from a couple of people but looks like the time works. I'll let people know if we have to pick another time.

-Erik

Erik Snyder

Lead Regional Air Quality Modeler
EPA Region 6
Phone: 214-665-7305
Fax: 214-665-7263
email: snyder.erik@epa.gov

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To: Snyder, Erik <snyder.erik@epa.gov>
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Sent: Friday, May 05, 2017 10:07 AM
To: Clark, David; Mohr, Ashley
Cc: McCorkle, Mark; Montgomery, William
Subject: RE: Call In Details - Prognostic Met Data (Thursday, April 6th @ 1:00 PM)

Hi David,

We did get the email and forward. I have not heard back from OAQPS on time for a call next week. I will follow-up with them and let you know.

-Erik

Erik Snyder

Lead Regional Air Quality Modeler
EPA Region 6
Phone: 214-665-7305
Fax: 214-665-7263
email: snyder.erik@epa.gov

From: Clark, David [mailto:CLARKD@adeq.state.ar.us]
Sent: Friday, May 05, 2017 10:03 AM
To: Mohr, Ashley <Mohr.Ashley@epa.gov>; Snyder, Erik <snyder.erik@epa.gov>
Cc: McCorkle, Mark <MAC@adeq.state.ar.us>; Montgomery, William <Montgomery@adeq.state.ar.us>
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David

David W. Clark, M.S.

Epidemiologist

Air Division – Planning & Air Quality Analysis Branch
Arkansas Department of Environmental Quality

5301 Northshore Drive

North Little Rock, AR. 72118

U.S.A.

Voice: 501 682-0070

Fax: 501 682-0753

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Cc: McCorkle, Mark[MAC@adeq.state.ar.us]; Montgomery, William[Montgomery@adeq.state.ar.us]
From: Clark, David
Sent: Fri 5/5/2017 3:07:37 PM
Subject: RE: Call In Details - Prognostic Met Data (Thursday, April 6th @ 1:00 PM)

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Passcode: Ex. 6 - Personal Privacy #

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Cc: McCorkle, Mark[MAC@adeq.state.ar.us]; Montgomery, William[Montgomery@adeq.state.ar.us]
From: Clark, David
Sent: Fri 5/5/2017 3:02:47 PM
Subject: FW: Call In Details - Prognostic Met Data (Thursday, April 6th @ 1:00 PM)
ADEQ_SO2_Met_Inputs_MPE_19Apr2017.pdf

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Sent: Thur 4/27/2017 12:52:01 PM
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To: Mohr, Ashley[Mohr.Ashley@epa.gov]
From: Clark, David
Sent: Thur 12/22/2016 1:35:41 PM
Subject: RE: Appendix W Final Rule Signed

Thank you Ashley. We are proceeding with our Independence County (FutureFuel & Entergy Independence) SO2 modeling using the new version of AERMOD.

David

David W. Clark, M.S.

Epidemiologist

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From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Wednesday, December 21, 2016 4:40 PM
To: Dianne Anderson; Daniel Menendez; Daniel Jamieson - TCEQ - Permit modeling (Daniel.Jamieson@tceq.texas.gov); Jeff Stonesifer; Sufi Mustafa; Eric Peters; Gi-Dong; Eric Milligan; Joseph Wills (joseph.wills@deq.ok.gov); Clark, David; Hurt, Charles; Rheaume, Thomas; McCorkle, Mark; vennetta.hayes@la.gov; Yvette Olmos; Tien Nguyen; john babin
Cc: Robinson, Jeffrey; Snyder, Erik; Cox, Kyndall
Subject: Appendix W Final Rule Signed

All –

Please see below the announcement the Regional Offices received from HQs regarding signature on the final revisions to Appendix W. Here is the specific website link for Appendix W rulemaking on the SCRAM website: https://www3.epa.gov/ttn/scram/appendix_w-2016.htm

Revisions to the *Guideline on Air Quality Models*

On Dec. 20, 2016, EPA revised its *Guideline on Air Quality Models* (*Guideline*). The *Guideline* provides recommended models and other techniques, as well as guidance for their use in predicting ambient concentrations of air pollutants. The *Guideline* is used by EPA, States, Tribes, and private industry in the review and preparation of permits for new sources for Prevention of Significant Deterioration and for State or Tribal Implementation Plan revisions. EPA's *Guideline* revision will provide States, Tribes and private industry with updated air quality models and techniques, modeling procedures, and enhanced technical guidance. These revisions will improve efficiency and accuracy of regulatory modeling applications, increasing certainty in the degree and type of air pollution emission controls necessary to achieve health protective air quality levels. A fact sheet and pre-publication version of the action will be posted at https://www.epa.gov/scram

Please share with others in your organization that I may have missed. If you have any questions, please do not hesitate to reach out to either myself or Erik Snyder. Please note, both myself and Erik will be out of the office during the upcoming holidays, which may delay our response. We will follow-up with you once we return of the office.

Wishing you all a safe and happy Holiday Season!

Thanks,

Ashley

Ashley N.Q. Mohr
Environmental Scientist
Air Permits Section (6MM-AP)
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, TX 75202
(214) 665-7289
FAX (214) 665-6762
mohr.ashley@epa.gov

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To: Mohr, Ashley[Mohr.Ashley@epa.gov]; Snyder, Erik[snyder.erik@epa.gov]
Cc: McCorkle, Mark[MAC@adeq.state.ar.us]
From: Clark, David
Sent: Wed 11/30/2016 3:29:56 PM
Subject: RE: ADEQ ADJ_U* Sensitivity Analysis - Independence County AR

Hello Ashley,

Any updates for us?

David

David W. Clark, M.S.

Epidemiologist

Air Division – Planning & Air Quality Analysis Branch
Arkansas Department of Environmental Quality

5301 Northshore Drive

North Little Rock, AR. 72118

U.S.A.

Voice: 501 682-0070

Fax: 501 682-0753

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From: Clark, David
Sent: Thursday, November 10, 2016 8:17 AM
To: 'Mohr, Ashley'; Snyder, Erik
Cc: McCorkle, Mark
Subject: RE: ADEQ ADJ_U* Sensitivity Analysis - Independence County AR

Thank you Ashley.

David W. Clark, M.S.

Epidemiologist

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David,

Thanks for following up. I had planned to send you an update today since Erik and I will be out on travel next week. We spoke with OAQPS earlier this week regarding availability for a call to discuss pending Model Clearinghouse requests, including the one for Independence County. They have indicated that they do not have any availability until after next week's RSL Modelers' Workshop because of workload associated with Appendix W and workshop prep. We have started looking at the request and do not have any specific questions at the moment. Initially, it

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We appreciate you staying on top of this with us, and we will continue our review and push for some time with OAQPS to discuss.

Thanks,

Ashley

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To: Mohr, Ashley <Mohr.Ashley@epa.gov>; Snyder, Erik <snyder.erik@epa.gov>
Cc: McCorkle, Mark <MAC@adeq.state.ar.us>
Subject: ADEQ ADJ_U* Sensitivity Analysis - Independence County AR

Hello Ashley & Erik,

We just wanted to check on the status of our SO_2 R6/MCH ADJ_U* sensitivity analysis submission for Independence County and see if you had any updates. If the modeling files or any other information is needed, as always feel free to reach out to us.

David

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Cc: McCorkle, Mark[MAC@adeq.state.ar.us]
From: Clark, David
Sent: Thur 11/10/2016 2:16:52 PM
Subject: RE: ADEQ ADJ_U* Sensitivity Analysis - Independence County AR

Thank you Ashley.

David W. Clark, M.S.

Epidemiologist

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Arkansas Department of Environmental Quality

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Ashley

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From: Haney, Jay
Sent: Mon 10/17/2016 1:40:07 AM
Subject: Independence County - DRR Source SO2 Modeling Discussion - Conf call - Tues, 18 Oct 2016 - 1:00 pm CDT, 11:00 am PDT

All:

The conference call will be held Tuesday, 18 October at 1:00 pm CDT, 11:00 am PDT.

For the call, please use the number below:

Call-in number: 1-877-423-6338

Participant Code: Ex. 6 - Personal Privacy

Jay

Jay L. Haney | Technical Director – Air Quality Modeling Group | 415-507-7164 | Jay.Haney@icfi.com

ICF | 101 Lucas Valley Road, Suite 260, San Rafael, CA 94903

From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Thursday, October 13, 2016 5:55 AM
To: Clark, David <CLARKD@adeq.state.ar.us>; Snyder, Erik <snyder.erik@epa.gov>; Grady, James <Grady.James@epa.gov>; Donaldson, Guy <Donaldson.Guy@epa.gov>; Haney, Jay <Jay.Haney@icf.com>; Charles R. "Chuck" Buttry (CButtry@trinityconsultants.com) <CButtry@trinityconsultants.com>; Antici, Philip <philipantici@ffcmail.com>; David Triplett (dtripl1@entergy.com) <dtripl1@entergy.com>
Cc: Montgomery, William <Montgomery@adeq.state.ar.us>; McCorkle, Mark <MAC@adeq.state.ar.us>

Subject: RE: Independence County - DRR Source SO2 Modeling Discussion

David,

That sounds great. I will look forward to the call in number from Jay and go ahead to set up a meeting and conference room for our folks.

Thanks,

Ashley

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Ashley,

Tuesday, October 18 at 1pm (CST) works well for us. Jay Haney (ICF Jones & Stokes) can send this group a call in number, if that works for your folks? Or you can provide a call in number if you prefer. As stated in our response, we are circulating a draft Adj_U* sensitivity analysis

appendix that will be submitted to EPA R6 after this call, so we would also like to discuss it as well to be sure there are not any EPA comments that require any changes to it.

Thanks again for your efforts with this,

David

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Epidemiologist

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Thanks,

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Cc: Montgomery, William <Montgomery@adeq.state.ar.us>; McCorkle, Mark <MAC@adeq.state.ar.us>
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Hello again Ashley,

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Sent: Wednesday, October 12, 2016 10:51 AM
To: Mohr, Ashley; Snyder, Erik; Grady, James; Donaldson, Guy; Haney, Jay (Jay.Haney@icf.com); Charles R. "Chuck" Buttry (CButtry@trinityconsultants.com); 'Antici, Philip'; David Triplett (dtripl1@entergy.com)
Cc: Montgomery, William; McCorkle, Mark
Subject: RE: Independence County - DRR Source SO2 Modeling Discussion

Hello Ashley,

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Thank you again,

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From: McCorkle, Mark
Sent: Tuesday, October 11, 2016 3:34 PM
To: Mohr, Ashley
Cc: Snyder, Erik; Grady, James; Donaldson, Guy; Clark, David; Montgomery, William
Subject: RE: Independence County - DRR Source SO2 Modeling Discussion

Hi Ashley,

A draft response, prepared by David Clark, is under in-house review. We will send it shortly and set up a good time for a call. Thanks for your assistance in this. - Mark

From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Tuesday, October 11, 2016 1:34 PM
To: McCorkle, Mark

Cc: Snyder, Erik; Grady, James; Donaldson, Guy
Subject: Independence County - DRR Source SO2 Modeling Discussion

Mark,

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Thanks,

Ashley

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Cc: Montgomery, William[Montgomery@adeq.state.ar.us]; McCorkle, Mark[MAC@adeq.state.ar.us]
From: Clark, David
Sent: Fri 10/14/2016 3:52:37 PM
Subject: RE: Independence County - DRR Source SO2 Modeling Discussion

Ashley,

We would also like to have a discussion with Headquarters and the MCH. I am thinking it is probably best to set this up as a separate call for later next week, so could you explore the availability of these folks and maybe we can finalize this during next Tuesday's call?

David

David W. Clark, M.S.

Epidemiologist

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Cc: Montgomery, William[Montgomery@adeq.state.ar.us]; McCorkle, Mark[MAC@adeq.state.ar.us]
From: Clark, David
Sent: Thur 10/13/2016 12:28:51 PM
Subject: RE: Independence County - DRR Source SO2 Modeling Discussion

Ashley,

Tuesday, October 18 at 1pm (CST) works well for us. Jay Haney (ICF Jones & Stokes) can send this group a call in number, if that works for your folks? Or you can provide a call in number if you prefer. As stated in our response, we are circulating a draft Adj_U* sensitivity analysis appendix that will be submitted to EPA R6 after this call, so we would also like to discuss it as well to be sure there are not any EPA comments that require any changes to it.

Thanks again for your efforts with this,

David

David W. Clark, M.S.

Epidemiologist

Air Division – Planning & Air Quality Analysis Branch
Arkansas Department of Environmental Quality

5301 Northshore Drive

North Little Rock, AR. 72118

U.S.A.

Voice: 501 682-0070

Fax: 501 682-0753

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From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Wednesday, October 12, 2016 4:12 PM
To: Clark, David; Snyder, Erik; Grady, James; Donaldson, Guy; Haney, Jay (Jay.Haney@icf.com); Charles R. "Chuck" Buttry (CButtry@trinityconsultants.com); Antici, Philip; David Triplett (dtripl1@entergy.com)
Cc: Montgomery, William; McCorkle, Mark
Subject: RE: Independence County - DRR Source SO2 Modeling Discussion

David,

Based on your response, I expect the conference call to focus on the non-beta option related comments EPA provided on the modeling protocol. Therefore, to allow for ease of scheduling I propose that on the EPA side the call will be limited to Region 6 folks. We can always follow-up with HQs if any particular issues come up during the call that need to be discussed with them. If so, Tuesday afternoon should work for us if we can plan on 1 PM. Let me know if this time will work.

Thanks,

Ashley

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From: Clark, David [mailto:CLARKD@adeq.state.ar.us]
Sent: Wednesday, October 12, 2016 12:14 PM
To: Mohr, Ashley <Mohr.Ashley@epa.gov>; Snyder, Erik <snyder.erik@epa.gov>; Grady, James <Grady.James@epa.gov>; Donaldson, Guy <Donaldson.Guy@epa.gov>; Haney, Jay (Jay.Haney@icf.com) <Jay.Haney@icf.com>; Charles R. "Chuck" Buttry (CButtry@trinityconsultants.com) <CButtry@trinityconsultants.com>; Antici, Philip <philipantici@ffcmail.com>; David Triplett (dtripl1@entergy.com) <dtripl1@entergy.com>

Cc: Montgomery, William <Montgomery@adeq.state.ar.us>; McCorkle, Mark <MAC@adeq.state.ar.us>
Subject: RE: Independence County - DRR Source SO2 Modeling Discussion

Hello again Ashley,

Would next Tuesday, October 18 in the afternoon be a good time for a conference call for your folks?

David

David W. Clark, M.S.

Epidemiologist

Air Division – Planning & Air Quality Analysis Branch
Arkansas Department of Environmental Quality

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From: Clark, David
Sent: Wednesday, October 12, 2016 10:51 AM
To: Mohr, Ashley; Snyder, Erik; Grady, James; Donaldson, Guy; Haney, Jay (Jay.Haney@icf.com); Charles R. "Chuck" Buttry (CButtry@trinityconsultants.com); 'Antici, Philip'; David Triplett (dtripl1@entergy.com)
Cc: Montgomery, William; McCorkle, Mark
Subject: RE: Independence County - DRR Source SO2 Modeling Discussion

Hello Ashley,

Thank you to you and Guy for helping us to keep this project moving forward. Attached are our responses to EPA's comments. Jay Haney (ICF Jones and Stokes) will be in contact with you to set up a conference call for the group to discuss the comments/responses and to provide EPA with an update.

Thank you again,

David

David W. Clark, M.S.

Epidemiologist

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From: McCorkle, Mark
Sent: Tuesday, October 11, 2016 3:34 PM
To: Mohr, Ashley
Cc: Snyder, Erik; Grady, James; Donaldson, Guy; Clark, David; Montgomery, William
Subject: RE: Independence County - DRR Source SO2 Modeling Discussion

Hi Ashley,

A draft response, prepared by David Clark, is under in-house review. We will send it shortly and set up a good time for a call. Thanks for your assistance in this. - Mark

From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Tuesday, October 11, 2016 1:34 PM
To: McCorkle, Mark
Cc: Snyder, Erik; Grady, James; Donaldson, Guy
Subject: Independence County - DRR Source SO2 Modeling Discussion

Mark,

Guy asked us to contact you to set up a time to discuss the comments we provided on September 29, 2016 on the modeling protocol for the Independence County SO2 modeling. Please let me know who should be included in this call and what days/times might be a good target. FYI – I am out of the office this upcoming Friday (10/14) and Monday (10/17).

Thanks,

Ashley

Ashley N.Q. Mohr
Environmental Scientist
Air Permits Section (6MM-AP)
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, TX 75202
(214) 665-7289
FAX (214) 665-6762
mohr.ashley@epa.gov

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To: vennetta.hayes@la.gov[vennetta.hayes@la.gov]
Cc: Mohr, Ashley[Mohr.Ashley@epa.gov]; Snyder, Erik[snyder.erik@epa.gov]; Feldman, Michael[Feldman.Michael@epa.gov]
From: Imhoff, Robert
Sent: Wed 10/12/2016 12:12:05 PM
Subject: RE: Greater Baton Rouge SO2 Stakeholders Group: Monitor Siting Analysis Modeling Report

Hi Vennetta,

I know you just got back and are probably loaded up but could you post the modeling files for the Sid Richardson DRR monitor siting?

Thanks,

Bob

From: Vennetta Hayes [mailto:Vennetta.Hayes@LA.GOV]
Sent: Wednesday, October 05, 2016 9:51 AM
To: Verhalen, Frances <verhalen.frances@epa.gov>; Donaldson, Guy <Donaldson.Guy@epa.gov>
Cc: Mohr, Ashley <Mohr.Ashley@epa.gov>; Snyder, Erik <snyder.erik@epa.gov>; Feldman, Michael <Feldman.Michael@epa.gov>; Imhoff, Robert <imhoff.robert@epa.gov>
Subject: FW: Greater Baton Rouge SO2 Stakeholders Group: Monitor Siting Analysis Modeling Report

I have attached the report for the siting of the monitor near Sid Richardson. I will forward the modeling files when I get back to the office.

Vennetta T. Hayes
LDEQ Air Permits
219-3412

To: Mohr, Ashley[Mohr.Ashley@epa.gov]
From: Clark, David
Sent: Tue 9/20/2016 5:52:24 PM
Subject: RE: SO2 Designations Modeling Question ?

Thank you again Ashley. We are confident that the facility's emissions will allow for a conservative approach, thus our thought on using the highest hourly concentration. Also that they would be values that required the least amount of work was an additional benefit. Our thought process was that if we used the highest hourly concentration, mathematically there could not be any way to produce higher value(s) – thus the most conservative approach and it's the least time consuming to format. However, with the response from HQ, it seems that this approach may now be more work compared to using the DVs.

We are trying to wrap our heads around the idea that the highest hourly concentration approach generates concerns regarding data gap issues and requires supporting analyses but the DV approach would not be prone to this same concern. Is it possible to get an explanation of why this would be the case?

David

David W. Clark, M.S.

Epidemiologist

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From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Tuesday, September 20, 2016 10:08 AM
To: Clark, David
Subject: RE: SO2 Designations Modeling Question ?

David,

I was able to check with HQs on this issue, and they echoed that using the more conservative approach shouldn't be an issue. But they did want some additional information on why the more conservative approach is being used just to ensure there are no data gap issues for the chosen monitor. Also, it would be helpful as part of the analysis to include a comparison of the actual value used and the DV, which would lend itself to supporting the fact that the approach is conservative.

Feel free to provide additional information regarding why this approach is being chosen via email response or give me a call if it's easier to discussion.

Thanks,

Ashley

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From: Clark, David [mailto:CLARKD@adeq.state.ar.us]
Sent: Tuesday, September 20, 2016 9:56 AM
To: Mohr, Ashley <Mohr.Ashley@epa.gov>
Subject: RE: SO2 Designations Modeling Question ?

Thank you for the response Ashley. We recognize the data needs to be from the latest 3-year period and we do intend to emphasize the conservatism of our approach.

Thank you again,

David

David W. Clark, M.S.

Epidemiologist

Air Division – Planning & Air Quality Analysis Branch
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From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Monday, September 19, 2016 3:37 PM
To: Clark, David; Snyder, Erik
Subject: RE: SO2 Designations Modeling Question ?

David,

Not sure if Erik has had an opportunity to provide a direct response, but I thought I would weigh-in. I do not see any issue in using the highest hourly concentration instead of using the design value. I would encourage ADEQ to clearly note that this approach is being used, as well as, a statement regarding the conservatism of this approach. That said, I did want to clarify that the Modeling TAD (draft document dated August 2016) recommends "… a less conservative "first tier" approach for a uniform monitored background concentration based on the monitored design values for the **latest 3-year period**, regardless of the years of meteorological data used in the modeling. " Therefore, consistent with the TAD one should be looking at the most recent air monitoring data to determine the background concentration and not necessarily the 3 years being modeled. Of course, in many cases these are the same since the most recent meteorological/emissions data are being used, but I at least wanted to provide that clarification.

Link to Modeling TAD → https://www.epa.gov/sites/production/files/2016-06/documents/so2modelingtad.pdf

Erik may provide additional information/feedback, but I at least wanted to get you a response. I can also check with our SO2 modeling contact to confirm and let you know if they have any additional feedback.

Thanks,

Ashley

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From: Clark, David [mailto:CLARKD@adeq.state.ar.us]
Sent: Friday, September 16, 2016 12:52 PM
To: Mohr, Ashley <Mohr.Ashley@epa.gov>; Snyder, Erik <snyder.erik@epa.gov>
Subject: SO2 Designations Modeling Question ?

Eric & Ashley,

My question is regarding AERMOD modeling per the Modeling TAD and the August 23, 2010 clarification memo (Applicability of Appendix W Modeling Guidance for the 1-hour SO2 NAAQS) for the 2010 SO2 NAAQS. For Background Concentrations the TAD discusses (p 29) the approach of adding the overall highest hourly concentration from the monitor "that could be overly conservative". Then the TAD also "recommends" the less conservative approach of using monitored design values for the three year period being modeled. If the facility's emissions are low enough that we wanted to use the first approach "that could be overly conservative" of adding the highest hourly concentration from the three year period being modeled, would this be acceptable for the model run that would be submitted to EPA as support for our designation recommendation?

Thank you in advance for any information and if you need to discuss this, feel free to contact me.

David

David W. Clark, M.S.

Epidemiologist

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To: Mohr, Ashley[Mohr.Ashley@epa.gov]
From: Clark, David
Sent: Tue 9/20/2016 2:55:43 PM
Subject: RE: SO2 Designations Modeling Question ?

Thank you for the response Ashley. We recognize the data needs to be from the latest 3-year period and we do intend to emphasize the conservatism of our approach.

Thank you again,

David

David W. Clark, M.S.

Epidemiologist

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From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Monday, September 19, 2016 3:37 PM
To: Clark, David; Snyder, Erik
Subject: RE: SO2 Designations Modeling Question ?

David,

Not sure if Erik has had an opportunity to provide a direct response, but I thought I would weigh-in. I do not see any issue in using the highest hourly concentration instead of using the design value. I would encourage ADEQ to clearly note that this approach is being used, as well as, a statement regarding the conservatism of this approach. That said, I did want to clarify that the Modeling TAD (draft document dated August 2016) recommends "… a less conservative "first tier" approach for a uniform monitored background concentration based on the monitored design values for the **latest 3-year period**, regardless of the years of meteorological data used in the modeling. " Therefore, consistent with the TAD one should be looking at the most recent air monitoring data to determine the background concentration and not necessarily the 3 years being modeled. Of course, in many cases these are the same since the most recent meteorological/emissions data are being used, but I at least wanted to provide that clarification.

Link to Modeling TAD → https://www.epa.gov/sites/production/files/2016-06/documents/so2modelingtad.pdf

Erik may provide additional information/feedback, but I at least wanted to get you a response. I can also check with our SO2 modeling contact to confirm and let you know if they have any additional feedback.

Thanks,

Ashley

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From: Clark, David [mailto:CLARKD@adeq.state.ar.us]
Sent: Friday, September 16, 2016 12:52 PM
To: Mohr, Ashley <Mohr.Ashley@epa.gov>; Snyder, Erik <snyder.erik@epa.gov>
Subject: SO2 Designations Modeling Question ?

Eric & Ashley,

My question is regarding AERMOD modeling per the Modeling TAD and the August 23, 2010 clarification memo (Applicability of Appendix W Modeling Guidance for the 1-hour SO2 NAAQS) for the 2010 SO2 NAAQS. For Background Concentrations the TAD discusses (p 29) the approach of adding the overall highest hourly concentration from the monitor "that could be overly conservative". Then the TAD also "recommends" the less conservative approach of using monitored design values for the three year period being modeled. If the facility's emissions are low enough that we wanted to use the first approach "that could be overly conservative" of adding the highest hourly concentration from the three year period being modeled, would this be acceptable for the model run that would be submitted to EPA as support for our designation recommendation?

Thank you in advance for any information and if you need to discuss this, feel free to contact me.

David

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To: Mohr, Ashley[Mohr.Ashley@epa.gov]
Cc: McCorkle, Mark[MAC@adeq.state.ar.us]
From: Clark, David
Sent: Mon 8/15/2016 8:46:42 PM
Subject: RE: Model Clearing House Adj_U* request

Ashley,

Wonderful. I'm blocking off calendars & setting up a room on our end.

We are seeking details to be sure we provide everything that is needed as the timeframe is shrinking quickly and time will likely only give us one opportunity to get this accomplished.

One item that we have discussed is that it is FutureFuel's location and emissions that are affected by the high complex terrain and not Entergy's so we have discussed only including FutureFuel in the sensitivity analysis or including emissions from both facilities.

We have also discussed just doing the sensitivity analysis as step 1 and after MCH approval to employ ADJ_U* then step 2 were we would conduct the actual run that includes both facilities that would then be submitted to EPA along with a re-designation request or to just do it all in 1 step with both facilities (ADJ_U* on & ADJ_U* off) that would have both the sensitivity analysis data to evaluate the effects of employing ADJ_U* and also have all of the data required by the DRR and modeling TAD to be also considered as the re-designation request. So in short, we have been discussing a 2 step effort or a 1 step effort on our behalf to accomplish the sensitivity analysis and the designation request.

Talk to you Thursday,

David

David W. Clark, M.S.

Epidemiologist

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From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Monday, August 15, 2016 3:25 PM
To: Clark, David
Subject: RE: Model Clearing House Adj_U* request

Thank you David. I have sent out an internal meeting invite to block off EPA folks' calendars. I will pass along the call-in details to everyone here, too. Please feel free to provide any additional information or call related materials in advance of Thursday. Otherwise, we will talk to you then!

Thanks,

Ashley

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From: Clark, David [mailto:CLARKD@adeq.state.ar.us]

Sent: Monday, August 15, 2016 3:26 PM
To: Mohr, Ashley <Mohr.Ashley@epa.gov>
Subject: RE: Model Clearing House Adj_U* request

Here is ours we can use: 1 877 411-9748; Access: Ex. 6 - Personal Privacy

David

David W. Clark, M.S.

Epidemiologist

Air Division – Planning & Air Quality Analysis Branch
Arkansas Department of Environmental Quality

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From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Monday, August 15, 2016 3:20 PM
To: Clark, David
Cc: McCorkle, Mark
Subject: RE: Model Clearing House Adj_U* request

If you have a call-in handy that would work. Otherwise, I will need to coordinate to get one here

since I do not have one assigned directly to me.

Thanks,

Ashley

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From: Clark, David [mailto:CLARKD@adeq.state.ar.us]
Sent: Monday, August 15, 2016 3:11 PM
To: Mohr, Ashley <Mohr.Ashley@epa.gov>
Cc: McCorkle, Mark <MAC@adeq.state.ar.us>
Subject: RE: Model Clearing House Adj_U* request

Thank you for your efforts Ashley. Yes, 3 PM Central on Thursday August 18 will work. Would you like to us an EPA or ADEQ call in number?

David

David W. Clark, M.S.

Epidemiologist

Air Division – Planning & Air Quality Analysis Branch
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From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Monday, August 15, 2016 3:04 PM
To: Clark, David
Subject: RE: Model Clearing House Adj_U* request

David,

I am trying to coordinate schedules for the requested call later this week. Thursday (8/18) is the preferred day, but I am having trouble lining up a full hour for a call with the exception of a 3 PM (central) start time. Let me know if this time is acceptable.

Thanks,

Ashley

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From: Clark, David [mailto:CLARKD@adeq.state.ar.us]
Sent: Wednesday, August 10, 2016 9:26 AM
To: Donaldson, Guy <Donaldson.Guy@epa.gov>
Cc: Mohr, Ashley <Mohr.Ashley@epa.gov>; Bridgers, George <Bridgers.George@epa.gov>;

Imhoff, Robert <imhoff.robert@epa.gov>; McCorkle, Mark <MAC@adeq.state.ar.us>
Subject: RE: Model Clearing House Adj_U* request

Hello Guy, George & Others,

Regarding the need for ADEQ to provide additional data for Model Clearinghouse consideration of our ADJ_U* request, we would like to set up a call (involving: R6, MCH, ADEQ, Entergy, FutureFuel & consultants) so we can be sure we understand the details of what is needed to be able to recommend a SO2 attainment designation by the rapidly approaching deadline of January 13, 2017. Would you please see if your calendars are open next Wednesday or Thursday (August 17th or 18th) any time from 10am--3pm (CST) to accommodate the three time zones that would be involved in this call?

Thank you in advance for your efforts,

David

David W. Clark, M.S.

Epidemiologist

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From: Imhoff, Robert [mailto:imhoff.robert@usepa.onmicrosoft.com]
Sent: Thursday, July 14, 2016 2:22 PM
To: Clark, David
Cc: Donaldson, Guy; Mohr, Ashley
Subject: Model Clearing House Adj_U* request

David,

I enjoyed meeting you on the phone today and this is to follow up with where we can go from here on your Adj_U* application. Ashely Mohr and I talked with George Bridgers on the Adj. U* issues today to get a path forward. Based on the information, it looks like to get a MCH concurrence we will need additional information. This information is necessary to establish a firm link between the science on which Adj_U* option is based and the individual source/receptor situation of an application. This is to make sure an approval is legally defensible and should include an assessment of modeled concentrations with and without the beta option. Specifically including an evaluation of the locations of the receptors where significant change occur (to confirm that it is an elevated terrain issues) and what the change in the actual u* value was when concentrations were reduced using the beta option (to confirm that the adjustment via the beta option is the reason for the concentration reductions). The Region 1 and 3 approvals provide examples of the type of assessment and evaluation needed and are available on MCH website at the links below.

Tall stacks in complex terrain:

Region 1 -
http://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=16-I-01

Region 3 -
http://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=16-III-01

Fugitive releases:

Region 10 -
http://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=16-X-01

You may elect to submit an unsolicited amendment to your current application to the MCH with additional information if you choose. Based on what George told us today he is unlikely to be able to approve your current application without the additional supporting sensitivity study. Please let us know if you have any additional questions or concerns.

Best regards,

Bob

Robert Imhoff

Environmental Engineer

U.S. EPA Region 6

1445 Ross Ave

Dallas TX 75202

Ph: (214) 665 7262

Email: Imhoff.Robert@epa.gov

To: Mohr, Ashley[Mohr.Ashley@epa.gov]
From: Clark, David
Sent: Mon 8/15/2016 8:25:57 PM
Subject: RE: Model Clearing House Adj_U* request

Here is ours we can use: 1 877 411-9748; Access: Ex. 6 - Personal Privacy

David

David W. Clark, M.S.

Epidemiologist

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From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Monday, August 15, 2016 3:20 PM
To: Clark, David
Cc: McCorkle, Mark
Subject: RE: Model Clearing House Adj_U* request

If you have a call-in handy that would work. Otherwise, I will need to coordinate to get one here since I do not have one assigned directly to me.

Thanks,

Ashley

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From: Clark, David [mailto:CLARKD@adeq.state.ar.us]
Sent: Monday, August 15, 2016 3:11 PM
To: Mohr, Ashley <Mohr.Ashley@epa.gov>
Cc: McCorkle, Mark <MAC@adeq.state.ar.us>
Subject: RE: Model Clearing House Adj_U* request

Thank you for your efforts Ashley. Yes, 3 PM Central on Thursday August 18 will work. Would you like to us an EPA or ADEQ call in number?

David

David W. Clark, M.S.

Epidemiologist

Air Division – Planning & Air Quality Analysis Branch
Arkansas Department of Environmental Quality

5301 Northshore Drive

North Little Rock, AR. 72118

U.S.A.

Voice: 501 682-0070

Fax: 501 682-0753

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From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Monday, August 15, 2016 3:04 PM
To: Clark, David
Subject: RE: Model Clearing House Adj_U* request

David,

I am trying to coordinate schedules for the requested call later this week. Thursday (8/18) is the preferred day, but I am having trouble lining up a full hour for a call with the exception of a 3 PM (central) start time. Let me know if this time is acceptable.

Thanks,

Ashley

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From: Clark, David [mailto:CLARKD@adeq.state.ar.us]
Sent: Wednesday, August 10, 2016 9:26 AM
To: Donaldson, Guy <Donaldson.Guy@epa.gov>
Cc: Mohr, Ashley <Mohr.Ashley@epa.gov>; Bridgers, George <Bridgers.George@epa.gov>; Imhoff, Robert <imhoff.robert@epa.gov>; McCorkle, Mark <MAC@adeq.state.ar.us>

Subject: RE: Model Clearing House Adj_U* request

Hello Guy, George & Others,

Regarding the need for ADEQ to provide additional data for Model Clearinghouse consideration of our ADJ_U* request, we would like to set up a call (involving: R6, MCH, ADEQ, Entergy, FutureFuel & consultants) so we can be sure we understand the details of what is needed to be able to recommend a SO2 attainment designation by the rapidly approaching deadline of January 13, 2017. Would you please see if your calendars are open next Wednesday or Thursday (August 17th or 18th) any time from 10am--3pm (CST) to accommodate the three time zones that would be involved in this call?

Thank you in advance for your efforts,

David

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From: Imhoff, Robert [mailto:imhoff.robert@usepa.onmicrosoft.com]

Sent: Thursday, July 14, 2016 2:22 PM
To: Clark, David
Cc: Donaldson, Guy; Mohr, Ashley
Subject: Model Clearing House Adj_U* request

David,

I enjoyed meeting you on the phone today and this is to follow up with where we can go from here on your Adj_U* application. Ashely Mohr and I talked with George Bridgers on the Adj. U* issues today to get a path forward. Based on the information, it looks like to get a MCH concurrence we will need additional information. This information is necessary to establish a firm link between the science on which Adj_U* option is based and the individual source/receptor situation of an application. This is to make sure an approval is legally defensible and should include an assessment of modeled concentrations with and without the beta option. Specifically including an evaluation of the locations of the receptors where significant change occur (to confirm that it is an elevated terrain issues) and what the change in the actual u* value was when concentrations were reduced using the beta option (to confirm that the adjustment via the beta option is the reason for the concentration reductions). The Region 1 and 3 approvals provide examples of the type of assessment and evaluation needed and are available on MCH website at the links below.

Tall stacks in complex terrain:

Region 1 -
http://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=16-I-01

Region 3 -
http://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=16-III-01

Fugitive releases:

Region 10 -
http://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=16-X-01

You may elect to submit an unsolicited amendment to your current application to the MCH with additional information if you choose. Based on what George told us today he is unlikely to be able to approve your current application without the additional supporting sensitivity study. Please let us know if you have any additional questions or concerns.

Best regards,

Bob

Robert Imhoff

Environmental Engineer

U.S. EPA Region 6

1445 Ross Ave

Dallas TX 75202

Ph: (214) 665 7262

Email: Imhoff.Robert@epa.gov

To: Mohr, Ashley[Mohr.Ashley@epa.gov]
Cc: McCorkle, Mark[MAC@adeq.state.ar.us]
From: Clark, David
Sent: Mon 8/15/2016 8:10:36 PM
Subject: RE: Model Clearing House Adj_U* request

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Cc: Donaldson, Guy; Mohr, Ashley
Subject: Model Clearing House Adj_U* request

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Fugitive releases:

Region 10 - http://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=16-X-01

You may elect to submit an unsolicited amendment to your current application to the MCH with additional information if you choose. Based on what George told us today he is unlikely to be able to approve your current application without the additional supporting sensitivity study. Please let us know if you have any additional questions or concerns.

Best regards,

Bob

Robert Imhoff

Environmental Engineer

U.S. EPA Region 6

1445 Ross Ave

Dallas TX 75202

Ph: (214) 665 7262

Email: Imhoff.Robert@epa.gov

To: Mohr, Ashley[Mohr.Ashley@epa.gov]
From: Yvette Olmos
Sent: Tue 7/5/2016 1:38:04 PM
Subject: RE:

Thank you, appreciate it.

I hope that you had a great 4th of July!!.

From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Friday, July 01, 2016 7:48 AM
To: Yvette Olmos
Cc: Cox, Kyndall
Subject: RE:

No problem.

As an update on the protocols:

Sundrop – ARM2 approval and concurrence memos have been drafted and are under review by HQs. They were sent up last week, and I was told that they would try to look at them this week. Hope to have a response sometime next week on this one. Will keep you updated.

Eurochem – Kyndall is taking the lead on review of the ARM2 portion, and I am working on Adjusted U* review. We need additional coordination with HQs on the Adjusted U* portion since it will be our first approval in the region. I am in the queue with HQs to have a call on Adjusted U* issues (we currently have 4 protocols in house using this beta option). HQs is still focused on final Appendix W rulemaking so we are experiencing some delays setting up conference calls. Will keep you updated on progress.

Meanwhile, I would suggest you and the applicant take a look at the most recent MCH approval/concurrence for Adjusted U*. It looks like Eurochem is using the same approval methodology (Option 2 for alternate model approval), but I did not see any site specific analysis/evaluation regarding the difference between with and without Adjusted U* within their modeling protocol. Might be an area where the applicant could provide additional justification.

This is one of the items I plan to discuss with HQs and will have more guidance on the level of analysis needed but wanted to go ahead to pass along so that the applicant could take a look.

https://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=16-III-01

if I don't talk to you again this week, have a nice holiday!

Thanks,

Ashley

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From: Yvette Olmos [mailto:Yvette.McGeheeOlmos@LA.GOV]
Sent: Thursday, June 30, 2016 7:36 AM
To: Mohr, Ashley <Mohr.Ashley@epa.gov>
Subject: RE:

No don't look for it, I know y'all are busy, if you run across it send it if not don't worry about it. I do have a couple of protocols in to you so those would be more important if you get a minute. Thank you for such a quick response, I know it was kind of a random question.

Thanks,

Yvette

From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Wednesday, June 29, 2016 3:42 PM
To: Yvette Olmos
Subject: RE:

I think you are referencing the annualized emissions approach described in the guidance for intermittent sources. This guidance was developed specifically for the more recent 1-hour NO2 and SO2 NAAQS taking into account the probabilistic form of those standards. Therefore, it wouldn't apply for the older standards, like CO. I thought there was a specific statement to this point in the guidance, but I haven't been able to find it as of this afternoon. I didn't want to further delay getting back to you. Let me know if you need additional information or would like me to provide the reference. It might not be until next week that I can provide since I am out of the office tomorrow.

Thanks,

Ashley

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From: Yvette Olmos [mailto:Yvette.McGeheeOlmos@LA.GOV]
Sent: Monday, June 27, 2016 2:13 PM
To: Mohr, Ashley <Mohr.Ashley@epa.gov>
Subject:

In the past when we have a source for NOx 1 hour that has a flare operating in susd mode for less than 500hrs. we have annualized the emissions and added them to the max. normal operation emissions to demonstrate compliance. Would this be allowed for CO as well?

To: Mohr, Ashley[Mohr.Ashley@epa.gov]
Cc: Snyder, Erik[snyder.erik@epa.gov]; Kordzi, Stephanie[Kordzi.Stephanie@epa.gov]; Robinson, Jeffrey[Robinson.Jeffrey@epa.gov]; Daniel Jamieson[daniel.jamieson@tceq.texas.gov]
From: Ahmed Omar
Sent: Fri 6/17/2016 6:46:32 PM
Subject: Second Modeling Protocol - 6056 Motiva Enterprises LLC
Second Modeling Protocol - 6056 Motiva Enterprises LLC.docx
Motiva PA Model Protocol Audit Response.pdf

Ashley

Attached are the revised modeling protocol submitted by Motiva Enterprises LLC (permit No. 6056) and TCEQ comments on the revised modeling protocol.

Please let me know if you have any question.

Thanks,

Ahmed Omar

TCEQ, Air Permits Division

Air Dispersion Modeling Team

Ahmed.Omar@tceq.texas.gov

(512)-239-1285

411 North Sam Houston Parkway East, Suite 400, Houston, Texas 77060, USA
T +1 281 448-6188 **F** +1 281 448-6189 **W** www.rpsgroup.com

June 6, 2016

Sean O'Brien
Texas Commission on Environmental Quality
Air Permits Division (MC 163)
Office of Air
P.O. Box 13087
Austin, TX 78711-3087

Re: **Modeling Protocol Audit Response**
Amendment of TCEQ Air Permit Nos. 6056 & 8404
Motiva Enterprises LLC Port Arthur Refinery
Naphtha Growth Project & C9 Splitter
Regulated Entity Number: RN100209451
Customer Reference Number: CN600124051

Dear Mr. O'Brien:

On behalf of Motiva Enterprises LLC (Motiva), RPS is submitting the enclosed response to the modeling protocol audit comments from the TCEQ. This is in support of the above-referenced permit amendment for its refinery in Port Arthur, Texas that is subject to Prevention of Significant Deterioration (PSD) review.

The modeling results will demonstrate that the proposed project will be in compliance with the applicable NAAQS, PSD Increments, TCEQ State Property Line standards, and TCEQ health effects guidelines.

If you should have any questions concerning the enclosed response to the modeling protocol audit comments, please feel free to call me at (832) 239-8030 or Ms. Laurie Carpenter with Motiva at (409) 989-7449.

Sincerely,

RPS

Alan Ideris
Consultant

Enclosure

cc: Ms. Sarah Kirksey, Air Section Manager, TCEQ Region 10, Beaumont, TX
Mr. Erik Snyder, U.S. EPA, Region VI, Dallas, TX
(electronic copy: snyder.erik@epa.gov)
Ms. Laurie Carpenter, Environment Air Specialist, Motiva, Port Arthur, TX

411 N. Sam Houston Parkway E., Suite 400, Houston, Texas 77060-3545 USA
T +1 281 448 6188 **F** +1 281 488 6189 **W** www.rpsgroup.com

Modeling Protocol Audit Response for Amendment of TCEQ Air Permit Nos. 6056 & 8404 Naphtha Growth Project & C9 Splitter

MOTIVA ENTERPRISES LLC

Port Arthur Refinery
Port Arthur, Jefferson County
RN100209451
CN600124051

June 2016

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Appendix B Modeling Files CD

ED_001261_00097115

Section 5
Modeling Emissions Inventory

5.7 Annualization of Intermittent Emissions

Original Submittal:

Since planned MSS emissions from two of the project heaters will only take place a maximum 168 hours per year for both heaters combined, these emissions are very infrequent and would not be expected to significantly contribute to the annual distribution of daily maximum 1-hour NO_2 or SO_2 concentrations. Therefore, the maximum hourly emission rate will be multiplied by 168/8760. Per EPA guidance, this approach accounts for the potential worst-case meteorological conditions associated with the MSS heater emissions, while the use of the average hourly emission rate represents a simple approach to account for the probability of the MSS heater emissions taking place for a given hour (*Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard, March 1, 2011*). The hourly average emission rates will not be used for any other short-term averaging times and pollutants, including the SO_2 State Property Line analysis.

TCEQ Comment:

"The protocol lists the expected hours per year for planned MSS activities to support the use of intermittent guidance. However, it is not clear from the information provided with the protocol that the MSS activities qualify as intermittent sources. Please indicate how often (e.g., the number of times per month, week, or day) the sources are expected to be operated, the duration of each event, and whether the two heaters can operate simultaneously prior to submitting the AQA."

Motiva Response:

Planned MSS for each of the two project heaters will take place for up to 7 days (up to 24 hours a day) combined. The two heaters may or may not operate simultaneously while the MSS activity is being performed. If they do not operate simultaneously, they could be operating up to 7 days total during the MSS activity for a total of 168 hours in a year. Since the heaters will only operate up to 7 days in a year in MSS mode, these emissions are very infrequent, and would

not be expected to significantly contribute to the annual distribution of daily maximum 1-hour NO_2 or SO_2 concentrations.

Section 6
Models Proposed and Modeling Techniques

6.5 Meteorological Data

Original Submittal:

The meteorological data to be used in the models includes observed hourly wind speed, wind direction, temperature and numerous other parameters. This data is used, along with other inputs, by the models to determine the dispersion of the emissions from sources in the model input.

AERMOD requires input from a preprocessor (AERMET) that organizes and processes meteorological data and estimates the necessary boundary layer parameters for dispersion calculations. Several parameters are used to describe the character of the modeled domain, including surface roughness length, albedo and Bowen ratio. These parameters are incorporated into the surface meteorological data set used by AERMOD.

The meteorological data to be used in the modeling was processed specifically for the Motiva Facility and was processed using AERMET v15181. The data and various options used in generating the meteorological files are summarized below.

Surface data files and one-minute automated surface observing systems (ASOS) data files were obtained from the National Climatic Data Center (NCDC), while upper air data was obtained from the National Oceanic and Atmospheric Association (NOAA) Earth Systems Research Laboratory Radiosonde database.

- Surface data source: ..... ftp://ftp.ncdc.noaa.gov/pub/data/noaa/
- ASOS data source: .....ftp://ftp.ncdc.noaa.gov/pub/data/asos-onemin/
- Upper air data source: .....http://esrl.noaa.gov/raobs/

The data files downloaded were for the most recent quality controlled years (2010, 2011, 2012, 2013, and 2014)

The surface station data was from Beaumont-Port Arthur (BPT, ID #12917) and upper air data was from Lake Charles, Louisiana (LCH, ID #03937), the stations closest to the site.

A time correction of +6 hours was used for both the surface files and upper air files to correct from GMT to CST. The threshold wind speed of 0.5 m/s was used within AERMINUTE to define winds less than 0.5 m/s as calm.

The EPA's AERSURFACE preprocessor was used to derive the surface characteristics (albedo, bowen ratio, and surface roughness) specific to the site. As discussed in the EPA's AERSURFACE User's Guide (EPA-454/B-08-001), the surface roughness is related to the height of obstacles to the wind flow and is, in principle, the height at which the mean horizontal wind speed is zero based on a logarithmic profile. The surface roughness length influences the surface shear stress and is an important factor in determining the magnitude of mechanical turbulence and the stability of the boundary layer. AERSURFACE utilizes land use data available from the 1992 National Land Cover Data (NLCD). A 1km radius, the default, was used to determine the appropriate surface roughness value.

AERSURFACE was performed with the following inputs consistent with guidance given in the AERMOD Implementation Guide (March 19, 2009):

- The location used was the site: 406,735.1 meters East and 3,306,588.5 meters North;
- The datum used was NAD83 and the terrain data was from "texas_southeast.tif";
- There is not continuous snow cover for one or more months at the site;
- The site is not an airport;
- The site is not in a desert area; therefore the selection of not arid was made; and
- The classification for surface moisture was average for 2012 and dry for 2010, 2011, 2013, and 2014 (for more information refer to the "KBPT Moisture Analysis.xlsx" spreadsheet in Appendix B).

The AERSURFACE results for average surface moisture are included below:

```
** Generated by AERSURFACE, dated 13016
** Generated from "C:\aersurface\data\texas_southeast.tif"
** Center UTM Easting (meters):    406735.1
** Center UTM Northing (meters):  3306588.5
** UTM Zone:  15    Datum: NAD83
** Study radius (km) for surface roughness:   1.0
** Airport? N, Continuous snow cover? N
** Surface moisture? Average, Arid region? N
** Month/Season assignments? Default
** Late autumn after frost and harvest, or winter with no snow: 12 1 2
** Winter with continuous snow on the ground: 0
** Transitional spring (partial green coverage, short annuals): 3 4 5
** Midsummer with lush vegetation: 6 7 8
** Autumn with unharvested cropland: 9 10 11
```

```
  FREQ_SECT  ANNUAL  1
  SECTOR   1    0  360
**                      Sect   Alb     Bo      Zo
  SITE_CHAR    1       1    0.16    0.48    0.223
```

And for dry surface moisture:

```
** Generated by AERSURFACE, dated 13016
** Generated from "C:\aersurface\data\texas_southeast.tif"
** Center UTM Easting (meters):    406735.1
** Center UTM Northing (meters):  3306588.5
** UTM Zone:  15    Datum: NAD83
** Study radius (km) for surface roughness:   1.0
** Airport? N, Continuous snow cover? N
** Surface moisture? Dry, Arid region? N
** Month/Season assignments? Default
** Late autumn after frost and harvest, or winter with no snow: 12 1 2
** Winter with continuous snow on the ground: 0
** Transitional spring (partial green coverage, short annuals): 3 4 5
** Midsummer with lush vegetation: 6 7 8
** Autumn with unharvested cropland: 9 10 11


  FREQ_SECT  ANNUAL  1
  SECTOR   1    0  360
**                      Sect   Alb     Bo      Zo
  SITE_CHAR    1       1    0.16    0.92    0.223
```

The modeling analysis will use a profile base elevation of 4.9 meters, which is the elevation that is recommended by TCEQ for Jefferson County per the “counties.xls” spreadsheet located at the following web address: http://www.tceq.texas.gov/permitting/air/modeling/aermod-datasets.html

The five years of meteorological data have been concatenated together to form one file to use in the following model runs:

- 1-hour NO_2 NAAQS;
- 1-hour and 8-hour CO NAAQS;
- 24-hour PM_{10} NAAQS/Increment;
- 24-hour and Annual $PM_{2.5}$ NAAQS;
- 24-hour $PM_{2.5}$ Increment (special processing disabled);
- 1-hour SO_2 NAAQS;
- 3-hour SO_2 NAAQS/Increment; and
- 24-hour SO_2 NAAQS/Increment.

The individual five years of meteorological data will be used in the following model runs:

- Annual NO_2 NAAQS/Increment;

- Annual PM_{10} Increment;
- Annual $PM_{2.5}$ Increment; and
- Annual SO_2 NAAQS/Increment.

The 2012 meteorological data set will be used in the modeling for the 1-hour SO_2 and H_2S State Property Line analyses and for each of the constituents in the health effects analysis.

The AERSURFACE input and output files, raw meteorological data (surface, upper air, and ASOS data files), and the five years of processed meteorological data to be used in the modeling are included on the CD in Appendix B.

TCEQ Comment:

"The period used to calculate whether the year is classified as dry, average, or moist did not include the most recent 30 years. The AERSURFACE user guide states: 'The surface moisture condition can be determined by comparing precipitation for the period of data to be processed to the 30-year climatological record, selecting "wet" conditions if precipitation is in the upper 30th-percentile, "dry" conditions if precipitation is in the lower 30th-percentile, and "average" conditions if precipitation is in the middle 40th-percentile.'

The surface moisture analysis should be re-evaluated following this guidance, using the most recent 30-year climatological record. Before submitting the AQA, please update this analysis, and subsequently, the AERSURFACE analysis and associated processed meteorological files."

Motiva Response:

The surface moisture analysis was re-evaluated using the most recent 30-year climatological record. The updated moisture analysis yielded the following revised input into AERSURFACE:

- The classification for surface moisture was average for 2012 and 2013 and dry for 2010, 2011, and 2014 (for more information refer to the "KBPT Moisture Analysis.xlsx" spreadsheet in Appendix B).

Compared to the previous surface moisture analysis, it was determined that 2013 was now classified as average instead of dry. Consequently, the AERSURFACE run and meteorological data for 2013 was reprocessed to reflect the change to average moisture. Please see the files in Appendix B for the revised meteorological files (the original protocol modeling files contain an AERSURFACE run with average moisture).

Appendix B

Modeling Files CD

June 17, 2016

Subject: Motiva Enterprises LLC Air Quality Analysis Protocol

On May 17, 2016, the Air Dispersion Modeling Team (ADMT) sent comments via e-mail to the applicant regarding the Prevention of Significant Deterioration (PSD) Air Quality Analysis (AQA) Protocol for Motiva Enterprises LLC located in Port Arthur, Jefferson County, Texas, dated March 2016. The applicant submitted responses to the ADMT comments, dated June 6, 2016. My comments related to the responses are provided below.

5.7 Annualization of Intermittent Emissions

Original ADMT Comment: The protocol lists the expected hours per year for planned MSS activities to support the use of intermittent guidance. However, it is not clear from the information provided with the protocol that the MSS activities qualify as intermittent sources. Please indicate how often (e.g., the number of times per month, week, or day) the sources are expected to be operated, the duration of each event, and whether the two heaters can operate simultaneously prior to submitting the AQA.

Applicant Response: Planned MSS for each of the two project heaters will take place for up to 7 days (up to 24 hours a day) combined. The two heaters may or may not operate simultaneously while the MSS activity is being performed. If they do not operate simultaneously, they could be operating up to 7 days total during the MSS activity for a total of 168 hours in a year. Since the heaters will only operate up to 7 days in a year in MSS mode, these emissions are very infrequent, and would not be expected to significantly contribute to the annual distribution of daily maximum 1-hour NO_2 or SO_2 concentrations.

ADMT Comment: The proposed approach looks to be reasonable based on the information provided with the response. The ADMT recommends that more information regarding the expected operation of each heater be provided with the AQA, and not just combined operations. For example, information such as how often each heater is expected to be operated, and the duration of each event for each heater.

6.5 Meteorological Data

Original ADMT Comment: The period used to calculate whether the year is classified as dry, average, or moist did not include the most recent 30 years. The AERSURFACE user guide states: "The surface moisture condition can be determined by comparing precipitation for the period of data to be processed to the 30-year climatological record, selecting "wet" conditions if precipitation is in the upper 30th-percentile, "dry" conditions if precipitation is in the lower 30th-percentile, and "average" conditions if precipitation is in the middle 40th-percentile."

The surface moisture analysis should be re-evaluated following this guidance, using

the most recent 30-year climatological record. Before submitting the AQA, please update this analysis, and subsequently, the AERSURFACE analysis and associated processed meteorological files.

Applicant Response: The surface moisture analysis was re-evaluated using the most recent 30-year climatological record. The updated moisture analysis yielded the following revised input into AERSURFACE:

- **The classification for surface moisture was average for 2012 and 2013 and dry for 2010, 2011, and 2014 (for more information refer to the "KBPT Moisture Analysis.xlsx" spreadsheet in Appendix B).**

Compared to the previous surface moisture analysis, it was determined that 2013 was now classified as average instead of dry. Consequently, the AERSURFACE run and meteorological data for 2013 was reprocessed to reflect the change to average moisture. Please see the files in Appendix B for the revised meteorological files (the original protocol modeling files contain an AERSURFACE run with average moisture).

ADMT Comment: The evaluation of the surface moisture is appropriate. Be sure to provide full documentation of the surface moisture analysis with the AQA.

If you have any questions, please contact Ahmed Omar at (512) 239-1285, by fax at (512) 239-1400, or by email at Ahmed.Omar@tceq.texas.gov.

To: Donaldson, Guy[Donaldson.Guy@epa.gov]
Cc: McCorkle, Mark[MAC@adeq.state.ar.us]; Mohr, Ashley[Mohr.Ashley@epa.gov]; Snyder, Erik[snyder.erik@epa.gov]
From: Clark, David
Sent: Tue 6/14/2016 1:44:22 PM
Subject: RE: EPA R6 & Model Clearinghouse Submittal - Arkansas SO2 NAAQS Independence County Designation

Hello Guy,

Has this request gone to HQ or do you have any other updates?

I will be out of the office for a week starting tomorrow, June 15 through Wednesday June 22, so during my absence please Cc Mark McCorkle on any new information you may have for us.

Thank you in advance,

David

David W. Clark, M.S.

Epidemiologist

Air Division – Planning & Air Quality Analysis Branch
Arkansas Department of Environmental Quality

5301 Northshore Drive

North Little Rock, AR. 72118

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Voice: 501 682-0070

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From: Donaldson, Guy [mailto:Donaldson.Guy@epa.gov]
Sent: Tuesday, May 24, 2016 5:05 PM
To: Clark, David
Cc: McCorkle, Mark; Mohr, Ashley; Snyder, Erik
Subject: RE: EPA R6 & Model Clearinghouse Submittal - Arkansas SO2 NAAQS Independence County Designation

David, I have checked in with our folks. Your request is being reviewed by Regional Staff. We expect that we will complete the Regional Review in the next 6-10 days and send to HQs. It is difficult to predict how long HQs review will take because there seems to be a large number of request going through the system. We will contact you when we have a better idea after we send it up.

From: Clark, David [mailto:CLARKD@adeq.state.ar.us]
Sent: Tuesday, May 24, 2016 11:59 AM
To: Donaldson, Guy
Cc: McCorkle, Mark; Mohr, Ashley; Snyder, Erik
Subject: RE: EPA R6 & Model Clearinghouse Submittal - Arkansas SO2 NAAQS Independence County Designation

Thank you Guy.

David W. Clark, M.S.

Epidemiologist

Air Division – Planning & Air Quality Analysis Branch
Arkansas Department of Environmental Quality

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From: Donaldson, Guy [mailto:Donaldson.Guy@epa.gov]
Sent: Tuesday, May 24, 2016 11:16 AM
To: Clark, David
Cc: McCorkle, Mark; Mohr, Ashley; Snyder, Erik
Subject: RE: EPA R6 & Model Clearinghouse Submittal - Arkansas SO2 NAAQS Independence County Designation

I am checking on the status.

From: Clark, David [mailto:CLARKD@adeq.state.ar.us]
Sent: Tuesday, May 24, 2016 8:40 AM
To: Donaldson, Guy
Cc: McCorkle, Mark
Subject: RE: EPA R6 & Model Clearinghouse Submittal - Arkansas SO2 NAAQS Independence County Designation

Good morning Guy,

I'm contacting to inquire about the status of the AERMOD protocol/Clearinghouse request we submitted as part of our SO2 designations work for Independence County. Do you know or could you please see where this stands?

Thank you in advance for any information,

David

David W. Clark, M.S.

Epidemiologist

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From: Clark, David
Sent: Friday, April 29, 2016 8:55 AM
To: 'Donaldson, Guy'; Snyder, Erik
Cc: McCorkle, Mark; Spencer, Stuart
Subject: RE: EPA R6 & Model Clearinghouse Submittal - Arkansas SO2 NAAQS Independence County Designation

Hello Guy & Erik,

Attached find a SO2 NAAQS designation AERMOD protocol/Clearinghouse request for Independence County, Arkansas that ADEQ is submitting in response to Ron Curry's February 11, 2016 letter to Arkansas' Governor Hutchinson (also attached) regarding the insufficient information for an Unclassifiable/Attainment SO2 NAAQS designation for Independence County. We have also sent this protocol/Clearinghouse request to both of you as a hardcopy document via postal mail.

David

David W. Clark, M.S.

Epidemiologist

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From: Donaldson, Guy [mailto:Donaldson.Guy@epa.gov]
Sent: Thursday, April 21, 2016 1:06 PM
To: Clark, David; Snyder, Erik
Cc: McCorkle, Mark
Subject: RE: EPA R6 & Model Clearinghouse Submittal - Arkansas SO2 NAAQS Independence County Designation

Thx for the heads up.

From: Clark, David [mailto:CLARKD@adeq.state.ar.us]
Sent: Thursday, April 21, 2016 9:26 AM
To: Donaldson, Guy; Snyder, Erik
Cc: McCorkle, Mark

Subject: EPA R6 & Model Clearinghouse Submittal - Arkansas SO2 NAAQS Independence County Designation

Good morning Guy & Erik,

I'm sending this correspondence as follow-up to Ron Curry's February 11, 2016 letter to Arkansas' Governor Hutchinson regarding the insufficient information for an Unclassifiable/Attainment SO2 NAAQS designation for Independence County, Arkansas and the stated opportunity for ADEQ to submit additional information. As you will recall, this letter prompted a February 29, 2016 phone conversation that included EPA R6, the Model Clearinghouse, ADEQ, FutureFuel Chemical Company (FutureFuel) and Entergy Arkansas Independence Steam Electrical Station (Entergy) where a combined FutureFuel/Entergy AERMOD dispersion analysis and a potential Model Clearinghouse submittal was discussed. From FutureFuel, ADEQ has received, reviewed and intends to forward to EPA R6 for consideration a modeling protocol and Clearinghouse request to employ ADJ_U* in a combined FutureFuel/Entergy AERMOD dispersion analysis.

This protocol/request is awaiting the signature of ADEQ's Office of Air Quality Associate Director, Stuart Spencer, who is out of the office this week at a conference and will return Monday April 25, 2016. With Stuart's return next week we anticipate forwarding this protocol/request to both of you for consideration and desired concurrence submittal to the Model Clearinghouse. Please accept this message as an update to keep you abreast of our progress with this endeavor and I will follow-up with both of you next week.

Thank you in advance for your assistance,

David

David W. Clark, M.S.

Epidemiologist

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To: Mohr, Ashley[Mohr.Ashley@epa.gov]
From: Yvette Olmos
Sent: Mon 6/13/2016 12:31:09 PM
Subject: RE: EuroChem (AI 197717) Modeling Protocol - revised 04-15-2016

I was wondering if you had a chance to look into this one yet?

From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Tuesday, April 26, 2016 8:33 AM
To: Yvette Olmos
Cc: Snyder, Erik; Cox, Kyndall
Subject: RE: EuroChem (AI 197717) Modeling Protocol - revised 04-15-2016

Yvette,

Thanks for sharing this information. Regarding timing, HQs has indicated that for ARM2 and Adj U* approvals a 2 to 3 week turnaround is anticipated (assuming all necessary information is provided by the applicant). Based on workload here in the Region (internal SO2 designation deadlines are looming), it will likely be early next week before I can devote a significant amount of time to review and really engage HQs on this one. I have already informed them of this request for ARM2 and Adj U* - so they are anticipating it. So, my best guess on timing is 3 to 4 weeks to turnaround the approval to allow for regional review and subsequent coordination with HQs. We will obviously try to move it more quickly if possible, but I also want to provide you with a realistic estimate.

As always, feel free to contact me to check on the status or with any other questions that come up. I will let you know if I identify in additional data needs for the request and if we encounter any additional delays in our review.

Side note – we did submit the Model Clearinghouse request documents to HQs this week for the other Louisiana facility for their final review. I will keep you updated as I hear back from them regarding their review and timing of final approval.

Thanks,

Ashley

THE POSITIONS or VIEWS CONTAINED IN THIS EMAIL DO NOT REPRESENT OFFICIAL EPA POLICY.

From: Yvette Olmos [mailto:Yvette.McGeheeOlmos@LA.GOV]
Sent: Tuesday, April 26, 2016 7:58 AM
To: Mohr, Ashley <Mohr.Ashley@epa.gov>
Subject: FW: EuroChem (AI 197717) Modeling Protocol - revised 04-15-2016

I need a review of ADJ_u* starting on page 6.

Also a review of ARM2 justification

I am sending the full protocol however the part I need a preapproval of starts on pg. 6.

The ARM2 protocol I sent you already and I believe EPA is sent a hard copy of the modeling protocol, however I figure it would be easier to have both documents together and with the request so I am attaching both again.

We need approval on both of these technically before they start modeling so if you can give me an estimate as best you can so the company can schedule the work. I know you have to contact OAQPS with this and it will take some time.

Thank you,

Yvette

From: Brian Glover [mailto:bglover@ramboll.com]
Sent: Friday, April 15, 2016 5:28 PM
To: Yvette Olmos

Cc: Bliss Higgins; Fran Prawiro; Melati Tessier
Subject: EuroChem (AI 197717) Modeling Protocol - revised 04-15-2016

Yvette,

As discussed in our recent meeting, EuroChem is preparing to update the initial Title V and PSD application submitted in September 2015 for their proposed fertilizer plant. The updated application will include a revised Air Quality Impacts Analysis (AQIA). Please see attached the modeling protocol in support of the revised AQIA. Please let us know if you have any comments or if you can approve.

Thanks,

Brian

Brian Glover

Principal

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June 9, 2016

Subject: Lyondell Chemical Company Air Dispersion Modeling Protocol

I have reviewed the Prevention of Significant Deterioration (PSD) Air Dispersion Modeling Protocol for Lyondell Chemical Company located in Channelview, Harris County, Texas, dated May 2016, and my comments are provided below.

1.0 Executive Summary – The purpose of any air quality analysis (AQA) for permitting is for the applicant to make a demonstration that their operation, as represented, would not cause or contribute to a National Ambient Air Quality Standard (NAAQS) or Increment violation or adversely affect public health and welfare. The representation made in the demonstration is typically a worst-case representation of the operation. All representations must be supported with technical justifications. Though assumptions and selections can be made using general guidance, these assumptions and selections must be justified why the particular guidance is appropriate to a specific case. A statement that the guidance has been followed or referencing discussions with TCEQ staff is not sufficient justification.

2.1.1 Prevention of Significant Deterioration – When conducting the PSD Significance analyses, consider all new and increased emissions from the site related to the project, including emissions associated with all planned maintenance, start-up, and shut down (MSS) activities. For pollutants that exceed the associated de minimis levels, conduct a NAAQS analysis that considers all allowable emissions at the site, including emissions associated with all planned MSS activities, permit-by-rules (PBRs), and emissions from off-property sources and activities. For applicable pollutants, conduct a PSD increment analysis that considers all increment consuming sources.

2.1.2 State NAAQS Modeling and State Property Line Analysis – When conducting the Minor New Source Review (NSR) analyses, consider all new and increased emissions from the site related to the project, including emissions associated with all planned MSS activities. For pollutants and averaging periods that exceed the associated de minimis levels, conduct a full Minor NSR NAAQS analysis that considers all allowable emissions at the site, including emissions associated with all planned MSS activities, PBRs, and emissions from off-property sources and activities.

When conducting the State Property Line analysis, consider all emissions at the site. The AQA must include justification why some emissions have not been modeled and how site-wide emissions have been considered in the demonstration of compliance with the standards.

2.1.3 State Health Effects Evaluation (ESL Evaluation) – When conducting the Health Effects analysis, consider all new and increased emissions from the site related to the project. For all health effects pollutants evaluated, provide the corresponding Chemical Abstract Service (CAS) numbers, as applicable, with the AQA.

The ADMT was unable to verify the ESL in Table A-12 of the protocol for APAO light ends from the ESL list. Please include any communications with the Toxicology Division that

verifies the ESL as part of the documentation with the AQA.

The protocol notes that the ESLs in Table A-12 for allyl tert-butyl peroxide (ATBP) (2-methyl-2-prop-2-enylperoxypropane), isobutylene oxide, and tert-butyl formate were provided by the TCEQ. Be sure to include any communications with the Toxicology Division that verifies the ESL as part of the documentation with the AQA.

Table A-12 lists two different compound names for CAS numbers 111-76-2 (2-butoxy ethanol and ethylene glycol monobutyl ether) and 115-11-7 (isobutene and propylene). Be sure that these compounds are not evaluated separately since they represent the same compounds based on their CAS numbers.

Tertiary butyl alcohol, t-butylhydroperoxide (TBHP), tris(2-butoxyethyl) phosphate (TBXP), toluene, and xylene are reported twice in Table A-12.

The long-term ESL for propionaldehyde was reported as 40 $\mu g/m^3$ in Table A-12. It should be noted that the annual ESL in the Toxicology's ESL list is 46 $\mu g/m^3$.

2.2.1 Significance Analysis – In general, report the maximum predicted high, first high (H1H) concentration for each pollutant. The results of the modeling for the $PM_{2.5}$ and 1-hr NO_2 NAAQS analyses should be presented as the highest five-year average of the maximum modeled $PM_{2.5}$ and 1-hr NO_2 concentrations predicted each year at each receptor, consistent with EPA guidance. Although not discussed in the protocol, the 1-hr SO_2 minor NSR NAAQS analysis may also be reported as the highest five-year average of the maximum modeled 1-hr SO_2 concentrations predicted each year at each receptor, consistent with EPA guidance. Please note that if five years of meteorological data are used to evaluate the 1-hr SO_2 minor NSR NAAQS, then five years of meteorological data should be used to evaluate all applicable averaging times of SO_2.

Be aware of model limitations when using a concatenated meteorological data set with multiple averaging times in the same model run. For example, when modeling NO_2 with a concatenated five-year meteorological data set in AERMOD and both the 1-hr and annual averaging times are selected, AERMOD will compute five-year average concentrations for both averaging times. This is not appropriate for the NO_2 annual averaging time.

As noted in the protocol, the 24-hr and annual $PM_{2.5}$ will need to be evaluated modeling the individual years to determine if a PSD full increment analysis will be required. As discussed below, be sure to include a discussion with the AQA on why the use of the $PM_{2.5}$ de minimis levels for the $PM_{2.5}$ Increment analysis would be considered appropriate.

Justification of Usage of $PM_{2.5}$ SILs

The selected monitor to justify the $PM_{2.5}$ de minimis levels looks to be reasonable. See comments below in Section 5 related to the representativeness of the monitor. The methodology for justifying the $PM_{2.5}$ de minimis levels for the NAAQS analysis is appropriate; however, more recent monitoring data are available. The demonstration was based on 2012-2014 monitoring

data. Since 2015 monitoring data are now available, be sure to include data from 2015 in the demonstration.

The protocol also included a demonstration to justify the $PM_{2.5}$ de minimis levels for the Increment analysis. The methodology for justifying the $PM_{2.5}$ de minimis levels for the Increment analysis is generally appropriate. As noted above, more recent monitoring data (2015) are available and should be used in the demonstration. In addition, the demonstration should be based on the major source baseline date (2010) and the most current complete year instead of the year prior to the major source baseline date. Be sure to update the demonstrations and include this information in the AQA.

2.2.2.1 PSD NAAQS Analysis – For the NAAQS analysis, in general, report the maximum predicted concentration for the annual analyses. For 1-hr and 8-hr CO, report the maximum predicted high, second high (H2H) concentration. For 24-hr PM_{10}, report the maximum predicted high, sixth high (H6H) concentration for the entire five-year period. For 24-hr $PM_{2.5}$, the modeled design value may be used in conjunction with the three-year average of the 98th percentile of the annual distribution of the 24-hr monitored background concentrations for comparison to the NAAQS, consistent with recent EPA guidance if a sufficient demonstration of the potential impacts associated with secondary $PM_{2.5}$ formation is provided. For annual $PM_{2.5}$, the modeling should be presented as the highest five-year average of the maximum predicted $PM_{2.5}$ concentrations. The modeled value is then added to the three-year average of the annual monitored background concentrations for comparison to the NAAQS, consistent with EPA guidance. For 1-hr NO_2, the modeling should be presented as the highest five-year average of the 98th percentile of the annual distribution of the maximum daily 1-hr predicted concentrations. The modeled value is then added to the three-year average of the 98th percentile of the annual distribution of the maximum daily 1-hr monitored background concentration for comparison to the NAAQS, consistent with EPA guidance.

The protocol did not address how SO_2 would be evaluated if a full impacts analysis was required. If five years of meteorological data are used, then for 1-hr SO_2, the modeling should be presented as the highest five-year average of the 99th percentile of the annual distribution of the maximum daily 1-hr predicted concentrations. The modeled value is then added to the three-year average of the 99th percentile of the annual distribution of the maximum daily 1-hr monitored background concentration for comparison to the NAAQS, consistent with EPA guidance. The 3-hr and 24-hr SO_2 should be reported as the maximum predicted H2H concentration. If one year of meteorological data is used, then report the maximum predicted concentrations for all averaging times.

See comments below in section 6 related to off-property sources.

2.2.2.2 PSD Increment Analysis – For the PSD Increment analysis, in general, report the maximum predicted concentration for the annual analyses. For averaging periods other than annual for all pollutants, report the maximum predicted H2H concentration of the five yearly H2Hs.

For $PM_{2.5}$, the major source baseline date is October 20, 2010 and the minor source baseline date

for Harris County is October 25, 2011.

The protocol notes that off-property increment consuming sources within the ROI plus 50 km will be modeled. Please note that the review for off-property sources should be reviewed out to 50 km.

2.2.3 Special Considerations - Secondary $PM_{2.5}$ – The method for addressing secondary formation of $PM_{2.5}$ is generally acceptable. See comments below for additional information. As noted in the protocol, the proposed SO_2 emissions are less than 40 tpy; therefore, significant secondary $PM_{2.5}$ formation associated with proposed SO_2 emissions is not expected, which is consistent with EPA guidance.

Discussion of Primary Impacts

The protocol notes that the modeled 24-hr and annual $PM_{2.5}$ predicted concentrations are below their respective SILs and no cumulative analysis was conducted. However, the modeled predicted concentrations listed in Table 2-6 of the protocol are reported as being greater than the SILs. Be sure to clarify this discrepancy in the AQA.

Discussion of Secondary Impacts

The monitor selected to review speciated $PM_{2.5}$ monitoring data is appropriate. Be sure to update the review to include 2015 monitoring data. As noted in the protocol, the review is based on the 24-hr monitored concentrations of $PM_{2.5}$ as well as total nitrates of $PM_{2.5}$; however, the monitored concentrations reported in Table C-8 represent the annual monitored concentration. Be sure to provide a demonstration that assesses the 24-hr monitored concentrations as well.

Other Secondary $PM_{2.5}$ Considerations

The protocol notes that a procedure outlined in the National Association of Clean air Agencies document entitled "$PM_{2.5}$ Modeling Implementation for Projects Subject to National Ambient Air Quality Demonstration Requirements Pursuant to New Source Review" (2011) involving offset interpollutant trading ratios will be included. The offset ratios in this procedure are based on EPA's 2008 final rule. It should be noted that the EPA no longer supports the "preferred" offset ratios in the 2008 final rule without additional technical demonstration specific to the source(s) and area(s) for which the ratios would be applied. However, this procedure in conjunction with the demonstrations noted above for addressing secondary $PM_{2.5}$ is sufficient.

2.2.4 Special Considerations - NO_2 – The protocol notes that a Tier 2 approach will be used to evaluate the NO_x emissions but may consider a Tier 3 approach if needed for refinements. As stated in the protocol, if a Tier 3 approach is used to evaluate the NO_x emissions, then a revised protocol will need to be submitted to the TCEQ and EPA Region 6 that discusses the details of the Tier 3 approach.

3.0/4.0 Area Map/ Plot Plan – Provide a plot plan with the AQA (electronic format preferred) that depicts the entire site. The plot plan should include the site property line, fence line,

locations of production activities, locations of emission sources represented in the AQA, and the locations of any buildings or structures represented in the AQA. Be sure to label all sources and buildings or structures represented in the AQA.

5.1 Pre-Construction Monitoring – Monitors that are used to address the PSD pre-application analysis (pre-construction monitoring analysis) requirement should be located in an area with similar types of sources as the project site. Documentation and justification must be provided for all selected monitors. When providing justification for a monitor, the justification should include more than just proximity of the monitor to the project site or containing sufficient data to meet the completeness criteria.

5.1.1 CO Site Selection and Values – The monitor selected to represent CO is reasonable.

5.1.2 NO_2 Site Selection and Values – The monitor selected to represent NO_2 is reasonable.

5.1.3 PM_{10} Site Selection and Values – The monitor selected to represent PM_{10} is reasonable.

5.1.4 $PM_{2.5}$ Site Selection and Values – The monitor selected to represent $PM_{2.5}$ is reasonable; however, as noted above, more recent monitoring data (2015) are available and should be included in the demonstration.

5.2 Background Concentrations – It should be noted that for both minor and PSD NAAQS demonstrations that include an evaluation of background monitoring concentrations, the monitor may be located in an area that is not near industrial sources provided that the applicant can sufficiently demonstrate that all applicable off-property sources were modeled.

The protocol includes a proposal to use the same monitors selected for the pre-construction monitoring analysis in the PSD NAAQS analysis. This is reasonable.

The protocol did not address a background monitor for SO_2. If needed, the applicant should select a representative monitor and justify the selection as was done for the other pollutants noted above. Be sure to include this information in the AQA.

6.1.1 Point and Pseudo-point Source Parameters – Be sure to include full documentation for each source characterization and complete technical justification for the associated source parameters in the AQA. Be sure to include the flare calculations with the AQA.

6.1.2 Area and Volume Source Parameters – Be sure to include full documentation for each source characterization and complete technical justification for the associated source parameters in the AQA.

The protocol notes that if an average source height cannot be determined, then a release height of ten feet will be used. Be sure to provide justification for using ten feet as a default release height.

Be sure to include all calculations associated with the volume sources as part of the

documentation with the AQA.

6.1.3 Modeled Emissions Rates Determination – The protocol notes that the higher of hourly normal and hourly MSS emissions will be chosen to represent the project proposed hourly emission rate. In addition, if source parameters are different in each of the different modes, the worst-case will be modeled. Be sure to discuss and fully document all planned MSS activities associated with the proposed project in the AQA. In addition, be sure to fully document any scenarios that are evaluated in the AQA and that the determination of the worst-case operating scenarios is technically justified.

The protocol notes that the 1-hr NO_2 modeling of the five diesel generators will be based on an annual average emission rate (i.e. applying EPA's intermittent guidance). This looks to be reasonable based on the operational conditions mentioned in the protocol. Be sure to include information such as the number of times per day, the duration for each event, and whether there are simultaneous operations with other sources. This information should be provided in the AQA. In addition, please note that the project area is located in the Houston-Galveston-Brazoria non-attainment area for ozone and testing for these types of engines are not allowed between 6 am to 12 pm. The reduced hours of operation will affect how the annual average emission rate is determined for modeling purposes.

The protocol notes that the 1-hr NO_2 modeling of the MSS activities for the boilers will be based on an annual average emission rate (i.e. applying EPA's intermittent guidance). This looks to be reasonable based on the operational conditions mentioned in the protocol. Be sure to include information such as the number of times per day, the duration for each event, and whether there are simultaneous operations with other sources. This information should be provided in the AQA.

The protocol notes that the five diesel generators emissions will be modeled based on the applicable averaging time for PM_{10}, $PM_{2.5}$, and CO. As noted above, the project area is located in the Houston-Galveston-Brazoria non-attainment area for ozone and testing for these types of engines are not allowed between 6 am to 12 pm. The reduced hours of operation will affect how the hourly average emission rate is determined for modeling purposes.

The protocol notes that the 1-hr SO_2 modeling of the MSS emissions routed to the ground flare will be based on an annual average emission rate (i.e. applying EPA's intermittent guidance). This appears to be reasonable based on the operational conditions mentioned in the protocol. Be sure to include information such as the number of times per day, the duration for each event, and whether there are simultaneous operations with other sources. This information should be provided in the AQA.

If EPA's intermittent guidance is used to evaluate the emergency engines and diesel generators or any other sources, be aware that this guidance only applies to the 1-hr NO_2 and 1-hr SO_2 NAAQS analyses. The annual average emission rates should not be used for any other short-term averaging times and pollutants, including the SO_2 State Property Line analysis.

6.2 Off-Property Inventory Sources – If a full impacts analysis is required, then the approach

to develop the off-property inventory by utilizing the TCEQ's Air Permits Allowable Database (APAD) is reasonable. The ADMT recommends that the applicant review the retrievals for completeness and accuracy prior to conducting any modeling. In addition, be sure to clearly identify and justify any changes to the retrieval sources. If the applicant is aware of data not contained in the retrieval, such as recently issued permitted facilities, the data should be included as applicable. Any changes to data or exclusion of sources must be clearly documented and justified. Be sure to provide any retrieval files that were obtained from APAD and all supporting materials with the AQA.

The applicant proposes to exclude intermittent sources of off-property engines from the 1-hr NO_2 and SO_2 modeling. This is reasonable. Be sure to include the justification for excluding the intermittent sources in the AQA. In addition, any changes to data or exclusion of sources must be clearly documented and justified. Be sure to provide all supporting materials with the AQA.

The protocol notes that for the PSD NAAQS analyses, all off-property inventory emissions sources located within the radius of impact (ROI) plus 10 km will be modeled along with all on-site sources. This approach does not follow established guidance of evaluating off-property sources within the ROI out to 50 km. The protocol goes on to justify this approach for the 1-hr NO_2 modeling; however, the applicant fails to justify this approach for any other pollutant or averaging time. The applicant should provide justification for deviating from established guidance for the other pollutants and averaging times subject to a full NAAQS review as applicable.

To avoid the potential double-counting of off-property sources, the protocol notes that off-property sources will be removed from the modeling demonstration if the source is located within a 10 km radius of the applicable representative monitor, or no emission increases have been authorized in an 18-month period immediately preceding the submittal of this protocol. Please note that removing these sources based on these criteria contradicts the supporting justification outlined in section 5.2 regarding the background monitored concentrations. Make sure all aspects of the demonstrations are consistent in terms of documentation and justification. In addition, the protocol notes that sources located within a 10 km radius of the applicable representative monitor will be removed if the sources are determined to be operating consistently or at a steady-state. The information with the protocol on how this determination would be made was not provided. As noted above, be sure to document and justify the removal of any source from the APAD retrieval.

6.3 Additional Off-Property Inventory Sources – Although noted in the protocol, if the applicant is aware of data not contained in the retrieval, such as recently issued permitted facilities, the data should be included as applicable. Any changes to data or exclusion of sources must be clearly documented and justified. Be sure to provide all supporting materials with the AQA.

The protocol notes that emission rates for all sources within the applicable ROI and all non-PBR sources within 20 km from the project site will be reviewed and updated. Be sure to provide justification as to why the supplemental review will be limited to the ROI and 20 km; why the criteria used for the supplemental review is appropriate; and documentation associated with the

supplemental review.

The protocol notes that if emission rates are not available in APAD, then the emission rates will be updated using information from emissions inventory data. Prior to relying on actual emissions from the emissions inventory data, be sure to search permit files for allowable emission rates.

Table 6-2 of the protocol lists the default stack parameters that will be used if the applicant is unable to find actual stack parameters for various types of sources in the off-property inventory. The applicant should discuss in the AQA how the various default values were developed and why they are reasonable to use.

7.0 Selection of Model Options – The protocol notes that the MAXDCONT feature may be used for all modeled NAAQS exceedance events. Before utilizing this technique, review and evaluate the assumptions made in the modeling analyses to determine if any refinements can be made to the demonstration. Please contact the ADMT for further guidance prior to using this model output option.

7.1 Selection of Urban Dispersion Option – The protocol notes that the population of Houston, rather than the population of the Houston-The Woodlands-Sugarland MSA will be conservatively used to characterize the heat island effect for the Channelview site. The protocol did not provide sufficient documentation and technical justification to support the claim that using the population of Houston is a conservative approach. The population should be determined following EPA guidance from Section 5 of the AERMOD Implementation Guide. The determination of the appropriate population for input to AERMOD should be addressed in the AQA.

The protocol notes that AERMOD (version 15181) will be used to conduct the modeling. This is appropriate.

9.0 Building Wake Effects (Downwash) – Provide all structure heights used in the downwash analysis and any computer assisted drawing files with the AQA.

Ensure that all GEP heights used in BPIP PRIME are justified according to Guideline for Determination of Good Engineering Practice Stack Height:

http://www.epa.gov/scram001/guidance/guide/gep.pdf

For structures not included in the downwash analysis or for air quality analyses conducted without consideration of downwash, please provide technical justification for supporting this approach.

10.0 Receptor Grids – Please note that ambient air begins at the fence line for PSD analyses and at the property line for minor NSR analyses. Be sure to clarify in the AQA whether there is a difference between the fence line and the property line.

In addition, please note that a single property line designation (SPLD) exists for the north plant between Lyondell Chemical Company, Equistar Chemicals (RN100542281), and GIM Channelview Cogeneration LLC (RN100220276). The protocol notes that Equistar Chemicals operates the north plant. Unless it can be demonstrated that the applicant controls access to the entire north plant property, the applicant will need to include receptors on all properties not controlled by the applicant for the PSD analyses.

11.0 Meteorological Data – The protocol notes that TCEQ's Harris County pre-processed meteorological data will be used in the modeling demonstration. Please note that Harris County has two sets of meteorological data provided, depending on the location of the surface data. The applicant proposes to use the meteorological dataset with George Bush Intercontinental Airport representing the surface conditions. No justification was provided for selecting the George Bush meteorological dataset over the Houston-Hobby meteorological data set. Be sure to include this justification in the AQA. Provide all meteorological and AERSURFACE files in the AQA associated with the modeling analysis, including any concatenated files used.

12.4.3 Visibility Impairment Analysis – The protocol notes that Class II areas do not require a visibility impairment analysis and that the proposed project will comply with the visibility and opacity requirements in 30 TAC Chapter 111. It is incorrect to state that a visibility impairment analysis is not required. The visibility impairment analysis is required; however, the applicant can meet the requirement by acknowledging compliance with the visibility and opacity requirements in 30 TAC Chapter 111.

Deliverables – All modeling and downwash input and output files should be sent electronically via email, FTP, or CD/DVD. Electronic copies of the modeling report, plot plan, and maps are also preferred.

If you have any questions, please contact Justin Cherry at (512) 239-0955 or by fax at (512) 239-1400, or by email at justin.cherry@tceq.texas.gov.

Air Dispersion Modeling Protocol
Supporting the NSR Permit Application for
New Propylene Production Unit (Permit 132611, PSDTX1462)
BASF Corporation
Freeport, Texas

Prepared for:

BASF Corporation
Freeport Site
602 Copper Road,
Freeport, Texas 77541

Prepared by:

AECOM
9400 Amberglen Boulevard
Austin, Texas 78729

May 2016

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APPENDIX

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EXECUTIVE SUMMARY

BASF Corporation (BASF) owns and operates a chemical manufacturing facility at the Freeport, Texas (Brazoria County) site. BASF operates under multiple Texas Commission on Environmental Quality (TCEQ) – New Source Review (NSR) Air Permit authorizations. BASF has submitted an application for an air permit to authorize a new propylene production unit (Project OPUS) at the Freeport, Texas site. It is anticipated that during technical review of the permit application, TCEQ would request an air dispersion modeling evaluation of all new emissions of nitrogen dioxide (NO_2), Sulfur Dioxide (SO_2), carbon monoxide (CO), particulate matter under 10 microns (PM_{10}), and particulate matter under 2.5 microns ($PM_{2.5}$) to demonstrate compliance with National Ambient Air Quality Standards (NAAQS), and pollutants as required by the Modeling and Effects Review Applicability (MERA) analysis associated with the NSR permit application.

All modeling procedures conducted for this Air Quality Analysis (AQA) will conform to the latest state guidance as represented in the TCEQ documents, *Air Quality Modeling Guidelines,* (APDG 6232v2, Revised 4/2015), *Modeling and Effects Review Applicability* (MERA) [APDG 5874v3, Revised 7/2009], Code of Federal Regulations (CFR) *Title 40 Part 51 Appendix W*, U.S. Environmental Protection Agency (EPA) *Guidelines on Air Quality Models,* (EPA-450/2-78-027 and EPA-450/2/78/027R).

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1.0 Project Identification Information

Applicant:	BASF Corporation
Site Location:	Freeport Site
SIC Number:	2869, Chemical Manufacturing Plant
TCEQ Customer Number (CN):	CN600124895
TCEQ Reference Number (RN):	RN100218049
Air Quality Account Number:	BL-0021-O
Applicant's Primary Contact:	Doug Reeves
Applicant's Primary Contact No.:	713-752-4952
Applicant's Primary E-mail:	doug.reeves @basf.com
Nearest City and County:	Freeport, Texas
Applicant's Modeler:	AECOM

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2.0 Project Overview

BASF owns and operates a chemical manufacturing facility in Brazoria County, Freeport, Texas ("Freeport site"). BASF operates the Freeport site under multiple TCEQ NSR Air Permit authorizations. The current application represents an initial permit application for a NSR Permit for a new Gas-to-Propylene Production Unit, also described as "Project OPUS", which will be located at the BASF Freeport, Texas site. The permit application proposes to authorize increase in emissions of NO_2, SO_2, CO, PM_{10}, $PM_{2.5}$ and volatile organic compounds (VOCs).

BASF has proposed to install emission units including a Reformer, methanol to propylene (MTP) Heater, Regeneration Gas Heater, Steam Superheater, two Boilers, two elevated Flares, an enclosed combustor "enclosed ground flare" a Thermal Oxidizer and MTP Regeneration Gas Oxidizer, two Emergency Diesel Generators, and a Cooling Tower.

The proposed site is located in Brazoria County which is a part of the Houston-Galveston-Brazoria ozone non-attainment area designated as "Severe" non-attainment under the 1997 ozone standard.[1]Emissions from the proposed project alone exceed significance levels for certain criteria pollutants and will require a Nonattainment New Source Review (NNSR) for NO_2 and VOCs (as precursors for ozone), a Prevention of Significant Deterioration (PSD) review for NO_2, CO, PM_{10}, and $PM_{2.5}$, and a minor New Source Review (NSR) for SO_2. As a part of the permit application to authorize emissions, an air quality dispersion modeling analysis will be required to demonstrate that the predicted impacts of criteria pollutants (NO_2, SO_2, CO, PM_{10}, and $PM_{2.5}$) and non-criteria pollutants from the proposed operations will not exceed any of the applicable NAAQS, applicable PSD increment, State Property Line Standard, or cause adverse effects to human health or welfare for pollutants regulated by TCEQ.

The purpose of any AQA for permitting is for the applicant to make a demonstration that their operation, as represented, would not cause or contribute to a National Ambient Air Quality Standard (NAAQS) or PSD Increment violation or adversely affect public health and welfare. The representations made in the demonstration are worst-case representation of the operation. Justification of the worst-case representations is included in Section 7.1.2. Modeling guidelines provided by TCEQ and EPA will be followed in completing this modeling analysis.

[1] The Federal Register notice 81466/ Vol. 80, No. 250 published on December 30, 2015, effective January 29, 2016, states "*EPA finds that the HGB ozone nonattainment area has attained the 1997 ozone standard and meets the requirements in 40 CFR 51.1118.for determination of attainment status for Houston-Galveston-Brazoria 1997 Ozone Nonattainment Area*"; however, EPA has not completed the re-designation of this area and the current designation for Brazoria County, "Severe" under the 1997 1-hour Ozone standard, is still applicable as stated in 40 Code of Federal Regulations 81.344.

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2.1 Preliminary Impact Determination

The predicted impacts of the proposed emissions increases of NO_2, SO_2, CO, PM_{10}, and $PM_{2.5}$ from project only sources will be compared to the appropriate significant impact levels (SILs), and Significant Monitoring Concentrations (SMCs) included in the Table 2-1 below determining the necessity of refined modeling.

The U.S. Court of Appeals vacated and remanded 40 Code of Federal Regulations (CFR) 51.166(k)(2) and 52.21(k)(2) based on Environmental Protection Agency's (EPA's) lack of authority to exempt sources from the requirements of the Federal Clean Air Act (FCAA) when it established SILs for $PM_{2.5}$. Based on recent U.S. Court decision regarding $PM_{2.5}$ SILs and based on Guidance for $PM_{2.5}$ Permit Modeling (EPA, May 20 2014), the permit application should not rely on SILs alone to avoid a cumulative impacts analysis for the proposed project. Rather, they should take into account background pollution values to ensure that a planned facility's emissions do not cause or contribute to a NAAQS violation. Therefore, according to the EPA's guidance, "If the preconstruction monitoring data shows that the difference between the $PM_{2.5}$ NAAQS and the monitored $PM_{2.5}$ background concentrations in the area is greater than the EPA's $PM_{2.5}$ SIL value, then the EPA believes it would be sufficient in most cases for permitting authorities to conclude that a proposed source with a $PM_{2.5}$ impact below the $PM_{2.5}$ SIL will not cause or contribute to a violation of the $PM_{2.5}$ NAAQS and to forgo a more comprehensive cumulative modeling analysis". EPA "believes that sources with final PSD permits are not likely to be affected by the Court's decision, since they were issued in accordance with the rule in effect at that time". Using this methodology, justification of the continued use of the $PM_{2.5}$ SILs will be provided in the air quality analysis.

TABLE 2-1. CRITERIA POLLUTANT THRESHOLDS

Pollutant	Averaging Period	Significant Impact Level ($\mu g/m^3$)	Significant Monitoring Concentrations ($\mu g/m^3$)
CO	8-hour	500	--
	1-hour	2,000	575
NO_2	Annual	1	14
	1-hour	7.5	--

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Pollutant	Averaging Period	Significant Impact Level ($\mu g/m^3$)	Significant Monitoring Concentrations ($\mu g/m^3$)
PM_{10}	24-hour	5	10
	Annual	1[2]	--
$PM_{2.5}$	Annual	0.3	--
	24-hour	1.2	--
SO_2	Annual	1	N/A[3]
	24-hour	5	
	3-hour	25	
	1-hour	7.8	

2.2 PSD Review

All new and increased emissions of NO_2, CO, PM_{10}, and $PM_{2.5}$ from project only sources are greater than the major source thresholds; therefore, a PSD review will be conducted for these pollutants.

2.2.1 PSD Air Quality Analysis

A PSD NAAQS analysis will be performed to evaluate impacts from the following compounds as the proposed emissions for these pollutants are greater than the major source thresholds: NO_2, CO, PM_{10}, and $PM_{2.5}$. Predicted preliminary impact concentrations of these pollutants will be compared to their respective SILs. For any pollutant with a predicted impact greater than the SIL, a Cumulative PSD NAAQS evaluation will be required. Procedures outlined in TCEQ's *Air Quality Modeling Guidelines,* (APDG 6232v2, Revised 4/2015) will be used as a guide.

2.2.2 PSD Increment Analysis

A PSD increment analysis will be performed to evaluate the following compounds: NO_2, PM_{10}, and $PM_{2.5}$. Maximum predicted impacts from the cumulative PSD NAAQS analysis (excluding the background concentration) will be compared to the applicable increment calculated using the

[2] The annual PM_{10} standard has been revoked; annual PM_{10} SIL value is included for PSD increment analysis only.
[3] Proposed SO_2 emissions increases do not exceed the major source thresholds; therefore, a PSD NAAQS review is not required for this pollutant. A minor NSR NAAQS review will be performed for SO_2.

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methodology in TCEQ's *Air Quality Modeling Guidelines,* (APDG 6232v2, Revised 4/2015) and EPA's Appendix W to Part 51 - *Guideline on Air Quality Models*. Per EPA and TCEQ's guidance, the maximum annual average concentration at any receptor for 1 year of on-site meteorological data will be reported for NO_2, PM_{10} and $PM_{2.5}$. The maximum high, second high (H2H) concentrations at any receptor for 1 year of on-site meteorological data will be reported for 24-hour PM_{10} and $PM_{2.5}$.

2.2.3 Pre-application Analysis

A pre-application analysis will be performed on the existing ambient air quality for the following criteria pollutants requiring PSD review: NO_2, CO, and PM_{10}. Maximum predicted impacts from the preliminary impact determination will be compared to the applicable SMCs included to determine if an analysis of the ambient air quality will be required per methodology in TCEQ's *Air Quality Modeling Guidelines,* (APDG 6232v2, Revised 4/2015).

2.2.4 Additional Impacts Analysis

An Additional Impacts Analysis will be performed to show that additional impacts from a new major source or major modification of an existing source will not impair visibility, soils, and vegetation as a result of the emissions associated with the source or modification.

2.2.5 Class I area Analysis

Any new major source or major modification located within 100 kilometer (km) of a Class I area is required to perform an impacts analysis for the affected Class I areas; however, an analysis may also be required for sources located more than 100 km from a Class I area if there is concern that the project emissions could cause an adverse impact on a Class area (see TCEQ APDG 6232v2, Revised 04/15 Air Quality Modeling Guidelines, Page 28). The nearest Class I areas and their distance from the facilities are – Caney Creek Wilderness, 600 km; Breton National Wildlife Preserve, 630 km; Big Bend National Park, 760 km; and Guadalupe Mountains National Park, 950 km. None of the Class I areas are within 600 km of the facility, which is significantly greater than the 100 km threshold and the emissions from the proposed project are not expected to cause any adverse impacts on this Class I area. Therefore, a Class I area analysis is not proposed to be included in the modeling analysis.

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2.2.6 Ozone Impacts Analysis

The proposed net emissions increase of VOCs from the OPUS project are less than 100 tpy; however, the site is located in Brazoria County which is designated "nonattainment" under the 1997 ozone standard and classified as "Severe."[4] The project VOC emissions are greater than 5 tpy; therefore, the project is subject to Nonattainment New Source Review (NNSR), and an ozone impact analysis is not required as a part of this permitting action.

2.3 Minor NSR NAAQS Analysis

The proposed emissions from the project do not trigger PSD review for SO_2. The predicted SO_2 impacts from the project sources will be compared to the applicable SILs to determine if a cumulative NAAQS analysis is required. If the predicted SO_2 impacts are greater than the SILs then a cumulative NAAQS analysis will be required.

2.4 State Property Line Analysis

A State Property Line Analysis will be performed for SO_2 (1-hour) to demonstrate compliance with the State standards for net ground-level concentrations of this pollutant. The maximum ground-level concentration from project-level emissions will be compared to the De Minimis level of 2% of the State Property Line standards. If the predicted SO_2 impact is greater than 2% of the standard, a site wide analysis will be required.

2.5 Secondary $PM_{2.5}$ Formation Analysis

Per TCEQ's Air Quality Modeling Guidance (APDG 6232v2), the complex chemistry of secondary formation of $PM_{2.5}$ is well documented and entities proposing new or increased emissions of $PM_{2.5}$ should provide an evaluate impacts of secondary formation $PM_{2.5}$ to demonstrate that the proposed emissions are not expected to cause an exceedance of the NAAQS. NO_2 and SO_2 are considered as $PM_{2.5}$ precursors; therefore, the Significant Emission Rate (SER) for NO_2 and SO_2, which is defined as 40 tpy for both under 40 Code of Federal Regulations (CFR) §52.21 (b)(23)(i) is used to determine the need for a review of the secondary $PM_{2.5}$ formation.

[4]The Federal Register notice 81466/ Vol. 80, No. 250 published on December 30, 2015, effective January 29, 2016, states "*EPA finds that the HGB ozone nonattainment area has attained the 1997 ozone standard and meets the requirements in 40 CFR 51.1118.for determination of attainment status for Houston-Galveston-Brazoria 1997 Ozone Nonattainment Area*"; however, EPA has not completed the re-designation of this area and the current designation for Brazoria County, "Severe" under the 1997 1-hour Ozone standard, is still applicable as stated in 40 Code of Federal Regulations 81.344.

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The total proposed increases in emissions of $PM_{2.5}$, NO_2, and of SO_2 are consistent with the requirements of assessment case 3 in Table III-1 of the United States Environmental Protection Agency's (EPA's) "Guidance for $PM_{2.5}$ Modeling" dated May 20, 2014; therefore, BASF is proposing the following qualitative analysis of the secondary $PM_{2.5}$ formation which is consistent with EPA's guidance.

1. BASF is proposing to use $PM_{2.5}$ monitored data from the Deer Park #2 monitoring station located in Houston. This monitor is conservative since the values of PM2.5 emissions in the area surrounding the Deer Park monitor are significantly greater than area around the proposed BASF site.

TABLE 2-2. 2014 EI REPORTED EMISSIONS

Pollutant	Reported Emission in a 50 km radius of Deer Park #2 Monitor (tpy)	Reported Emission in a 50 km radius of BASF Freeport Site (tpy)	Reported Emission in a 10 km radius of Deer Park #2 Monitor (tpy)	Reported Emission in a 10 km radius of BASF Freeport Site (tpy)
NO_X	22,515	6,760	6,206	2,681
SO_2	9,209	549	3,108	259
$PM_{2.5}$	5,552	1,304	1,380	657

As shown in the table above, the $PM_{2.5}$ emissions reported in the area surrounding the monitor are significantly higher than the area surrounding the BASF Freeport site. Additionally, the emissions of NO_X and SO_2, precursors for secondary $PM_{2.5}$ formation, are also significantly greater in the area surrounding the monitor as compared to the area surrounding the site. Therefore, primary and secondary $PM_{2.5}$ concentrations from the existing sources in the area surrounding the monitor are already captured by the monitor. The monitoring data for this monitor shows levels of $PM_{2.5}$ concentrations that are below the NAAQS. As further described in Section 5.1, per TCEQ's recommendation, the three years with the highest design concentrations out of the 2013-2015 monitoring data were used to determine the background concentrations. The 24-hour average design value (average 98th percentile value of last three years with the highest design value, 2013 – 2015) of 18.43 $\mu g/m^3$ is comfortably below the 24-hour $PM_{2.5}$ NAAQS of 35 $\mu g/m^3$. The

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most recent 3-year annual design value of 8.77 μg/m³ similarly compares favorably to the annual $PM_{2.5}$ NAAQS of 12 μg/m³. These values leave room under the NAAQS for new source impacts of up to 16.57 μg/m³ (24-hour) and up to 3.23 μg/m³ (annual mean).

2. The total precursor emissions associated with the secondary $PM_{2.5}$ formation in Brazoria County are 14,264[5] tpy of NOx and 1,682[6] tpy of SO_2 according to EPA's Air Emission Source (http://www.epa.gov/air/emissions/index.htm). The NO_X and SO_2 emissions from the proposed project are 77.8 tpy and 4.9 tpy, respectively, which are a small fraction of the NO_X and SO_2 emissions for the air-shed (0.53 % for NOx and 0.29 % for SO_2). This indicates that the secondary $PM_{2.5}$ formation associated with the proposed NO_X and SO2 emissions would be expected to be considerably smaller than the monitored concentrations of nitrates and sulfates, respectively. Therefore, only a very small portion of these NOx and SO_2 impacts from the proposed sources would convert to $PM_{2.5}$.
3. Highest secondary $PM_{2.5}$ concentrations from the BASF Freeport sources are expected to occur further downwind of the site since conversion of NO_X and SO_2 to secondary $PM_{2.5}$ pollutants (nitrates and sulfates) is expected to occur over time when the plume is further dispersed and farther from the sources. Conversely, highest primary $PM_{2.5}$ are expected to occur at or near the property boundary. This makes it unlikely that maximum primary and secondary $PM_{2.5}$ from the proposed sources will occur at the same time or location. Furthermore, there are only 3 facilities within a 30 kilometer (km) radius of the facility with emissions of $PM_{2.5}$ reported in 2014 EI more than the PSD significance threshold of 10 tpy and only 1 facility with reported emissions greater than 10 tpy in a 10 km radius of the facility. Therefore, secondary $PM_{2.5}$ impacts from the proposed BASF Freeport sources along with the impacts from primary $PM_{2.5}$ sources in the area are not expected to significantly contribute to the air quality in the air shed.
4. Additionally, the following conservative assumptions will be incorporated in the modeling of primary $PM_{2.5}$ emissions:
    a. Inherent conservatism is using "First Tier" approach to combining modeled primary $PM_{2.5}$ impacts with monitored $PM_{2.5}$ background concentrations; and
    b. Use of monitoring data from a conservative monitor with higher reported emissions of $PM_{2.5}$ from contributing sources.

Based on the argument above, and consistent with current guidance, BASF believes that modeling of primary $PM_{2.5}$ emissions will be representative and there sufficient basis to conclude

[5] Excluding NO_X emissions from biogenic sources and fires.
[6] Excluding SO_2 emissions from fires.

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that the $PM_{2.5}$ NAAQS will be protected. Photochemical modeling is not required to evaluate secondary $PM_{2.5}$ formation for this permit application

2.6 Health Effects Review Analysis

The Modeling and Effects Review Applicability (MERA) [APDG 5874v3, Revised 7/2009] guidance will be used to evaluate impact concentrations of proposed pollutants.

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3.0 Plot Plan

A plot plan that illustrates both (1) the property boundary for the BASF Freeport site and (2) the locations of the modeled sources which emit the evaluated contaminants from the project will be included in the modeling report. A copy of the building parameters for on-site structures which have the potential to contribute to downwash will also be included in the modeling report. For informational purposes, a rough draft plot plan has been included for reference.

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A non-confidential plot plan showing all sources and structures will be included with the AQA.

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4.0 Area Maps

The area map (Figure 4-1. Area Map) depicts an aerial view of the BASF Freeport site.

4.1 Area Map Description

The existing BASF Freeport site is classified under the Standard Industrial Classification (SIC) number 2869, as a Chemical Manufacturing facility. The site is located in Freeport, TX, which is approximately 80 km south of Houston. Within the BASF property fence line, there are no interior public roads or public access points. An area map has been rendered to depict a regional aerial view of surrounding areas within 3,000 feet and 3 kilometer (km) of plant.

4.2 Topography

The BASF Freeport facility is located in Brazoria County. The analysis used terrain heights obtained from Multi-Resolution Land Characteristics Consortium (MRLC) National Land Cover Database (NLCD) National Elevation Datasets (NED) files. For the BASF Freeport facility, NED files were obtained from the query generated by BEEST based on terrain limits at the following website: http://www.mrlc.gov/viewerjs. AERMAP (AMS/EPA Regulatory Model Terrain Pre-processor) was used to process terrain data from the NED files.

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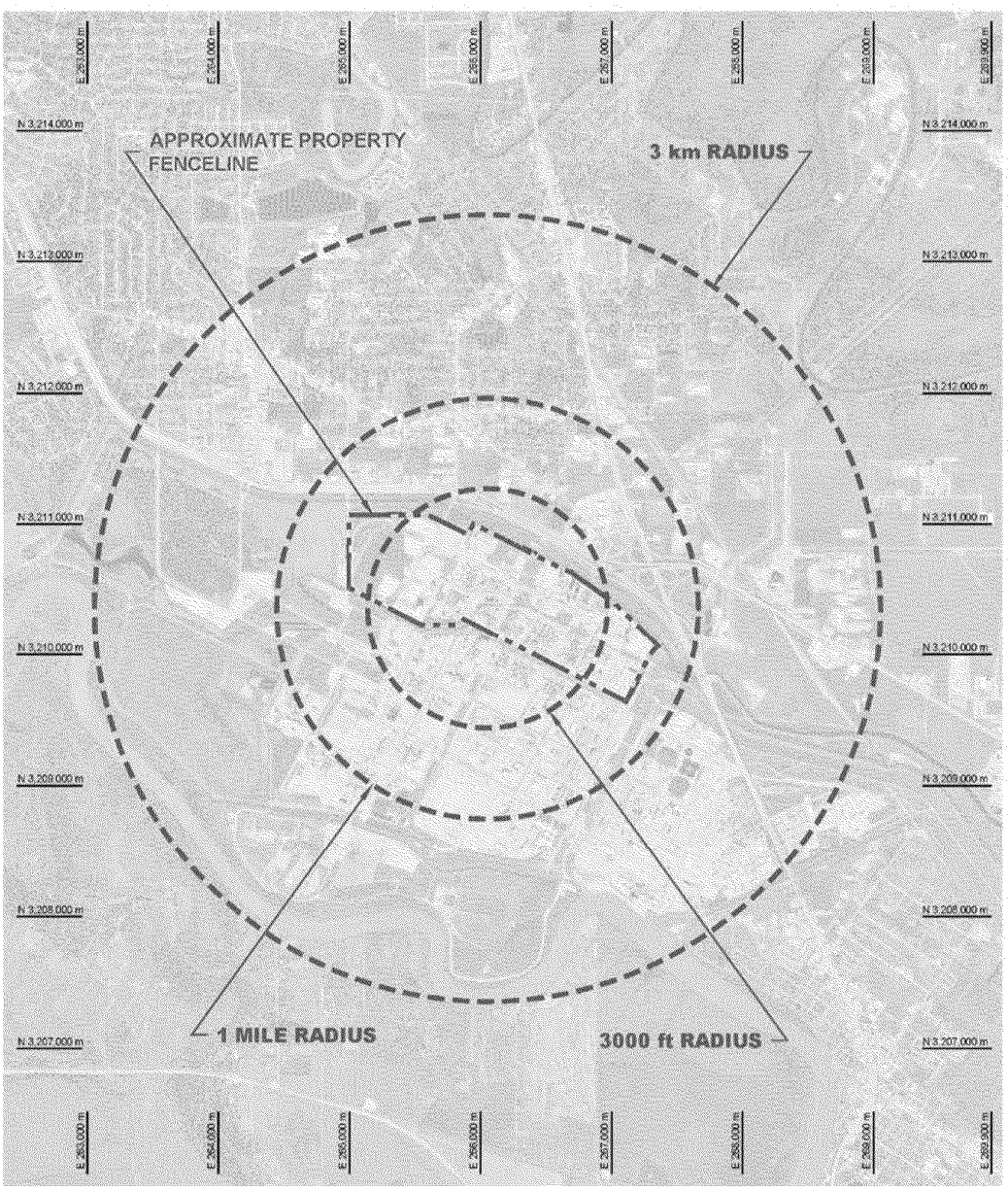

FIGURE 4-1. AREA MAP

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5.0 Air Quality Monitoring Data

5.1 Pre-construction Monitoring

A pre-application analysis will be performed to evaluate the need for pre-construction monitoring. Emissions from the proposed project trigger PSD review for CO, NO_2, PM_{10} and $PM_{2.5}$. The predicted impacts for these pollutants from the project sources are compared to the EPA De Minimis concentrations listed in the Table 5-1 below to evaluate whether pre-construction monitoring is required.

TABLE 5-1. SIGNIFICANT MONITORING CONCENTRATIONS THRESHOLDS

Pollutant	Averaging Period	SMC (µg/m3)
CO	8-hour	575
NO_2	Annual	14
PM_{10}	24-hour	10
$PM_{2.5}$	24-hour	[7]

Based on preliminary impact determinations, the predicted concentrations of CO, NO_2 and PM_{10} are less than the SMCs; therefore, pre-construction monitoring will not be required for these pollutants. Since the U.S. Court of Appeals has vacated the SMC for $PM_{2.5}$, an analysis of the existing ambient $PM_{2.5}$ concentration in the area surrounding the plant will be required. BASF is proposing to use the data from the Houston Deer Park #2 CAMS 235 [EPA ID 48-201-1039] monitor to satisfy the pre-construction monitoring requirements. Refer to section 5.2 for justification for using the Houston Deer Park #2 monitor.

5.2 NAAQS Analysis Background Concentration

Emissions from the proposed project trigger PSD review for CO, NO_2, PM_{10} and $PM_{2.5}$. A representative monitoring station will be selected to obtain background air concentration data for NO_2, PM_{10} and $PM_{2.5}$for which predicted preliminary impacts are expected to be greater than the SILs. The justification for the monitor selection will include an analysis of the area surrounding the project site relative to the monitor site with respect to nearby sources of emission

[7] On January 22, 2013, the U.S. Court of Appeals for the District of Columbia vacated 40 CFR 51.166(i)(5)(i)(c) and 52.21(i)(5)(i)(c)based on EPA's lack of authority to exempt the preconstruction monitoring requirements through the Significant Monitoring Concentration (SMC) established for PM2.5 (Sierra Club v. EPA)

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(comparison between emission rates within certain radius (i.e. 10 km) from the monitoring station and emission rates within the same radius from the project), monitoring objectives, and type of location.

PM_{10} Background Monitoring Data: BASF Freeport site is located in Freeport, Brazoria County, Texas. Since there is no valid PM_{10} monitor available in Brazoria County, a representative monitoring station was evaluated in a nearby county, which has similar emission rates within certain radius of distance, similar county-wide population, and similar types of land use to project area. The closest PM_{10} monitor from the BASF Freeport site is located in Galveston County, but it is surrounded by ocean and no industrial facilities are located nearby. This monitor might be useful in the context of a site-wide cumulative NAAQS analysis (because it is unaffected by nearby stationary sources).

The closest county with emissions and industry similar to the Brazoria County is Harris County. The only PM_{10} monitor in Houston-Galveston-Brazoria area is Deer Park #2 CAMS 235 [EPA ID 48-201-1039] located at 4514 1/2 Durant St, Deer Park, Texas. Per TCEQs' Air Quality Modeling Guidelines (APDG 6232v2, revised 04/15), emissions for sources that fall within 10 km radius of the monitor site and within 10 km radius of the BASF Freeport Facility were compared to justify the representative background monitor.

40 CFR Appendix K to Part 50, Interpretation of the National Ambient Air Quality Standards for Particulate Matter, specifies that, for 24-hour PM_{10} standard "a minimum of 75 percent of the scheduled PM_{10} samples per quarter are required" and, "In all cases, 3 years of representative monitoring data that meet the 75 percent criterion of the previous paragraph should be utilized, if available, and would suffice."

TABLE 5-2. COMPLETENESS OF DAILY PM_{10} AVERAGED MONITORING VALUES (≥75%)

Monitor	Monitor Year	Required Days	Valid Days[8]	Data Capture Percentage
Deer Park #2	2013	61	60	98%
	2014	61	58	95%
	2015	60	59	98%

The Deer Park #2 monitor meets the 75% completeness criteria for most recent 3 years of data per 40 CFR Appendix K to Part 50. The emission inventory data was obtained from the

[8] Data obtained from EPA's Air Data website accessed on 05/05/16: https://www3.epa.gov/airdata/ad_rep_mon.html

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"2014statesum.xlsx" in the section of "Detailed Data from the Point Source Emissions Inventory" located at the following TCEQ website: http://www.tceq.texas.gov/airquality/point-source-ei/psei.html.

The "2014statesum Monitor Data - SAP.xlsx" (included with the email accompanying this protocol) shows the calculations and supporting documentations for the total $PM_{2.5}$ emissions reported in Table 5-3. This file shows how the "2014statesum.xlsx" was used to evaluate the total emission rates within 10 km radius of the monitor site and within 10 km radius of the BASF Freeport facility. The Tab "STATE SUM" represents original information of "2013statesum.xlsx" obtained from TCEQ website. Then, this information was sorted by Harris County in "Harris" tab and sorted by Brazoria County in "Brazoria" tab. The coordinate information for each RN was obtained from TCEQ. Using this spreadsheet, the distance was generated for BASF Freeport Facility and the Deer Park 2 monitoring station. The emissions for sources that fall within 10 km radius of the BASF Freeport Facility are shown in the tab "BASF Freeport", and the emissions for sources that fall within 10 km radius of Deer Park #2 monitor are shown in the tab "Deer Park #2" and are summarized in Table 5-3 below. The emissions within the 10 km radius from the Deer Park #2 monitor are higher (more conservative) than the emissions within the 10 km radius from the BASF Freeport facility.

The Deer Park #2 monitor was selected as a representative monitor for the following reasons:

- The emissions from the area surrounding the monitor are significantly higher than the site;
- The area surrounding the monitor has similar land; and
- The population and county-wide emissions for the county where the monitor is located are significantly higher than the county where the site is located; and

Additionally, the monitor background values are conservative since they will be used in addition to off-property sources from the emissions inventory.

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TABLE 5-3. DESCRIPTION OF AMBIENT MONITOR OF PM_{10}

Monitor[9]	County	PM_{10} Monitoring Site ID	Distance from Project (km)	Land Type	Total PM_{10} Emissions within 10km Radius[10] (tpy)	County-wide PM_{10} Emissions[11] (tpy)	County-wide Population[12]
BASF Freeport Plant	Brazoria	-	-	Industrial/ Residential	938	42,920	346,312
Deer Park 2	Harris	CAMS 235 [EPA ID 48-201-1039]	79.80	Industrial/ Residential	1,910	108,627	4,538,028

[9] Monitors were selected based on the percent of completeness data.
[10] PM_{10} emission data by facility was obtained from "2014statesum.xlsx" obtained from TCEQ's Point Source Emissions Inventory. The 10 km of radius was selected to define the area of influence to each monitoring station based on average distance of monitors in Harris County.
[11] County-wide emission data for Brazoria County (NEI 2011 v2 GPR) and for Harris County (NEI 2011 v2 GPR) was obtained from the EPA's website.
[12] County-wide population data for 2015 was obtained from U.S. Census Bureau: http://quickfacts.census.gov/qfd/states/48000.html

Ambient hourly PM_{10} monitoring data at Deer Park #2 CAMS 235 [EPA ID 48-201-1039] for 2013-2015 was obtained from the TCEQ's website: http://www.tceq.state.tx.us/cgi-bin/compliance/monops/yearly_summary.pl. A 24-hour PM_{10} background concentration was estimated based on the 3-year H2H daily average concentration from the representative monitor. Table 5-4 shows the H2H monitored concentration for 24-hour averaging time encompassing 2013, 2014, and 2015 data for Deer Park #2 monitoring site.

TABLE 5-4. PM_{10} MONITORED CONCENTRATION

Monitoring Site	Year	H2H 24-hour Average Monitored PM_{10} Concentration ($\mu g/m^3$)	3-year H2H 24-hour Average Monitored PM_{10} Concentration ($\mu g/m^3$)
Deer Park #2 [13]	2013	49	57
	2014	57	
	2015	50	

$PM_{2.5}$ Background Monitoring Data: As discussed in the analysis above, the Deer Park #2 CAMS 235 [EPA ID 48-201-1039] was selected as a representative PM_{10} monitor for BASF based on total emissions within 10km radius from the monitor and from the project location. Similarly, $PM_{2.5}$ emissions for Seabrook Friendship monitor, Deer Park #2 monitor and the Houston Aldine monitor were compared; the results are included in Table 5-5. As seen in Table 5-5, the $PM_{2.5}$ emissions within the 10 km radius from the Deer Park #2 monitor are higher (more conservative) than the emissions within the 10 km radius from the BASF Freeport facility; therefore, the Deer Park #2 monitor was selected as a representative monitor. Additionally, the monitor background values are conservative since they will be used in addition to off-property sources from the emissions inventory.

40 CFR Appendix N to Part 50, Interpretation of the National Ambient Air Quality Standards for $PM_{2.5}$, specifies that, for 24-hour $PM_{2.5}$ standard "Three years of valid annual $PM_{2.5}$ 98th percentile mass concentrations are required to produce a valid 24-hour $PM_{2.5}$ NAAQS DV. A year meets data completeness requirements when quarterly data capture rates for all four quarters are at least 75 percent" and for annual $PM_{2.5}$ standard "Three years of valid annual means are required to produce a valid annual $PM_{2.5}$ NAAQS DV. A year meets data completeness requirements when quarterly data capture rates for all four quarters are at least 75 percent."

[13] Monitoring Site selected when using a 10 km area of influence.

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TABLE 5-5 DESCRIPTION OF AMBIENT MONITOR OF $PM_{2.5}$

Monitor[14]	County	$PM_{2.5}$ Monitoring Site ID	Distance from Project (km)	Land Type	Total $PM_{2.5}$ Emissions within 10km[15] Radius (tpy)	County-wide $PM_{2.5}$ Emissions[16] (tpy)	County-wide Population[17]
BASF Freeport Plant	Brazoria	-	-	Industrial/ Residential	657	10,157	346,312
Seabrook Friendship Park	Harris	CAMS 45 [EPA ID 48-201-1050]	75	Industrial/ Suburban	284	21,987	4,538,028
Deer Park 2	Harris	CAMS 235 [EPA ID 48-201-1039]	79.80	Industrial/ Residential	1,380	21,987	4,538,028
Houston Aldine	Harris	CAMS 8 [EPA ID 48-201-0024]	101.33	Residential	52	21,987	4,538,028

[14] Monitors were selected based on the percent of completeness data.
[15] $PM_{2.5}$ emission data by facility was obtained from "2014 statesum.xlsx " obtained from TCEQ's Point Source Emissions Inventory. The 10 km of radius was selected to define the area of influence to each monitoring station based on average distance of monitors in Harris County.
[16] County-wide emission data for Brazoria County (NEI 2011 v2 GPR) and for Harris County (NEI 2011 v2 GPR) was obtained from the EPA's website.
[17] County-wide population data for 2015 was obtained from U.S. Census Bureau: http://quickfacts.census.gov/qfd/states/48000.html

TABLE 5-6. COMPLETENESS OF DAILY $PM_{2.5}$ AVERAGED MONITORING VALUES (≥75%)

Monitor [1]	Monitor Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual
Deer Park #2	2013	100%	90%	95%	96%	95%
	2014	91%	100%	100%	98%	97%
	2015	100%	89%	91%	98%	95%

The Deer Park #2 monitor meets the 75% completeness criteria for most recent 3 years of data per 40 CFR Appendix N to Part 50.

Ambient hourly $PM_{2.5}$ monitoring data at Deer Park #2 CAMS 235 [EPA ID 48-201-1039] for 2013-2015 was obtained from the TCEQ's website: http://www.tceq.state.tx.us/cgi-bin/compliance/monops/yearly_summary.pl. 24-hour and annual $PM_{2.5}$ background concentrations were estimated based on the 3-year average of the 98th percentile daily average concentration from the representative monitor. Table 5-7 shows the 3-year average of 98th percentile of daily average background concentration for Deer Park #2 monitoring site as well as the 3-year average of annual mean background concentration.

TABLE 5-7. $PM_{2.5}$ MONITORED CONCENTRATION

Monitoring Site	Monitored Year	98th Percentile of 24-hour Average $PM_{2.5}$ Monitored Concentration ($\mu g/m^3$) [18]	3-year Average 98th Percentile 24-hour Average Monitored $PM_{2.5}$ Concentration ($\mu g/m^3$)	Annual Mean $PM_{2.5}$ Monitored Concentration ($\mu g/m^3$) [19]	3-year Average Annual Mean $PM_{2.5}$ Monitored Concentration ($\mu g/m^3$)
Deer Park #2 [20]	2013	20.15	18.55	9.45	8.77
	2014	18.28		8.99	
	2015	18.81		8.55	

NO_2 Background Monitoring Data: The BASF Freeport site is located in Brazoria County. Brazoria County has 3 NO_2 monitor stations: Danciger CAMS 756 [EPA ID 480390618], Lake Jackson CAMS 1016 [EPA ID 480391016], and Mustang Bayou CAMS 757 [EPA ID 480390619]. Both Danciger and Mustang Bayou stations are located at a distance of 25 miles from the BASF site and are located in an area primarily classified rural. The CAMS 1016 [EPA ID 480391016] monitor is located less than 10 km from the BASF Freeport site and is the nearest

[18] For 24-hour PM2.5, the background represents the 98th percentile of daily average ambient concentration per year.
[19] For annual PM2.5, the background concentration represents the average value of annual mean concentration per year.
[20] Monitoring Site selected when using a 10 km area of influence.

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monitoring station for NO_2 and is located downwind of the major contributing source in the area. Due to the proximity of the Lake Jackson monitor in comparison to the other monitors and the area surrounding the monitors, BASF is proposing to evaluate the Lake Jackson monitor for NO_2 background monitor data. Data from stations further away are not likely to be more representative than the CAMS 1016 site for NO_2.

40 CFR Appendix S to Part 50, Interpretation of the National Ambient Air Quality Standards for Oxides of Nitrogen (Nitrogen Dioxide), specifies that, "An annual primary standard design value is valid when at least 75 percent of the hours in the year are reported." and for 1-hour NO_2 standard, "An NO_2 1-hour primary standard design value is valid if it encompasses three consecutive calendar years of complete data. A year meets data completeness requirements when all 4 quarters are complete. A quarter is complete when at least 75 percent of the sampling days for each quarter have complete data. A sampling day has complete data if 75 percent of the hourly concentration values, including State-flagged data affected by exceptional events which have been approved for exclusion by the Administrator, are reported."

TABLE 5-8. COMPLETENESS OF DAILY NO_2 AVERAGED MONITORING VALUES (≥75%)

Monitor [1]	Monitor Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual
Lake Jackson	2013	98%	100%	99%	93%	98%
	2014	98%	99%	96%	100%	98%
	2015	99%	97%	88%	71%	88%

The Lake Jackson monitor meets the 75% completeness criteria for most recent 3 years of data per 40 CFR Appendix S to Part 50 for both 1-hour and annual periods except for the fourth quarter of 2015. A substitution test was performed for the fourth quarter of 2015 per 40 CFR Part 50 Appendix S 3.2(c)(ii)(B). The total number of number of days with reported concentrations in the fourth quarter of 2013, 2014 and 2015 is 270 days, which is greater than the threshold of at least 200 days across the three matching quarter of the three years; therefore, substitution is permitted per 40 CFR Part 50 Appendix S 3.2(c)(ii)(A). After substituting the highest non-excluded reported daily maximum 1-hour value for the fourth quarter of 2015 for as much of the missing daily data in this "deficient" quarter as is needed to make them 100 percent complete, the recalculated 3-year 1-hour standard "test design value" is equal to 24 parts per billion (ppb). This value is below the NAAQS standard (100 ppb). Also, the recalculated annual standard is 3 ppb, which is below the NAAQS standard (53 ppb) therefore, per 40 CFR Part 50 Appendix S 3.2(c)(ii)(B), the 1-hour and annual primary standard design value passes the diagnostic test and is valid. BASF proposes CAMS 1016 monitor for NO_2 background concentration determination.

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Ambient hourly and annual NO_2 monitoring data at Lake Jackson CAMS 1016 [EPA ID 480391016] for 2013-2015 was obtained from the TCEQ's website: http://www.tceq.state.tx.us/cgi-bin/compliance/monops/yearly_summary.pl. 1-hour NO_2 background concentration was estimated based on the 98th percentile daily maximum concentration averaged over 3 years (2013-2015) from the representative monitor. The annual NO_2 background concentration was estimated based on annual mean of 2014 1-hour average concentration values at the representative monitor. Table 5-9 shows the monitored concentrations at the Lake Jackson monitoring site.

TABLE 5-9. NO_2 MONITORED CONCENTRATION

Monitoring Site	3-year Average 98th Percentile 1-hour Daily Maximum Concentration (ppb)	Annual Average Concentration (ppb)[21]	3-year Average 98th Percentile 1-hour Daily Maximum Concentration (µg/m³)	Annual Mean 1-hour Concentration (µg/m³)
Lake Jackson	20	3	37.4	4.84

The monitor background values are conservative since they will be used in addition to off-property sources from the emissions inventory.

CO Background Monitoring Data: CO is anticipated to be below its representative SIL and not require additional review under NAAQS analysis. A background monitoring station for CO is not being proposed at this time. BASF will propose a CO monitor if it is determined later that a cumulative NAAQS analysis is required.

SO_2 Background Monitoring Data: SO_2 is anticipated to be below its representative SIL and not require additional review under NAAQS analysis. A background monitoring station for SO_2 is not being proposed at this time. BASF will propose a SO_2 monitor if it is determined later that a cumulative NAAQS analysis is required.

[21] Annual average concentration for 2013 represented since that is the highest concentration recorded from 2013 to 2015.

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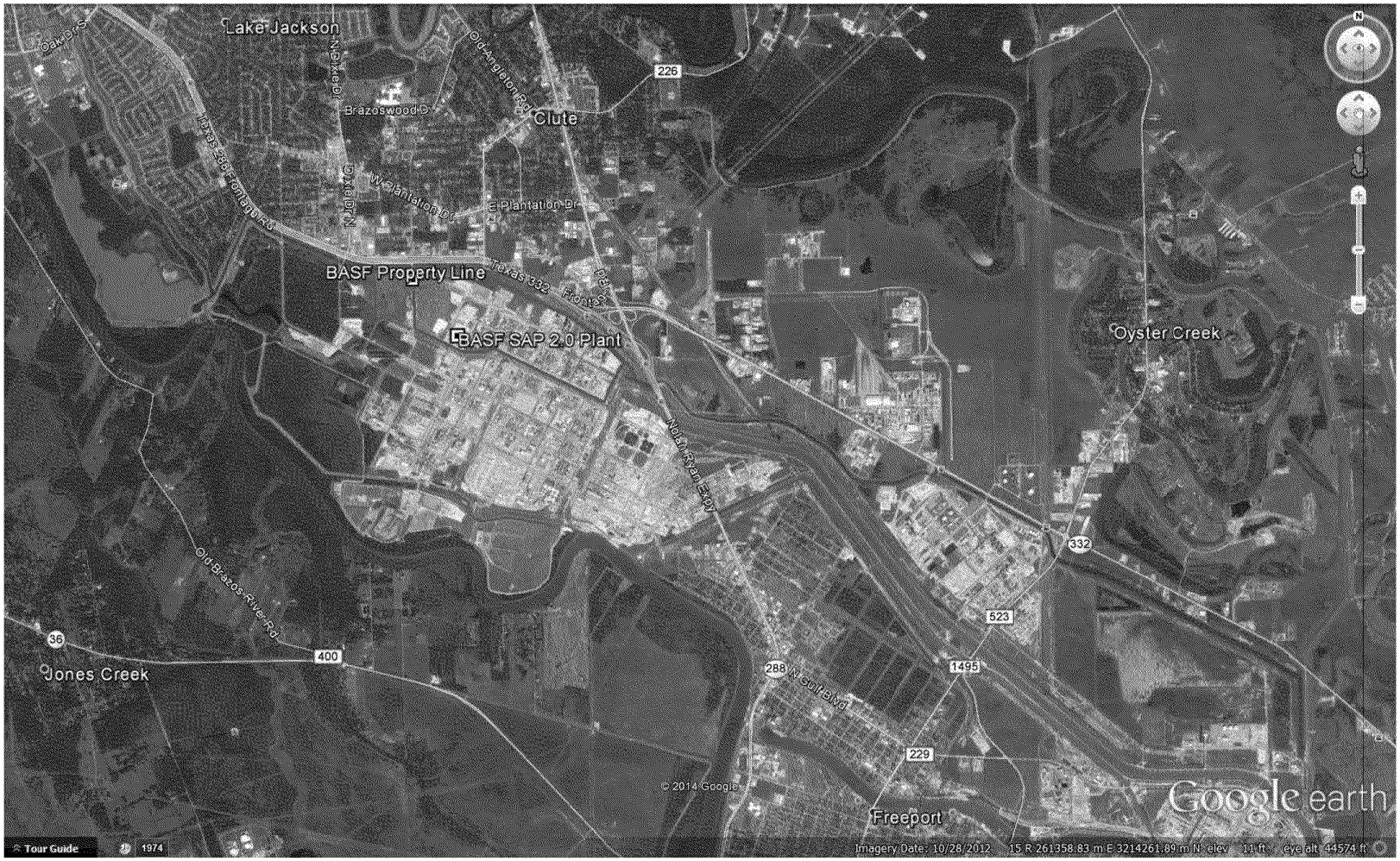

FIGURE 5-1. AERIAL MAP OF BASF FREEPORT IN BRAZORIA COUNTY

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FIGURE 5-2. AERIAL MAP OF $PM_{2.5}$ BACKGROUND MONITORING STATION (CAMS 45 [EPA ID 48-201-1050]) AT SEABROOK FRIENDSHIP PARK IN HARRIS COUNTY (INDUSTRIAL/RESIDENTIAL)

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FIGURE 5-3. AERIAL MAP OF PM_{10} AND $PM_{2.5}$ BACKGROUND MONITORING STATION (CAMS 235 [EPA ID 48-201-1039]) AT DEER PARK 2 IN HARRIS COUNTY (INDUSTRIAL/RESIDENTIAL)

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FIGURE 5-4. AERIAL MAP OF $PM_{2.5}$ BACKGROUND MONITORING STATION (CAMS 8 [EPA ID 48-201-0024]) AT HOUSTON ALDINE IN HARRIS COUNTY (RESIDENTIAL)

FIGURE 5-5. AERIAL MAP OF NO_2 BACKGROUND MONITORING STATION IN LAKE JACKSON (CAMS 1016 [EPA ID 480391016] AND BASF FREEPORT SITE IN BRAZORIA COUNTY

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5.3 $PM_{2.5}$ SIL Justification for NAAQS Analysis

Per January 22, 2013 court decision, any permitting authority wishing to use a particular SIL value as a screening tool in a significant impact analysis should determine whether a substantial portion of the NAAQS has already been consumed. Per EPA's Guidance for $PM_{2.5}$ Permit Modeling (EPA, May 20, 2014), if the difference between the NAAQS and the measured $PM_{2.5}$ background in the area is greater than the applicable SIL value, then the EPA believes it would be sufficient in most cases for permitting authorities to conclude that a source with an impact below that SIL value will not cause a new NAAQS violation. As seen in Table 5-10, because the difference between the NAAQS and the measured background $PM_{2.5}$ concentration for the selected monitoring site is greater than the applicable SIL, BASF believes there is sufficient justification for using the SIL value.

TABLE 5-10. $PM_{2.5}$ BACKGROUND CONCENTRATION FROM DEER PARK #2 MONITOR

Compound	Avg. Period[22]	Background ($\mu g/m^3$)[23]	NAAQS ($\mu g/m^3$)[24]	Difference Between Background and NAAQS ($\mu g/m^3$)	SIL ($\mu g/m^3$)[25]	Difference Greater than SIL?
$PM_{2.5}$	24-hour	18.55	35	16.45	1.2	YES
	Annual	8.77	12	3.23	0.3	YES

5.4 $PM_{2.5}$ SIL Justification for Increment Analysis

Per January 22, 2013 court decision, any permitting authority wishing to use a particular SIL value as a screening tool in a significant impact analysis should determine whether a substantial portion of the NAAQS has already been consumed. The procedure specified in TCEQ's Modeling Guidance (APDG 6232v2, Appendix A, pg. 35 and 36) to justify the use of significant impact levels was used to justify the use of $PM_{2.5}$ SIL. The major source baseline date for $PM_{2.5}$ is October 20, 2010.

[22] For 24-hour $PM_{2.5}$, the background represents the 3-year average value of 98th percentile ambient concentration. For Annual $PM_{2.5}$, the background represents the 3-year average value of annual mean concentration.
[23] Background concentration of most recent and complete year of data (2013-2015).
[24] National Ambient Air Quality Standard (NAAQS) were obtained from EPA's website: http://www.epa.gov/air/criteria.html.
[25] Significant Impact Level (SIL) thresholds for $PM_{2.5}$ were obtained from the Interim $PM_{2.5}$ NAAQS Implementation Guidance.

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TABLE 5-11. 5-YEAR H2H $PM_{2.5}$ BACKGROUND CONCENTRATION FROM DEER PARK #2 MONITOR

Compound	Avg. Period[26]	2011 (µg/m³)	2012 (µg/m³)	2013 (µg/m³)	2014 (µg/m³)	2015 (µg/m³)
$PM_{2.5}$	24-hour	23.70	23.44	27.43	28.40	24.38
	Annual	9.96	9.55	9.45	8.99	8.55

TABLE 5-12. $PM_{2.5}$ BACKGROUND CONCENTRATION JUSTIFICATION

Compound	Avg. Period	Difference in background (2015 – 2011)[27] (A) (µg/m³)	PSD Class II Increment (B) (µg/m³)	Difference (B-A=C) (µg/m³)	SIL (µg/m³)	Difference is greater than or equal to SIL?
$PM_{2.5}$	24-hour	0.68	9	8.32	1.2	YES
	Annual	-1.40	4	5.40	0.3	YES

Per TCEQ's Modeling Guidance (APDG 6232v2, Appendix A, page 36), "If the difference between the PSD increment and the difference in measured background concentrations is greater than or equal to the SIL, then it would be sufficient to conclude that a source with an impact less than the SIL would not cause or contribute to a violation of the PSD increment and forego a cumulative modeling analysis." As seen in and Table 5-12, the difference between the PSD increment and the ambient background concentrations for the time period between the most recent complete year and the major source baseline date is greater than the applicable SIL; BASF believes there is sufficient justification for using the SIL value.

[26] For 24-hour $PM_{2.5}$, the background represents the high, second high value of ambient concentration. For Annual PM2.5, the background represents annual average concentration.

[27] The monitor does not meet the completeness criteria for 2010. Since the major source baseline date was set in October 2010, the background value for 2011 is used for comparison.

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6.0 Modeling Emissions Inventory

6.1 On-property Sources

A detailed description of the project on-property sources of NO_2, CO, PM_{10}, $PM_{2.5}$ and SO_2 to be included in the air dispersion analysis is included in Section 7. The on-site non-project sources will also be included in the PSD NAAQS and increment analysis.

6.2 Off-property Sources

The current inventories of maximum allowable emission rates for industrial sources within 50 km will be obtained from the TCEQ Air Permits Allowable Data Base (APAD) for use in the NAAQS analyses. If the predicted impacts from the full NAAQS analysis are greater than the increment thresholds and a full PSD Increment Analysis is required, only increment consuming sources will be included in the modeling. The primary search option was selected for the inventory sources in both analyses. APAD retrievals were requested from the Information Resources Division of the TCEQ to obtain a current list of off-property inventory sources.

The determination of whether an emissions change at a given source consumes or expands Increment is based on the source definition (major or minor for PSD) and the time the change occurs in relation to baseline dates. The major source baseline date for NO_2 is February 8, 1988, for PM_{10} is January 6, 1975, and for $PM_{2.5}$ is October 20, 2010. Increases or decreases in actual emissions at major sources after the major source baseline date as a result of construction of a new source, a physical or operational change (i.e., modification) to an existing source, or shutdown of an existing source affect the available increment, and therefore, must be included in an increment analysis. Actual emission changes at minor sources only affect increment after the minor source baseline date, which is set at the time when the first complete PSD application is submitted in a county.

As a first step in the PSD increment analysis, the predicted high concentration obtained from the PSD full NAAQS analysis for each averaging period will be compared to the applicable increment. If this analysis results in predicted impacts greater than the increment then all off-property PSD Increment consuming emission sources within the ROI plus at least 50 km will be modeled with BASF sources to demonstrate compliance with Class II PSD Increment Standards. In order to obtain an off property inventory for $PM_{2.5}$ PSD Increment analysis, BASF will review the TCEQ IMS for all PSD major projects within 50 km of the site that have been submitted between the dates of October 20, 2010 (major source baseline date) and December 20, 2011

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(minor source baseline date). Additionally, new modified major and minor projects submitted between the minor source baseline date and the submission of the BASF Freeport permit application will also be reviewed. Per TCEQ's modeling guidance (APDG 6232), the minor source baseline dates have been established for NO_2, PM_{10}, and SO_2 for all areas of the state. For NO_2, the minor source baseline date was established as a single date for the entire state. For PM_{10} and SO_2, the minor source baseline dates were established by air quality control regions (AQCRs). The minor source baseline dates for $PM_{2.5}$ are established by county. The following minor source baseline dates were obtained from TCEQ: NO_2 – February 8, 1988, PM_{10} – August 3, 1978, and $PM_{2.5}$ (Brazoria County) – December 20, 2011. Sources and emissions of qualifying projects as noted above will be requested from TCEQ and included as Increment consuming sources in the PSD Increment analysis. The results of the $PM_{2.5}$ PSD Increment analyses will be reported as the highest modeled concentration, per EPA guidance.

As per TCEQ guidance, the APAD retrieval should be supplemented, as necessary, with recently-permitted sources. Thus, in an effort to ensure a more complete inventory is included in the Full Impacts Analysis, BASF will obtain from TCEQ a list of regulated entities within each pollutant's respective AOI and identify regulated entities that are absent from the APAD retrieval. BASF will then make a reasonable attempt to obtain and incorporate source parameter and emissions information into the off-property inventory. Proposed efforts include obtaining modeled parameters from air quality analyses recently submitted to TCEQ, reviewing the most-recent emissions inventory (EI) stack locations and parameters, and reviewing permit application files.

6.2.1 Supplementing Data from APAD

The data obtained from the APAD search contains information from the Point Source Database (PSDB) which was last updated to include sources permitted prior to 2000. BASF will supplement the data obtained from the APAD search with a permit search using TCEQ's Remote Document Server, the permit files from TCEQ's Central Records for permits issued within a 3-year period prior to the date of TCEQ's approval of this modeling protocol. Source parameters, emission rates and coordinates will be obtained from permit information and the TCEQ's State of Texas Air Reporting Systems (STARS) 2014 EI database.

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Per EPA guidance[28], considering all sources within a 50 km radius of the facility is likely to produce overly conservative results; therefore, EPA suggests that "the emphasis on determining which nearby sources to include in the modeling analysis should focus on the area within about 10 kilometers of the project location in most cases." The maximum ROI for the project is expected to be less than 10 km; therefore, predicted impacts of project sources are not expected to contribute significantly to the ground level concentrations at receptors beyond 10 km from the facility. BASF is proposing to refine the data obtained from the permit search and 2014 EI to include sources from all regulated entities within a radius of 10 km of the facility or ROI, whichever is greater. The facilities fitting this criterion will be considered in addition to all the sources obtained from the APAD retrieval

6.2.2 Data Corrections

In order to rectify inconsistencies and data gaps in the APAD retrieval, BASF will make a reasonable effort to verify the data from the APAD retrieval with the data obtained from searching TCEQ's permit database and most recent available EI. Additionally, per TCEQ's Air Quality Modeling Guidance, missing or invalid data will be handled as follows:

- Missing emission rates: Allowable emission rate represented as 0 lb/hr or 0 tpy in the APAD retrieval will be replaced with allowable emission rates from permit application files;
- Missing or invalid source parameters:
    - For missing or invalid parameters for type "STACK" and "FLARE": Height = 1.0 meter, Temperature = 0 Kelvin, Velocity = 0.001 meters/second, Diameter = 0.001 meters; and
    - For missing or invalid parameters for type "FUGITIVE": Height = 1.0 meter, Length = 1.0 meter, Width = 1.0 meter, Degree = 0.
- Missing source coordinates: For sources with invalid or missing coordinates, the sources will be modeled approximately at the center of the facility.

[28] EPA, Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard, pg. 16, March 1, 2011.

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7.0 Modeling Emissions Sources

In this section, the types of emission sources used within this modeling project are described.

7.1 Source Parameters

Point, pseudo-point, flare and area sources will be used to evaluate health impacts for this modeling analysis. Following is a description of the proposed source characterization:

- Sources with vertical releases and exit velocities will be modeled as point sources;
- Tank emissions and sources with little or no vertical velocity (e.g. stacks with rain caps or horizontal releases) will be modeled as pseudo point sources as follows[29]:
    - Stack diameter: actual;
    - Exit temperature: ambient/actual; and
    - Exit Velocity: 0.001 m/s;
- Flares will be modeled per TCEQ guidance with the following parameters:
    - Exit gas velocity: 20 meters per second;
    - Exit gas temperature: 1273 Kelvin;
    - Height of release: use the actual height of the flare tip
    - Effective Diameter: Calculated using the equations specified in TCEQ's modeling guidance document (APDG 6232).
- Process area fugitives and other sources with ground-level emissions spread over an area will be modeled as area sources.

Non-default stack parameters will be derived from vendor information, and/or process knowledge.

7.1.1 Stack Parameter Justification

In general, process area fugitives will be represented with the dimensions specific to the process area and are representative of the emissions that will be released concurrently in a 1-hour period. Two process areas have been represented as FUGAREA1 and FUGAREA2 modeling Source IDs. FUGAREA1 and FUGAREA2 each correspond to fugitive emissions areas for the "methanol section" and "MTP section" of the plant, respectively. The emissions associated with these areas are from piping equipment and other fugitive equipment sources with little or no

[29] Per TCEQ's Air Quality Modeling Guidelines (APDG 6232) dated April 2015 and EPA's AERMOD Implementation Guide dated March 19, 2009.

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plume rise and hence can be characterized as area sources. Similarly, emissions from maintenance, startup and shutdown (MSS) activities carried out in the process areas are also located in the same extents of FUGAREA1 and FUGAREA2, which correspond to equipment opening activities in the methanol and MTP sections. These emissions also disperse in two dimensions with little or no plume rise and hence can be characterized as area sources. Area source release heights will be placed at the average midpoint height of the released emissions.

Point source parameters will be based on current design estimates. Flares will use default parameters and calculated effective diameters. The effective diameter calculations will be provided in the report.

7.1.2 Scenario Justification

Intermittent Sources Justification

MSS Emissions from Flares (EPNs 18-1-11, 18-1-12, and 18-1-13): Typically only emissions from pilot flames are expected from the elevated flares (EPN 18-1-11 and 18-1-12) and the enclosed ground flare (EPN 18-1-13) during normal operations. The elevated flare and the EGF may be used during startup and shutdown activities to control excess emissions. Startup and shutdown emissions from OPUS are infrequent events that occur on a limited number of days per year (we expect to have an explicit limit on the number of startups/shutdowns in the NSR permit). Estimated times for the events are as follows:

Cold startup: Approximately 48 hr duration, continuous event, 1x/yr
Warm startup: Approximately 24 hr duration, continuous event, 3x/yr
Cold shutdown: Approximately 14 hr duration, continuous event, 1x/yr
Warm shutdown: Approximately 12 hr duration, continuous event, 2x/yr

We further note that cold startups and shutdowns, which have higher emissions than warm startups and shutdowns, are likely to occur only once every 3-4 years (although we cannot permit for a frequency of less than once per year), further justifying the annualization of these emissions.

We believe that the flares are the exact types of sources described as “intermittent sources” in the EPA guidance, as they are on a random schedule, and typically will operate less than 2% of the year (158 hr/yr) if all the permitted events occur in a single year.

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Per guidance included in EPA's memorandum titled *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard* dated March 1, 2011, specifically pertaining to treatment of intermittent sources, MSS emissions from flares at the site will be modeled as intermittent sources. Therefore, annualized emission rate will be used for 1-hour NO_2 and 1-hour SO_2 NSR NAAQS analysis. Annualized emission rates will not be used for normal operation emissions, all other averaging periods, and other pollutants.

Auxiliary Boilers (EPNs 18-1-5 and 18-1-6): The auxiliary boilers normally operate at a low firing rate (typically 25%) during normal operation, but are operated at near 100% load during startup / shutdown operations and other times during normal operations when steam is required. The normal operations and MSS emissions are proposed to be permitted separately in the NSR permit. BASF is proposing to model emissions from MSS activities from the auxiliary boilers as intermittent sources. We estimate that they may operate at this higher load for approximately 10 days/yr to support startup and shutdown operations and 8 days to provide supplemental steam during normal operations.

Per guidance included in EPA's memorandum titled *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard* dated March 1, 2011, specifically pertaining to treatment of intermittent sources, the auxiliary boilers at the site will be modeled as intermittent sources. Therefore, annualized emission rate will be used for 1-hour NO_2 and 1-hour SO_2 NSR NAAQS analysis.

Emergency generators (EPNs 18-1-20 through 18-1-22): Emergency generators proposed at the site are operated only for the purpose of testing and are not operated on a continuous basis. BASF is proposing to operate these engines for an hour per week for testing purposes for up to a total annual operation time of 52 hours. BASF will only be testing one engine at a time. Consequently, the operation of these sources is not expected to contribute significantly to the annual distribution of daily maximum 1-hour contributions.

Per guidance included in EPA's memorandum titled *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard* dated March 1, 2011, specifically pertaining to treatment of intermittent sources, the emergency generators (EPNs 18-1-20 through 22) at the site will be modeled as intermittent sources. Therefore, annualized emission rate will be used for 1-hour NO_2 and 1-hour SO_2 NSR NAAQS analysis.

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If a cumulative impact analysis (full NAAQS) is required using Tier 3 analysis using Ozone Limiting Method (OLM) or Plume Volume Molar Ratio Method (PVMRM), the in-stack ratio of the intermittent sources would be set to 1 while the annualized emission rates are used for 1-hour NO_2 analysis.

The proposed BASF Freeport plant will be located in Houston-Galveston-Brazoria (HGB) ozone nonattainment area; therefore, testing of engines cannot be carried out between 6AM and noon. A total potential operating time of 6,570 hours per year representing the operating restrictions for this area will be used while annualizing NO_2 1-hour and SO_2 1-hour emission rates.

Operating Scenario Justification

When flaring, EPN 18-1-13 (Enclosed Ground Flare, EGF) will be used as the primary control device. If the flow of process gases exceeds the maximum capacity of the Enclosed Ground Flare (not expected), the excess throughput would then be automatically diverted to the elevated flares [EPNs 18-1-11 for Methanol (MeOH) and 18-1-12 for Methanol to Propylene (MTP)] for destruction. We propose to model the pilot emissions from the EGF and elevated flares as continuous sources. Emissions from the MSS activities routed to the flare system would be normally routed to the EGF and therefore would be modeled as such. Additionally, a comparison analysis will be conducted to determine the worst-case impacts from EGF versus flares. MSS emissions will be modeled from the worst-case scenario.

The modeled emission rates, source parameters and coordinate information will be included with the modeling report.

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8.0 Model Descriptions and Techniques

This section outlines the dispersion modeling techniques utilized in the modeling analysis.

8.1 Dispersion Model Selection

EPA's preferred model, the American Meteorological Society/Environmental Protection Agency Regulatory (AERMOD) model (Version 15181), will be utilized for all modeling evaluations. AERMAP (AMS/EPA Regulatory Model Terrain Pre-processor) (version 11103) was used to process terrain data from the NED files.

8.2 PSD Air Quality Analysis Methodology

The NAAQS are maximum concentration limits measured in terms of the total concentration of a pollutant in the atmosphere. In a typical PSD NAAQS analysis, off-property inventory emissions sources located within the ROI plus 50 km will be modeled along with all the onsite sources to demonstrate compliance with the NAAQS. Per NAAQS review, BASF will perform an air quality analysis for NO_2, CO, PM_{10} and $PM_{2.5}$ as described in the procedures outlined in TCEQ's Air Quality Modeling Guidelines, (APDG 6232v2, Revised 4/2015).

The Tier 2 NO_2 evaluation method explained in the EPA's memorandum *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard* dated March 1, 2011, Ambient Ratio Method (ARM), will be used as a first-pass for cumulative NAAQS compliance demonstration. BASF proposes to use the ARM ratio of 0.8 for the 1-hour NO_2 standard and 0.75 for the annual NO_2 standard. If it is determined that a more detailed analysis is required then BASF is proposing to use in-stack ratios obtained from the EPA's NO2/NOx In-Stack Ratio (ISR) Database[30] to perform Tier 3 NO_2 evaluation.

8.3 PSD Increment Analysis Methodology

A PSD Increment is the maximum increase in ambient concentrations allowed to occur above a baseline date for a pollutant. As a first step in the PSD increment analysis, the predicted maximum annual concentration for the NO_2, PM_{10}, and $PM_{2.5}$ annual averaging time, and high,

[30]The EPA's ISR database can be accessed here: https://www3.epa.gov/scram001/no2_isr_database.html

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second high (H2H) predicted concentration for the PM_{10} and $PM_{2.5}$ 24-hour averaging period obtained from the PSD full NAAQS analysis will be compared to the applicable increment. If this analysis results in predicted impacts greater than the increment then all off-property PSD Increment consuming emission sources within the ROI plus at least 50 km will be modeled with BASF sources to demonstrate compliance with Class II PSD Increment Standards. A PSD Increment consumer is defined as (1) any new *major* stationary source that has been constructed since, or any existing *major* stationary source that has been modified after the *major* source baseline date, and (2) any new stationary source that has been constructed, or any existing stationary source that has been modified after the *minor* source baseline date.[31] For a given pollutant, the major source baseline date is the date after which actual emissions associated with construction at *major* stationary sources consume the available PSD Increment. The minor source baseline date is the date of submittal of the first complete PSD permit application in the area after the trigger date.

A current list of off-property inventory PSD Increment consuming sources will be obtained from TCEQ based on the procedures described in Section 6 of this protocol for the PSD Increment Analyses for applicable averaging periods involving NO_2, $PM_{2.5}$, and PM_{10}, if necessary.

Per EPA guidance, NO_2, $PM_{2.5}$, and PM_{10} annual average impacts will be reported as the maximum annual average concentration over the one year on-site meteorological data modeled. PM_{10} (24-hour) average impacts will be reported as the highest yearly second high (H2H) modeled concentration for one year on-site meteorological data modeled. The $PM_{2.5}$ average 24 hour impacts will be reported as the maximum high, second high (H2H) 24-hour average modeled concentration one year on-site meteorological data modeled. There are no PSD Increments for CO.

In order to determine which major source modifications to include in the PSD Increment analysis for applicable pollutants and averaging periods, NSR projects at all major sources within a radius from the Freeport facility equal to the applicable ROI plus 50 km will be analyzed.

Project numbers of modeling projects completed since the minor source baseline date with potential impacts for significant receptors for the proposed BASF project will be requested. The

[31] U.S. EPA, Office of Air Quality Planning and Standards, New Source Review Workshop Manual: Prevention of Significant Deterioration and Nonattainment Area Permitting, DRAFT, October 1990; pg. C.35 – C.36.

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applicable modeling projects between the minor source baseline date and the date of application will be utilized to determine increment consuming emissions of applicable pollutants.

8.4 Health Effects Evaluation Methodology

Per anticipated TCEQ request, BASF will perform an air quality analysis for all pollutants as required by MERA guidance.

8.5 Minor NSR NAAQS

The predicted high concentration for all averaging period from the preliminary impact determination will be compared to the applicable SILs to determine compliance with Minor NSR NAAQS for SO_2. BASF anticipates the SO_2 impacts for all averaging periods to be less than SILs; therefore, additional modeling is not proposed for SO_2. If the impacts exceed the SILs a cumulative NAAQS analysis will be conducted to predict impacts from off-property sources in addition to the on-site source.

8.6 State Property Line Analysis

TCEQ Air Quality Modeling Guidelines summarizes the general procedure for a State Property Line analysis. Modeling for the State Property Line evaluation began with modeling the net emissions increase of SO_2 (1-hour). Predicted ground-level concentrations from the proposed sources will be compared to De Minimis concentrations equal to two percent[32] of the State Property Line standard. If maximum predicted impacts are below these levels, the project does not cause a significant air quality impact, and no further modeling is required.

8.7 Additional Impacts Analysis

An additional impacts analysis will be performed for the project per TCEQ and EPA guidance to show that the impacts from the proposed project will not impair visibility, soils and vegetation as result of the emissions. The additional impact analysis will address the following elements:

Growth Analysis – Construction for the proposed expansion project will begin upon issuance of authorizations by TCEQ (expected in the fourth quarter of 2016). The project is expected to create additional 128 permanent jobs in the area. The project is expected to employ as many as

[32] Per TCEQ's document Air Quality Modeling Guidelines, April 2015 (APDG 6232v2)

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1,000-1,500 additional temporary workers for the construction and commissioning of the project starting first quarter of 2017 and will continue into third quarter of 2018. The total increase due to permanent jobs is less than 0.25% of the population of Brazos Port Area.[33] The project is not expected to cause a significant shift in the population and activity in the area; therefore, the associated air emissions are not expected to have significant impacts.

Class II Visibility Impairment Analysis - Brazoria County is classified as a Class II area, which allows normal well-managed industrial growth. The TCEQ has no specific modeling requirements for visibility impairment. The TCEQ specifies that compliance with TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, meets visibility requirements. BASF complies with Class II visibility analysis by acknowledging compliance with the visibility and opacity requirements in 30 TAC Chapter 111. Therefore, no additional analysis is required.

Class I Visibility Impairment Analysis – The project is proposed to be located in Freeport Texas. The nearest Class I area, Caney Creek Wilderness is 600km away from the facility's proposed location. Therefore, the proposed emissions are not expected to contribute to visibility impairment in any Class I areas.

Soils and Vegetation Analysis – EPA has developed NAAQS Secondary standards to provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. The predicted impacts of emissions from the proposed sources are expected to be less than the primary NAAQS, which are more conservative than the secondary NAAQS. TCEQ has determined that the ambient concentrations of criteria pollutants below secondary NAAQS will not result in harmful effects; therefore, further analysis of soil and vegetation impacts is not required.

[33] Based on a 2014 estimate of combined population of Brazos Port Area, which includes City of Freeport (12,191), City of Clute (11,392), and City of Lake Jackson (27,604) obtained from United States Census Bureau accessed on April 5, 2016: http://www.census.gov/quickfacts/map/PST045214/4827420,48

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9.0 Land Use

Several parameters are used to describe the character of the modeled domain, including surface roughness length, albedo, and Bowen ratio. All of these factors have been considered while developing site specific meteorological data. A 1 year (2012) on-site preprocessed meteorological data set prepared and submitted to TCEQ for an amendment to BASF NSR permit 1733A at the same location will be utilized for this modeling exercise. Additional information and justification for utilization of the on-site meteorological data is included in the modeling exercise previously submitted to and approved by TCEQ.

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10.0 Terrain

BASF Freeport site is located in the Brazoria County. The analysis used terrain heights obtained from Multi-Resolution Land Characteristics Consortium (MRLC) National Land Cover Database (NLCD) National Elevation Datasets (NED) files. For the BASF Freeport facility, NED files were obtained from the query generated by BEEST based on terrain limits at the following website: http://www.mrlc.gov/viewerjs. AERMAP (AMS/EPA Regulatory Model Terrain Pre-processor) was used to process terrain data from the NED files.

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11.0 Building Wake Effects

Direction-specific building data will be generated for stack heights below good engineering practice (GEP) using the EPA Building Parameter Input Program PRIME (BPIPPRM; version 04274). A plot plan illustrating both emission points and building downwash structures for the BASF Freeport site will be provided in the modeling report. UTM coordinates for building corners were determined to identify building shapes and locations (UTM Zone 15 NAD 27). This information, along with the building heights will be used by BPIPPRM to obtain downwash inputs to AERMOD. This information will be included with the modeling report.

AERMOD considers direction-specific downwash using the PRIME algorithm which is evaluated in the BPIPPRM program. All BPIPPRM input and output modeling files will be listed in Section 15.0 of the final modeling report.

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12.0 Receptor Grid

The receptor grid used for this modeling analysis is as follows:

- 25-meter spacing extending from the property line out to 300 meters;
- 100-meter spacing within 1 km of the facility for any locations not covered by the 50-meter grid;
- 500-meter spacing within 5 km of the facility for any locations not covered by the 100-meter grid; and
- 1000-meter spacing within 10 km of the facility for any locations not covered by the 500-meter grid.

Figures of the receptor grid design will be included with the modeling report. If necessary, industrial and non-industrial areas will be evaluated with separate receptor grids. For the purposes of this modeling analysis, it is considered that the property line and the fence line are the same.

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13.0 Meteorological Data

Per guidance received from TCEQ during the pre-modeling meeting on June 16, 2015, a 1 year (2012) on-site preprocessed meteorological data set prepared and submitted to TCEQ for an amendment to BASF NSR permit 1733A at the same location will be utilized for this modeling exercise. Additional information and justification for utilization of the on-site meteorological data, originally provided with the NSR Permit 1733A, will be included in the AQA.[34]

During preparation of the AQA, BASF determined that substituting data from the Brazoria County Airport in place of missing onsite data (i.e., using the "SUBNWS" AERMET method) leads to a misrepresentation of the conditions at the Freeport site during the few hours of missing onsite data. BASF is proposing to use onsite data alone with no substitutions from the unrepresentative Brazoria County Airport data. Technical justification for this approach was prepared in support of the AQA for Permit 1733A by TRC on behalf of BASF and submitted to TCEQ in April 2015 (included in Appendix A).

[34] This data was provided in the report submitted by TRC on June 9, 2014 to TCEQ in support for the data used in the Air Quality Analysis (AQA) for BASF's NSR Permit 1733A amendment application.

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14.0 Modeling Results

Modeling results will be included in the forthcoming final modeling report.

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15.0 Modeling Runs and Hard Copy Output

The AERMOD model input and output files will be provided on a CD or DVD which will be submitted concurrently with the final modeling report.

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16.0 CD

The modeling report will include a CD or DVD with all associated electronic files.

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17.0 References

TCEQ, 2015 — *Air Quality Modeling Guidelines (Revised)*, APDG 6232v2, Revised 4/2015. Texas Natural Resource Conservation Commission, P.O. Box 13087, Austin, Texas 78711-3087.

TCEQ, 2009 — *Modeling and Effects Review Applicability: How to Determine the scope of Modeling and Effects Review for air Permits*, APDG 5874, July 2009, Air Permits Division, Texas Commission on Environmental Quality.

EPA, 2014 — *Guidance for PM2.5 Modeling*, May 2014, United States Environmental Protection Agency, Research Triangle Park, NC 27711

EPA, 2011 — *Addendum User's Guide for the AMS/EPA Regulatory Model – AERMOD*

EPA, 2011 — *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard*

EPA, 2011 — *Additional Clarification Regarding Application of Appendix W Modeling Guidance for 1-hour NO2 National Ambient Air Quality Standard,* March 1, 2011, Air Quality Modeling Group, C439-01, Environmental Protection Agency, Research Triangle Park, NC 27711

EPA, 2006 — *40 CFR Appendix N to Part 50 (Interpretation of the National Ambient Air Quality Standards for PM2.5*

EPA, 2005 — *Revision to the Guidance on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions; Final Rule*, November 2005, EPA Code of Federal Regulations Title 40 Part 51 Appendix W., 1301 Constitution Ave., NW., Washington, DC 20004.

EPA, 2004 — User's Guide For the AMS/EPA Regulatory Model – AERMOD, U.S. Environmental Protection Agency, Research Triangle Park, NC.

EPA, 1990 — *New Source Review Workshop Manual Prevention of Significant Deterioration and Nonattainment Area Permitting (Draft)*, October 1990, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711.

EPA, 1978 — *Guideline on Air Quality Models*, April 1978, Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711.

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APPENDIX A
TECHNICAL JUSTIFICATION OF METEOROLOGICAL DATA

TRC Environmental Corporation
10011 Meadowglen Lane, Suite 100
Houston, Texas 77042
Main 713.244.1000 ● Fax 713.244.1099

To:	Mr. Dan Jamieson, TCEQ ADMT
From:	BASF Corporation
Subject:	Air Quality Analysis (AQA) for TCEQ Permit No. 1733A
Date:	April 20, 2015

Onsite Meteorological Data Processing Protocol Supplement

1.0 Project Information and Introduction

Applicant:	BASF Corporation
Facility:	Freeport Complex
Permit Application No.:	1733A
Nearest City:	Freeport
County:	Brazoria County
Customer Reference No.:	CN 600124895
Regulated Entity No.:	RN 100218049
Applicant's Modeler:	Elizabeth Stanko, TRC

Onsite meteorological data from the BASF Corporation (BASF) Freeport plant were used to calculate AERMOD impacts for use in the Air Quality Analysis (AQA) for permit 1733A. BASF received approval for the use of onsite meteorological data in May 2014 after several protocol iterations and receiving comments from TCEQ ADMT. Following the protocol review by TCEQ, a revision was made to the onsite meteorological data processing protocol to omit substitution of airport wind data from Brazoria County Airport (LBX) in place of missing onsite data. This protocol supplement provides technical data in support of the revision to the final onsite meteorological data processing protocol that was prepared in support of the AQA for permit 1733A submitted in March 2015.

2.0 Onsite Meteorological Data Processing Technical Supplement

During preparation of the AQA, BASF determined that substituting data from the Brazoria County Airport in place of missing onsite data (i.e., using the "SUBNWS" AERMET method) leads to a misrepresentation of the conditions at the Freeport site during the few hours of missing onsite data. This determination is based on several important factors:

1. **Onsite Data Capture Rate**

   The onsite data has an exceptional data capture rate. At a 98.75% capture rate, the onsite data followed the TCEQ-accepted BASF's Air Quality Monitoring Quality Assurance

Project Plan (QAPP). This data capture exceeds even the Brazoria County Airport capture rate for the same period (97.4%) and together with the approved QAPP procedures leads to a robust and representative meteorological data set for the BASF Freeport site.

2. **Dominant Wind Conditions**

   The Brazoria County Airport dominant wind conditions are different than that which is observed at the Freeport site. The Brazoria County Airport wind rose Figure 1 in Attachment A shows a dominant stronger southerly flow versus the onsite data wind rose Figure 2 in Attachment A, which records a dominant weaker southeasterly flow. In addition, the airport reports a significant northerly flow that is not observed to a high degree (occurs less than 7 percent of the time) at the Freeport site.

3. **Surface Roughness Characteristics**

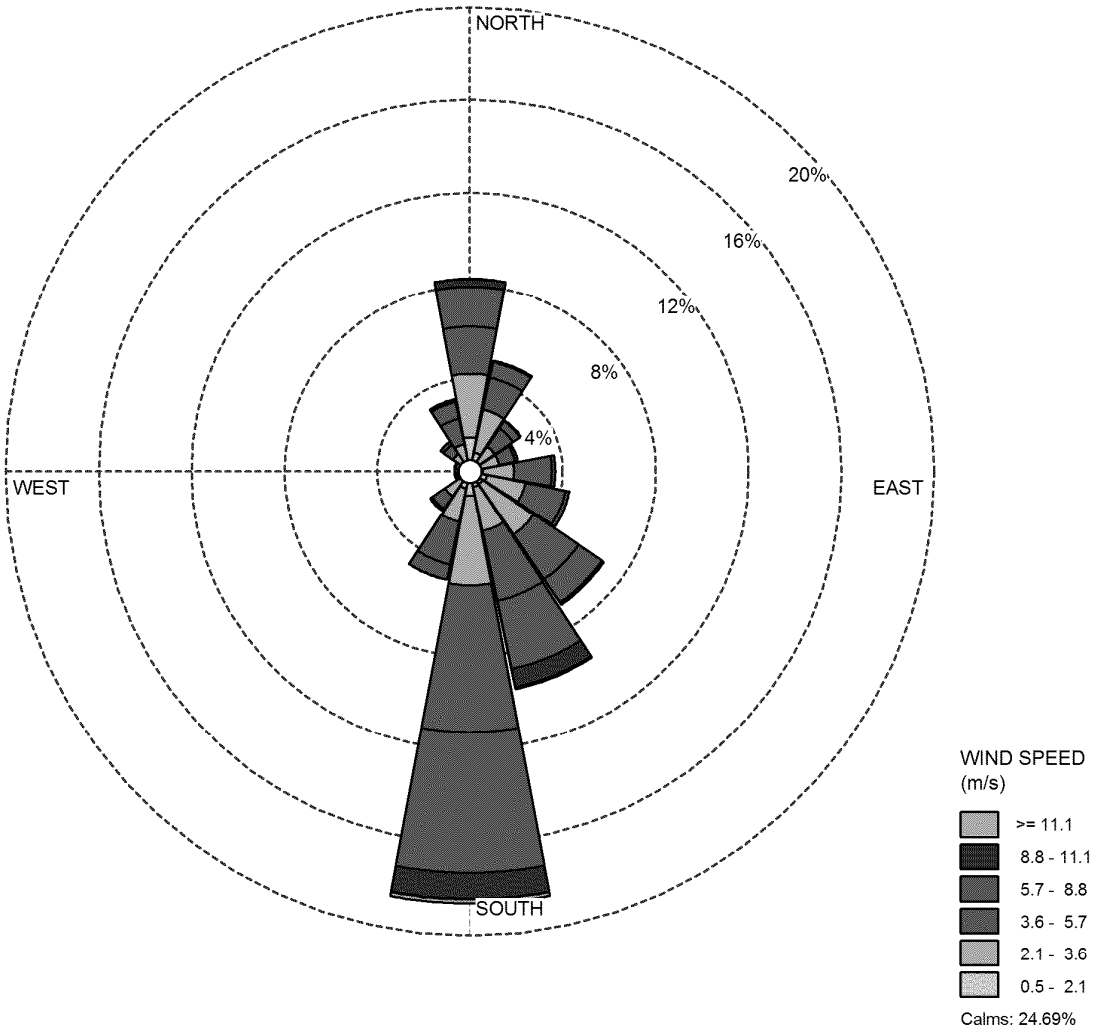
   The Freeport site has substantially higher surface roughness characteristics as calculated by AERSURFACE. Figure 3 in Attachment A and Table 1 in Attachment A show an analysis of the Freeport site surface roughness compared directly to the Brazoria County Airport surface roughness. The values are paired according to identical AERSURFACE seasons and sectors and show quite clearly that the Freeport site is characterized by higher surface roughness for nearly all seasons and sectors. Substituting a lower and unrepresentative surface roughness from the airport during AERMET processing will directly lead to a lower and unrepresentative mechanical mixing depth at the Freeport site.

For the above reasons, we have used the onsite data alone with no substitutions from the un-representative Brazoria County Airport data. Attachment A provides Figures 1 through 3, and Table 1.

Attachment A

Figure 1

WIND ROSE PLOT:
Brazoria County Airport Meteorological Observations

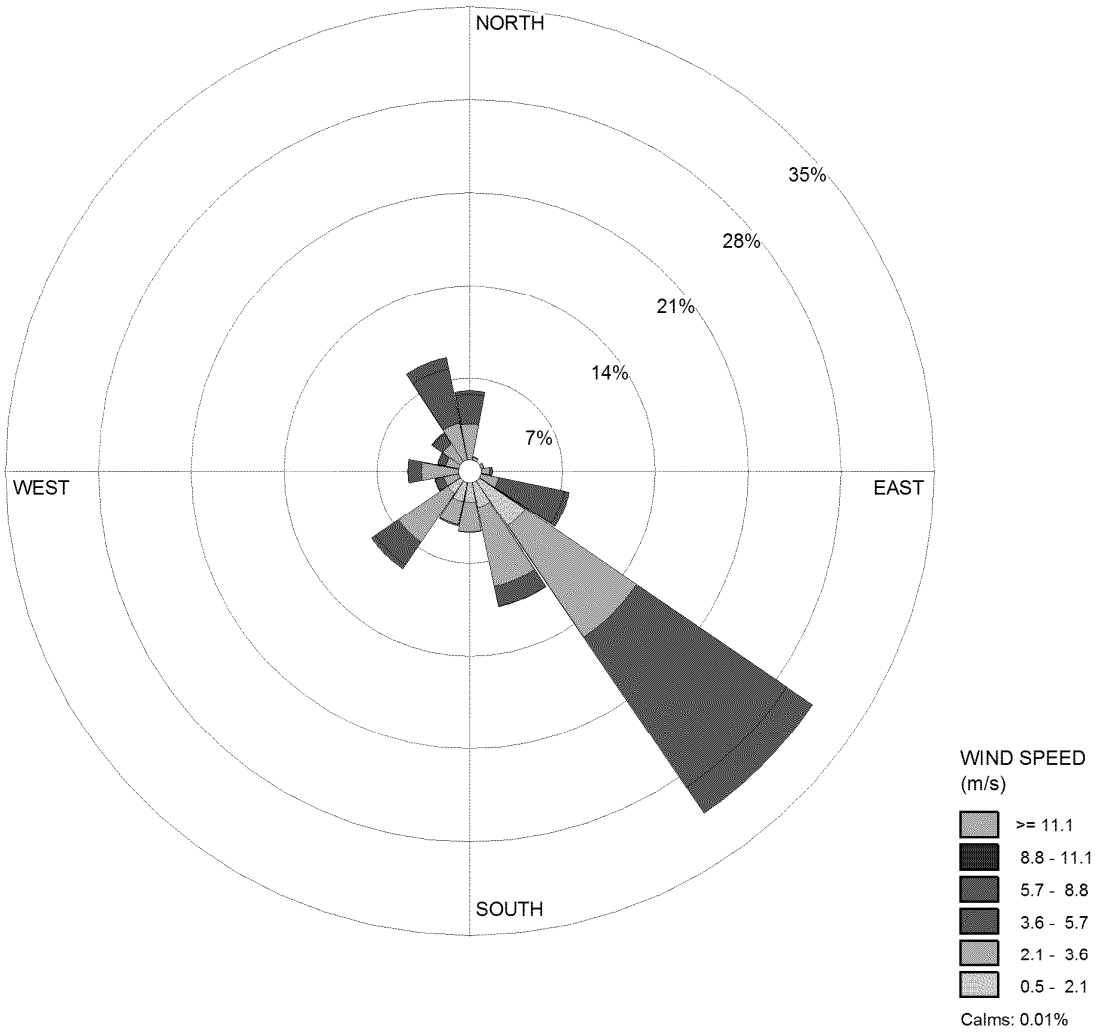


COMMENTS: Location: 95.462W, 29.11N Data Time: 1/1/2012 00:00 through 12/31/2012 23:00 221 missing / incomplete records (97.4% capture)		COMPANY NAME: **TRC Environmental Corporation**	
		MODELER: **Matthew S Jones**	TRC Results you can rely on
	CALM WINDS: **24.69%**	TOTAL COUNT: **8563 hrs.**	
	AVG. WIND SPEED: **3.26 m/s**	DATE: **4/16/2015**	PROJECT NO.: **194889**

WRPLOT View - Lakes Environmental Software

Figure 2

WIND ROSE PLOT:
Freeport Site Onsite Meteorological Observations



COMMENTS: Location: 95.399W, 29.001N Data Time: 1/1/2012 00:00 through 12/31/2012 23:00 110 missing / incomplete records (98.7% capture)		COMPANY NAME: **TRC Environmental Corporation**	
		MODELER: **Matthew S Jones**	TRC Results you can rely on
	CALM WINDS: **0.01%**	TOTAL COUNT: **8674 hrs.**	
	AVG. WIND SPEED: **3.27 m/s**	DATE: **4/16/2015**	PROJECT NO.: **194889**

WRPLOT View - Lakes Environmental Software

Figure 3

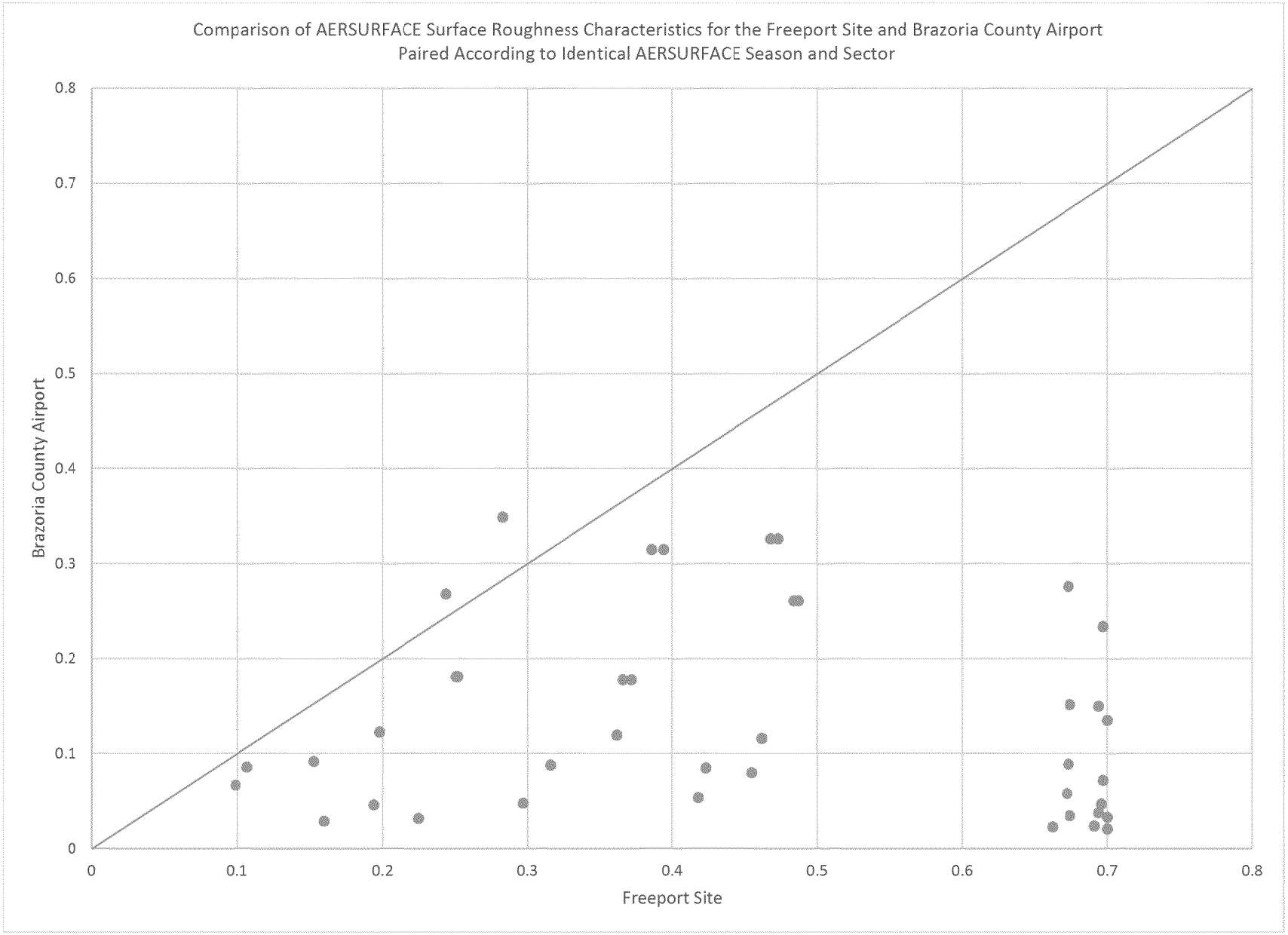


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Table 1 - AERSURFACE Output Comparison

Freeport Site 29.000536N, 95.402256W					Brazoria County Airport 29.115503N, 95.463190W				
Season	Sect	Alb	Bo	Zo	Season	Sect	Alb	Bo	Zo
1	1	0.16	1.12	0.225	1	1	0.16	1.41	0.032
1	2	0.16	1.12	0.316	1	2	0.16	1.41	0.088
1	3	0.16	1.12	0.423	1	3	0.16	1.41	0.085
1	4	0.16	1.12	0.662	1	4	0.16	1.41	0.023
1	5	0.16	1.12	0.691	1	5	0.16	1.41	0.024
1	6	0.16	1.12	0.7	1	6	0.16	1.41	0.021
1	7	0.16	1.12	0.696	1	7	0.16	1.41	0.047
1	8	0.16	1.12	0.672	1	8	0.16	1.41	0.058
1	9	0.16	1.12	0.418	1	9	0.16	1.41	0.054
1	10	0.16	1.12	0.099	1	10	0.16	1.41	0.067
1	11	0.16	1.12	0.107	1	11	0.16	1.41	0.086
1	12	0.16	1.12	0.16	1	12	0.16	1.41	0.029
2	1	0.15	0.95	0.297	2	1	0.14	0.97	0.048
2	2	0.15	0.95	0.362	2	2	0.14	0.97	0.12
2	3	0.15	0.95	0.462	2	3	0.14	0.97	0.116
2	4	0.15	0.95	0.674	2	4	0.14	0.97	0.035
2	5	0.15	0.95	0.694	2	5	0.14	0.97	0.038
2	6	0.15	0.95	0.7	2	6	0.14	0.97	0.033
2	7	0.15	0.95	0.697	2	7	0.14	0.97	0.072
2	8	0.15	0.95	0.673	2	8	0.14	0.97	0.089
2	9	0.15	0.95	0.455	2	9	0.14	0.97	0.08
2	10	0.15	0.95	0.153	2	10	0.14	0.97	0.092
2	11	0.15	0.95	0.198	2	11	0.14	0.97	0.123
2	12	0.15	0.95	0.194	2	12	0.14	0.97	0.046
3	1	0.16	0.82	0.372	3	1	0.17	0.88	0.178
3	2	0.16	0.82	0.394	3	2	0.17	0.88	0.315
3	3	0.16	0.82	0.473	3	3	0.17	0.88	0.326
3	4	0.16	0.82	0.674	3	4	0.17	0.88	0.152
3	5	0.16	0.82	0.694	3	5	0.17	0.88	0.15
3	6	0.16	0.82	0.7	3	6	0.17	0.88	0.135
3	7	0.16	0.82	0.697	3	7	0.17	0.88	0.234
3	8	0.16	0.82	0.673	3	8	0.17	0.88	0.276
3	9	0.16	0.82	0.487	3	9	0.17	0.88	0.261
3	10	0.16	0.82	0.244	3	10	0.17	0.88	0.268
3	11	0.16	0.82	0.283	3	11	0.17	0.88	0.349
3	12	0.16	0.82	0.252	3	12	0.17	0.88	0.181
4	1	0.16	1.12	0.366	4	1	0.17	1.41	0.178
4	2	0.16	1.12	0.386	4	2	0.17	1.41	0.315
4	3	0.16	1.12	0.468	4	3	0.17	1.41	0.326
4	4	0.16	1.12	0.674	4	4	0.17	1.41	0.152
4	5	0.16	1.12	0.694	4	5	0.17	1.41	0.15
4	6	0.16	1.12	0.7	4	6	0.17	1.41	0.135
4	7	0.16	1.12	0.697	4	7	0.17	1.41	0.234
4	8	0.16	1.12	0.673	4	8	0.17	1.41	0.276
4	9	0.16	1.12	0.484	4	9	0.17	1.41	0.261
4	10	0.16	1.12	0.244	4	10	0.17	1.41	0.268
4	11	0.16	1.12	0.283	4	11	0.17	1.41	0.349
4	12	0.16	1.12	0.251	4	12	0.17	1.41	0.181

ED_001261_00097196

BASF Corporation
Freeport Plant - Project OPUS

May 13, 2016

Subject: BASF Corporation Air Quality Analysis Protocol – response to comments.

Please find below response to TCEQ's comments prepared by AECOM on behalf of BASF:

TCEQ: 2.0 Project Overview – The purpose of any AQA for permitting is for the applicant to make a demonstration that their operation, as represented, would not cause or contribute to a National Ambient Air Quality Standard (NAAQS) or PSD Increment violation or adversely affect public health and welfare. The representation made in the demonstration is typically a worst-case representation of the operation. All representations must be supported with technical justifications. Though assumptions and selections can be made using general guidance, these assumptions and selections must be justified why the particular guidance is appropriate to a specific case. A statement that the guidance has been followed or referencing discussions with TCEQ staff is not sufficient justification.

AECOM: *Text in this section has been revised to include language suggested by TCEQ.*

TCEQ: 2.1 Preliminary Impact Determination – Table 2-1 of the protocol lists the criteria pollutant thresholds. For PM_{10}, only the 24-hr averaging time was addressed. Although the PM_{10} annual NAAQS has been revoked, annual PM_{10} will still need to be addressed for the increment analysis. Please note that the de minimis level for annual PM_{10} is 1 $\mu g/m^3$.

AECOM: *Text in this section has been revised to include de minimis level for PM_{10} suggested by TCEQ.*

TCEQ: 2.2 PSD Review – When conducting the PSD Significance analyses, consider all new and increased emissions from the site related to the project, including emissions associated with all planned maintenance, start-up, and shut down (MSS) activities. For pollutants that exceed the associated de minimis levels, conduct a NAAQS analysis that considers all allowable emissions at the site, including emissions associated with all planned MSS activities, permit-by-rules (PBRs), and emissions from off-property sources and activities. For applicable pollutants, conduct a PSD increment analysis that considers all increment consuming sources.

Note that 24-hr and annual $PM_{2.5}$ will need to be evaluated modeling the individual years to determine if a PSD full increment analysis will be required.

AECOM: *BASF has noted this comment and will consider when conducting Air Quality Analysis (AQA).*

TCEQ: 2.2.2 PSD Increment Analysis – The protocol notes that the maximum predicted impacts from the cumulative PSD NAAQS analysis (excluding background concentrations) will be used in the increment analysis. Please note that utilizing the results from the NAAQS demonstration may not be appropriate for PM_{10} and $PM_{2.5}$, depending on the output metric used.

ED_001261_00097197

AECOM: *BASF has noted this comment and will consider when conducting air quality modeling analysis. BASF will be comparing the appropriate averaging period to appropriate thresholds for increment analysis. The text under this section has been updated.*

TCEQ: 2.2.3 Pre-application Analysis – The purpose of the pre-application analysis is to provide an analysis of the existing ambient air quality in the area that the major source or major modification would affect. The pre-application analysis can be addressed by providing representative monitoring data to establish the existing air quality in the area. An applicant may be exempt from this requirement by demonstrating that the model predictions associated with the project emissions are less than the significant monitoring concentrations (SMCs). Although noted in other sections of the protocol, $PM_{2.5}$ was not identified in this section as a pollutant requiring a pre-application analysis. The SMC for $PM_{2.5}$ has been vacated and is no longer applicable; therefore, the pre-application analysis for $PM_{2.5}$ must be addressed. See comments in section 5.1 below for additional information.

AECOM: *Text in this section has been revised to include $PM_{2.5}$ as suggested by TCEQ.*

TCEQ: 2.2.4 Additional Impacts Analysis – The AQA should explain in detail how the project will affect the area in terms of a growth analysis, soil and vegetation analysis, and a Class II visibility impairment analysis. Be aware that the applicant can meet the visibility analysis by acknowledging compliance with the visibility and opacity requirements in 30 TAC Chapter 111.

AECOM: *Noted, BASF will meet the visibility analysis by acknowledging compliance with the visibility and opacity requirements in 30 TAC Chapter 111.*

TCEQ: 2.3 Minor NSR NAAQS Analysis – When conducting the Minor New Source Review (NSR) analyses, consider all new and increased emissions from the site related to the project, including emissions associated with all planned MSS activities. For pollutants and averaging periods that exceed the associated de minimis levels, conduct a full Minor NSR NAAQS analysis that considers all allowable emissions at the site, including emissions associated with all planned MSS activities, PBRs, and emissions from off-property sources and activities.

AECOM: *Noted, BASF will be modeling all new and increased emissions from the site related to the project, including emissions associated with all planned MSS activities. For pollutants and averaging periods that exceed the associated de minimis levels, BASF will conduct a full Minor NSR NAAQS analysis.*

TCEQ: 2.4 State Property Line Analysis – When conducting the State Property Line analysis, consider all emissions at the site. The AQA must include justification why some emissions have not been modeled and how site-wide emissions have been considered in the demonstration of compliance with the standards.

AECOM: *BASF is proposing to model proposed allowable project emission rates (without annualization for intermittent sources) in order to estimate property line impacts. A technical justification for demonstrating compliance such has project emissions increases; total site emission etc. may be included with the analysis.*

TCEQ: 2.5 Secondary $PM_{2.5}$ Formation Analysis – The protocol states that a qualitative assessment of the secondary formation of $PM_{2.5}$ will be provided. The applicant should provide a detailed analysis of how secondary formation of $PM_{2.5}$ will be addressed prior to submitting the AQA. For more information, see the following web link from EPA:

http://www.epa.gov/ttn/scram/guidance/guide/Guidance_for_PM25_Permit_Modeling.pdf

AECOM: *The $PM_{2.5}$ secondary formation analysis has been updated to include a qualitative analysis.*

TCEQ: 2.6 Health Effects Review Analysis – When conducting the Health Effects analysis, consider all new and increased emissions from the site related to the project. For all health effects pollutants evaluated, provide the corresponding Chemical Abstract Service (CAS) numbers, as applicable, with the AQA.

AECOM: *Noted, BASF will consider all new and increased emissions from the site related to the project. Chemical Abstract Service (CAS) number for all evaluated compounds will be included with the AQA.*

TCEQ: 3.0 Plot Plan – Provide a plot plan with the AQA (electronic format preferred) that depicts the entire site. The plot plan should include the site property line, fence line, locations of production activities, locations of emission sources represented in the AQA, and the locations of any buildings or structures represented in the AQA. Please be sure to clearly label all of these features on the plot plan.

The protocol notes that the exact location of point sources and buildings are subject to change. Please note that changes in point sources and buildings locations may require a revised AQA if these changes take place after the initial AQA submittal.

The plot plan that was provided with the protocol is marked as confidential. Be sure to provide a non-confidential version of the plot plan with the AQA.

AECOM: *Noted, BASF will include a non-confidential plot plan with the AQA complete with all details. BASF understands that revised modeling analysis will be required if the location of sources change, this language has been removed from the protocol.*

TCEQ: 5.1 Pre-construction Monitoring – The protocol notes that preliminary modeling indicates that the predicted concentrations for CO, NO_2, and PM_{10} are less than the applicable SMCs. If the preliminary results change and the model predictions of any of these pollutants are greater than or equal to an applicable SMC, then a revised protocol will need to be submitted that provides representative monitoring to address the pre-application analysis requirement. Existing ambient monitoring data that are used to address the PSD pre-application analysis requirement should be located in an area with similar types of sources and emissions as the project site.

For $PM_{2.5}$, the Houston Deer Park #2 monitor (EPA AIRS monitor 482011039) is being proposed to satisfy the pre-application analysis requirement. Since this monitor is located in a residential area, the ADMT recommends that the applicant select a different monitor that is located along the heavily industrialized Houston Ship Channel to better represent emissions near the project site. Please provide the monitor selection and monitoring data for this analysis prior to submitting the AQA.

AECOM: *Noted, BASF will submit a new modeling protocol if the predicted concentrations for CO, NO_2, and PM_{10} are greater than the applicable SMCs. BASF is of the opinion that ambient monitoring data that are used to address the PSD pre-application analysis requirement (Houston Deer Park #2) in this protocol are located in an area with similar types of sources and emissions as the project site. BASF is of the opinion that the selected monitor is conservative compared to the area surrounding the site since the reported emissions from source surrounding the monitor are higher than the sources surrounding the site.*

TCEQ: 5.2 NAAQS Analysis Background Concentration – The quantitative assessment of nearby sources of emissions near the project site relative to the monitor site is a reasonable approach for justifying a representative monitor. Although included as a footnote to Table 5-3 of the protocol, full documentation for information such as county emissions comparisons and county population comparisons should be provided with the AQA when justifying the use of a monitor that is located in a different county than the project site.

AECOM: *As noted, the source for the data included in the modeling protocol is included in the footnotes. Please provide guidance on the nature of documentation required to be included in the AQA.*

TCEQ: <u>PM_{10} Background Monitoring Data</u> – The protocol notes that the Deer Park #2 monitor is the only PM_{10} monitor in the Houston-Galveston-Brazoria area. Please note that there are other PM_{10} monitors within this area. However, the selection and justification of the Deer Park #2 monitor to represent PM_{10} background concentrations is reasonable. Be sure to include this information in the AQA.

The protocol notes that the 2013 emissions inventory data from the TCEQ website is used to account for the emissions near the project site and monitor. Please note that 2014 emissions inventory data are available from the TCEQ website and should be used instead of the 2013 data when the AQA is submitted.

Table 5-4 of the protocol lists the background concentration as the three-year high, second high (H2H) 24-hr averaged monitored concentration. It is not clear if the reported concentration is the three-year average of the H2H 24-hr monitored concentration or the H2H 24-hr monitored concentration out of the three years. Please note that PM_{10} monitored concentration should be reported as the H2H monitored concentration out of the most recent three years and not the three-year average. In addition, the monitored concentration was reported as 88.71 $\mu g/m^3$. Be sure to verify that the H2H is being used. Based on the ADMT's review of the H2H monitored concentrations, none of the years had 24-hr concentrations greater than 80 $\mu g/m^3$.

Make sure when referencing tables in the AQA, the information accurately reflects the discussion. For example, the protocol notes that total $PM_{2.5}$ emissions are reported in Table 5-3, but it should have noted that total PM_{10} emissions are reported in Table 5-3. Also, this section notes that monitoring data from 2012-2014 were obtained from the TCEQ website and reported in Table 5-5; however, the monitoring data actually reflects 2013-2015 data and is reported in Table 5-4. Similar references to the incorrect table numbers occur in other sections as well.

AECOM: *The protocol notes that there are no PM_{10} monitors in Brazoria County; therefore, a representative monitoring station was evaluated in a nearby county – Harris County. The revised protocol includes 2014 EI data in support of the justification for use of monitor. The PM_{10} design values have been updated and PM_{10} monitored concentration should be reported as the H2H monitored concentration out of the most recent three year.*

TCEQ: <u>$PM_{2.5}$ Background Monitoring Data</u> – The selected monitor and justification are reasonable for the $PM_{2.5}$ NAAQS demonstration. However, as stated above, the ADMT recommends that the applicant select a different monitor that is located along the heavily industrialized Houston Ship Channel to better represent emissions near the project site for the pre-application analysis.

AECOM: *BASF is of the opinion that ambient monitoring data that are used to address the PSD pre-application analysis requirement (Houston Deer Park #2) in this protocol are located in an area with similar types of sources and emissions as the project site. BASF is of the opinion that the selected monitor is conservative compared to the area surrounding the site since the reported emissions from source surrounding the monitor are higher than the sources surrounding the site.*

TCEQ: <u>NO_2 Background Monitoring Data</u> – The selected monitor and justification are reasonable for the NO_2 NAAQS demonstration. Be sure to provide all information in the AQA, including the calculations for the substitution test and conversions to appropriate units.

The protocol notes that the annual mean concentration for NO_2 is based on 2014 data. Please note that the 2013 data has the highest annual mean concentration out of the three years and should be used instead of the 2014 data. Also, the ADMT was unable to verify the 1-hr monitored concentration reported in Table 5-9 of the protocol. Make sure that the 98th percentile was correctly calculated for each year.

AECOM: *The protocol has been revised to represent 2013 data as the highest annual mean concentration. Supporting files used in calculating the reported design values are included for review. AECOM is available for further discussion once TCEQ has reviewed the supporting documentation.*

TCEQ: <u>CO Background Monitoring Data</u> – The protocol notes that the CO maximum predicted concentrations are anticipated to be less than the applicable de minimis levels. If the preliminary results change and the model predictions of are greater than or equal to an applicable de minimis level, then follow the same methodologies used for selecting ambient background concentrations for the pollutants discussed in the protocol.

AECOM: *Noted, BASF will conduct full NAAQS analysis if the maximum CO predicted concentrations are higher than the respective SILs.*

TCEQ: SO_2 Background Monitoring Data – The protocol notes that the SO_2 maximum predicted concentrations are anticipated to be less than the applicable de minimis levels. If the preliminary results change and the model predictions of are greater than or equal to an applicable de minimis level, then follow the same methodologies used for selecting ambient background concentrations for the pollutants discussed in the protocol.

AECOM: *Noted, BASF will conduct full NAAQS analysis if the maximum SO_2 predicted concentrations are higher than the respective SILs.*

TCEQ: 5.3 $PM_{2.5}$ SIL Justification for NAAQS Analysis – The methodology to justify the $PM_{2.5}$ de minimis levels for the NAAQS demonstration is appropriate; however, as mentioned above, the applicant should select a different monitor that is located along the heavily industrialized Houston Ship Channel to better represent emissions near the project site for justification of the de minimis levels. This information should be provided prior to submitting the AQA.

AECOM: *BASF is of the opinion that ambient monitoring data that are used to address the PSD pre-application analysis requirement (Houston Deer Park #2) in this protocol are located in an area with similar types of sources and emissions as the project site. BASF is of the opinion that the selected monitor is conservative compared to the area surrounding the site since the reported emissions from source surrounding the monitor are higher than the sources surrounding the site.*

TCEQ: 5.4 $PM_{2.5}$ Justification for Increment Analysis – Since the monitor is not located nearby the project site, the procedure to justify the $PM_{2.5}$ de minimis levels for the increment analysis is not sufficient to be exempt from conducting a full increment analysis; however, the full increment analysis could be limited to significant receptors with some additional justification. In support of this approach, the ADMT recommends that the applicant demonstrate that predicted impacts are driven by the applicant's sources, are located close in to the project site, and fall off quickly with distance from the project site.

AECOM: *BASF is of the opinion that ambient monitoring data that are used to address the PSD pre-application analysis requirement (Houston Deer Park #2) in this protocol are located in an area with similar types of sources and emissions as the project site. BASF is of the opinion that the selected monitor is conservative compared to the area surrounding the site since the reported emissions from source surrounding the monitor are higher than the sources surrounding the site.*

TCEQ: 6.1 On-property Sources – Be sure to include full documentation for each source characterization and complete technical justification for the associated source parameters in the AQA.

AECOM: *Documentation for all on-property sources considered in the modeling analysis will be included in the AQA.*

TCEQ: 6.2 Off-property Sources – The approach to develop the off-property inventory is generally reasonable. The protocol notes that the retrieval will be supplemented by identifying regulated entities within each pollutant's respective area of impact (AOI) that are not included in the retrieval. Be sure to provide justification as to why the supplemental review will be limited to within each pollutant's respective AOI; why the criteria used for the supplemental review is appropriate; and documentation associated with the supplemental review. In addition, the ADMT recommends that the applicant review the retrievals for completeness and accuracy prior to conducting any modeling. Any changes to data or exclusion of sources must be clearly documented and justified. Be sure to provide any retrieval files that were obtained from the TCEQ and all supporting materials with the AQA.

AECOM: *All documentation pertaining to the off-property sources to be included in the modeling analysis and justification for including/excluding sources will be included in the AQA.*

TCEQ: The protocol notes that primary inventory retrievals will be obtained based on the radius of impact (ROI) plus 50 kilometers (km). It should be noted that retrievals from the TCEQ's Air Permits Allowable Database (APAD) no longer provides primary and secondary options and the search is limited to 50 km.

AECOM: *The protocol has been updated to reflect this change.*

TCEQ: The protocol notes that for the $PM_{2.5}$ increment analysis, the applicant will review all PSD major projects in the AOI that have been submitted between the major source baseline date and the minor source baseline date. The applicant should review all PSD major projects out to 50 km since the major source baseline date. In addition, the applicant should use the date of this protocol response as the cutoff date for searching for increment sources instead of the application submittal date.

AECOM: *Noted, BASF will consider all PSD major projects out to 50 km and use the date of this protocol response (April 19, 2016) as the cutoff date.*

TCEQ: Please note that the results for the increment analysis are the maximum H2H predicted concentrations over a one-year period for the 24-hr averaging time and the maximum annual predicted concentration over a one-year period for the annual averaging time since on-site data are being used.

AECOM: *Noted, results for the increment analysis will be reported as the maximum H2H predicted concentrations over a one-year period for the 24-hr averaging time and the maximum annual predicted concentration over a one-year period for the annual averaging time.*

TCEQ: 6.2.1 Supplementing Data from APAD – The approach for limiting the search for off-property sources related to the permit search and 2014 emissions inventory data is generally acceptable. In addition to including sources from all regulated entities within 10 km or the ROI, whichever is greater, the ADMT recommends that all major sources out to 50 km be included. Furthermore, the ADMT recommends that the applicant provide a map that depicts the location of the sources to help support the case for limiting the search.

AECOM: *Per guidance provided by EPA in Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard, pg. 16, March 1, 2011, considering all sources within a 50 km radius of the facility is likely to produce overly conservative results. Therefore, BASF is of the opinion that a data search to supplement APAD data with sources within 10km is appropriate.*

The protocol notes that data obtained from APAD was last updated in 2000. For clarification, APAD did not exist in 2000. Retrievals were obtained from the TCEQ's Point Source Database (PSDB) during that time. However, many of the sources in APAD were populated with PSDB source data.

AECOM: *The attached protocol includes revised language per recommendation.*

TCEQ: 6.2.2 Data Corrections – Please note that the most recent emissions inventory data is 2014 and not 2013. In addition, the ADMT recommends that the applicant review permit files to obtain allowable emission rates rather than relying on annual emissions data from the 2014 emissions inventory when APAD sources are represented as 0 lb/hr or 0 tpy.

AECOM: *Noted, 2014 EI data will be used for modeling analysis and a review of the permit files will be conducted to obtain allowable emission rates.*

TCEQ: 7.1 Source Parameters – Be sure to provide the flare calculations in the AQA.

AECOM: *Flare effective diameter calculations will be included in the AQA.*

7.1.2 Scenario Justification – The protocol notes that the hourly emissions from the emergency engines (EPNs 18-1-20 through 22) will be treated as intermittent (i.e. following EPA's intermittent guidance). It is not clear from the information provided that the emergency engines qualify as intermittent sources. Information such as the frequency of operation, the number of times per year, the duration for each event, and whether there are simultaneous operations with other sources should be provided prior to submitting the AQA. In addition, please note that the project area is located in the Houston-Galveston-Brazoria non-attainment area for ozone and testing for these types of engines are not allowed between 6 am to 12 pm. The reduced hours of operation will affect how the annual average emission rate is determined for modeling purposes.

The protocol notes that the hourly emissions from the MSS activities (1 cold startup and shutdown, 3 warm startup and shutdown per year) will be treated as intermittent (i.e. following EPA's intermittent guidance). It is not clear from the information provided that the MSS activities qualify as intermittent sources, nor is it clear which sources these MSS activities apply. Information such as the number of times per year, the duration for each event, and whether there are simultaneous operations with other sources should be provided prior to submitting the AQA. In addition, be sure to clearly identify which activities this approach is being used.

Be sure to document any operational limitations and/or scenarios used in the modeling demonstrations. Also note that the intermittent guidance only applies to the 1-hr NO_2 and 1-hr

SO_2 NAAQS demonstrations. It should not be used for any other pollutant or averaging time, including the SO_2 State Property Line analysis.

AECOM: *This section of the protocol has been updated to include additional details pertaining to the nature and frequency of the emissions proposed to considered intermittent.*

TCEQ: 8.1 Dispersion Model Selection – The protocol notes that AERMOD version 15181 will be used in the modeling demonstration. This is appropriate.

TCEQ: 8.2 PSD Air quality Analysis Methodology – The protocol notes that a Tier 2 approach will be used to evaluate the NO_2 emissions but may consider a Tier 3 approach if needed for refinements. If a Tier 3 approach is used to evaluate the NO_x emissions, then a revised protocol will need to be submitted to the TCEQ and EPA Region 6 that discusses the details of the Tier 3 approach.

AECOM: *BASF will submit a revised protocol if Tier 3 approach is required.*

TCEQ: 8.3 PSD Increment Analysis Methodology – The protocol notes as a first step that the predicted high concentration from the PSD full NAAQS analysis will be compared to the increment. Please note that the H2H predicted concentration from the PSD full NAAQS modeling may also be used to compare to the applicable increment. In addition, and as noted above, utilizing the results from the NAAQS demonstration may not be appropriate for PM_{10} and $PM_{2.5}$, depending on the output metric used.

AECOM: *Noted, BASF will report predicted concentrations for PSD increment analysis to meet guidance.*

TCEQ: 8.5 Minor NSR NAAQS – The protocol notes that all project modeled impacts will be less than the de minimis levels for SO_2. If the model predictions are greater than or equal to the applicable de minimis levels, a revised protocol that discusses a full NAAQS impacts analysis will need to be submitted prior to submitting the AQA.

AECOM: *Noted, a full NAAQS analysis will be conducted if the predicted concentrations of SO2 exceed SILs. A revised protocol will be submitted for review to TCEQ if it is determined at a later date that a full NAAQS is required.*

TCEQ: 8.6 State Property Line – The protocol notes that the maximum ground-level concentration from project-level emissions will be compared to the de minimis level of 2% of the applicable state property line standards. Be aware that if the predicted high concentration is less than 2% of the applicable standard, then technical justification for demonstrating compliance may require additional information such as project emissions increases, total site emissions, results from previous site-wide demonstrations, or ambient monitoring data. Refer to Appendix F of the TCEQ's Air Quality Modeling Guidelines (APDG 6232) to determine if site-wide modeling is needed. The link below is provided for convenience:

http://www.tceq.texas.gov/permitting/air/guidance/newsourcereview/nsr_mod_guidance.html

AECOM: *BASF is proposing to model proposed allowable project emission rates (without annualization for intermittent sources) in order to estimate property line impacts. A technical justification for demonstrating compliance such has project emissions increases; total site emission etc. may be included with the analysis.*

TCEQ: 9.0 Land Use – The protocol notes that one year (2012) of on-site preprocessed meteorological data set will be used. Please note that if more than one year of on-site data is available, then the additional years should be included per EPA guidance. The protocol refers to a previously submitted modeling demonstration as justification for the use of the on-site meteorological data. Referring to previously submitted analyses is not sufficient justification. Please provide documentation detailing the justification for its use. If applicable, the same justification used in the previous modeling may be sufficient. Be sure to provide the justification prior to submitting the AQA. In addition, please provide the meteorological and AERSURFACE files for review prior to submitting the AQA.

AECOM: *Currently only Quality Assured data for 2012 is available; therefore, BASF is proposing to use 2012 meteorological data for modeling analysis. Justification used for use of the meteorological data provided in support of modeling for 1733A permit amendment will be included in the AQA as justification for use of met data. AERSURFACE files were not used since this is on-site met data ; however, the meteorological files proposed to be used in this modeling analysis are included with this response.*

TCEQ: 11.0 Building Wake Effects – Provide all structure heights used in the downwash analysis and any computer assisted drawing files with the AQA.

Ensure that all GEP heights used in BPIP PRIME are justified according to Guideline for Determination of Good Engineering Practice Stack Height:

http://www.epa.gov/scram001/guidance/guide/gep.pdf

For structures not included in the downwash analysis or for air quality analyses conducted without consideration of downwash, please provide technical justification for supporting this approach. Please note that piping fugitives should not be included as a downwash structure unless sufficient justification can be provided.

AECOM: *Noted,* all *structure heights used in the downwash analysis and any computer assisted drawing files will be included with the AQA. Justification for structures not used in the downwash analysis will be included with the AQA.*

TCEQ: 12.0 Receptor Grid-Design – Be aware that ambient air for Minor NSR analyses starts at the property line; however, for PSD modeling, ambient air starts at the fence line or other physical barrier to public access. Be sure to make clear in the AQA whether the property line and fence line are the same.

AECOM: *Updated protocol to clarify that for the purposes of this modeling analysis BASF considers the property line to be the fence line.*
TCEQ: 13.0 Meteorological Data – Refer to the comments above in Section 9.0 as it pertains to the meteorological data.

AECOM: *Currently only Quality Assured data for 2012 is available; therefore, BASF is proposing to use 2012 meteorological data for modeling analysis. Justification used for use of the meteorological data provided in support of modeling for 1733A permit amendment will be included in the AQA as justification for use of met data.*

TCEQ: Deliverables – All modeling and downwash input and output files should be sent electronically via email, FTP, or CD/DVD. Electronic copies of the modeling report, plot plan, and maps are also preferred.

AECOM: *Electronic copies of all modeling files and supporting documentation will be provided along with the AQA.*

May 31, 2016

Subject: BASF Corporation Air Quality Analysis Protocol

On April 19, 2016, the Air Dispersion Modeling Team (ADMT) sent comments to the permit reviewer regarding the Prevention of Significant Deterioration (PSD) Air Quality Analysis (AQA) Protocol for BASF Corporation located in Freeport, Brazoria County, Texas, dated April 2015. The applicant submitted a revised protocol with responses to the ADMT comments on May 13, 2016. My comments related to the responses are provided below. The comments in sections **5.1, 5.3, 7.1.2, 8.3, and 9.0** will need to be addressed before the AQA is submitted. The remaining comments are reminders and recommendations for information to be included with the AQA.

2.2.3 Pre-application Analysis

Original ADMT Comment: The purpose of the pre-application analysis is to provide an analysis of the existing ambient air quality in the area that the major source or major modification would affect. The pre-application analysis can be addressed by providing representative monitoring data to establish the existing air quality in the area. An applicant may be exempt from this requirement by demonstrating that the model predictions associated with the project emissions are less than the significant monitoring concentrations (SMCs). Although noted in other sections of the protocol, $PM_{2.5}$ was not identified in this section as a pollutant requiring a pre-application analysis. The SMC for $PM_{2.5}$ has been vacated and is no longer applicable; therefore, the pre-application analysis for $PM_{2.5}$ must be addressed. See comments in section 5.1 below for additional information.

Applicant Response: Text in this section has been revised to include $PM_{2.5}$ as suggested by TCEQ.

ADMT Response: The text in the revised protocol has not been updated to include $PM_{2.5}$. Be sure to include this information in the AQA.

2.5 Secondary $PM_{2.5}$ Formation Analysis

Original ADMT Comment: The protocol states that a qualitative assessment of the secondary formation of $PM_{2.5}$ will be provided. The applicant should provide a detailed analysis of how secondary formation of $PM_{2.5}$ will be addressed prior to submitting the AQA. For more information, see the following web link from EPA:

http://www.epa.gov/ttn/scram/guidance/guide/Guidance_for_PM25_Permit_Modeling.pdf

Applicant Response: Per TCEQ's Air Quality Modeling Guidance (APDG 6232v2), the complex chemistry of secondary formation of $PM_{2.5}$ is well documented and entities proposing new or increased emissions of $PM_{2.5}$ should provide an evaluate impacts of secondary formation $PM_{2.5}$ to demonstrate that the proposed emissions are not expected to cause an exceedance of the NAAQS. NO_2 and SO_2 are considered as $PM_{2.5}$ precursors;

therefore, the Significant Emission Rate (SER) for NO_2 and SO_2, which is defined as 40 tpy for both under 40 Code of Federal Regulations (CFR) §52.21 (b)(23)(i) is used to determine the need for a review of the secondary $PM_{2.5}$ formation.

The total proposed increases in emissions of $PM_{2.5}$, NO_2, and of SO_2 are consistent with the requirements of assessment case 3 in Table III-1 of the United States Environmental Protection Agency's (EPA's) "Guidance for $PM_{2.5}$ Modeling" dated May 20, 2014; therefore, BASF is proposing the following qualitative analysis of the secondary $PM_{2.5}$ formation which is consistent with EPA's guidance.

1. **BASF is proposing to use $PM_{2.5}$ monitored data from the Deer Park #2 monitoring station located in Houston. This monitor is conservative since the values of $PM_{2.5}$ emissions in the area surrounding the Deer Park monitor are significantly greater than area around the proposed BASF site.**

Table 2-2. 2014 EI Reported Emissions

Pollutant	Reported Emission in a 50 km radius of Deer Park #2 Monitor (tpy)	Reported Emission in a 50 km radius of BASF Freeport Site (tpy)	Reported Emission in a 10 km radius of Deer Park #2 Monitor (tp)	Reported Emission in a 10 km radius of BASF Freeport Site (tpy)
NO_x	22,515	6,760	6,206	2,681
SO_2	9,209	549	3,108	259
$PM_{2.5}$	5,552	1,304	1,380	657

As shown in the table above, the $PM_{2.5}$ emissions reported in the area surrounding the monitor are significantly higher than the area surrounding the BASF Freeport site. Additionally, the emissions of NO_x and SO_2, precursors for secondary $PM_{2.5}$ formation, are also significantly greater in the area surrounding the monitor as compared to the area surrounding the site. Therefore, primary and secondary $PM_{2.5}$ concentrations from the existing sources in the area surrounding the monitor are already captured by the monitor. The monitoring data for this monitor shows levels of $PM_{2.5}$ concentrations that are below the NAAQS. As further described in Section 5.1, per TCEQ's recommendation, the three years with the highest design concentrations out of the 2013-2015 monitoring data were used to determine the background concentrations. The 24-hour average design value (average 98th percentile value of last three years with the highest design value, 2013 – 2015) of 18.43 µg/m³ is comfortably below the 24-hour $PM_{2.5}$ NAAQS of 35 µg/m³. The most recent 3-year annual design value of 8.77 µg/m³ similarly compares favorably to the annual $PM_{2.5}$ NAAQS of 12 µg/m³. These values leave room under the NAAQS for new source impacts of up to 16.57 µg/m³ (24-hour) and up to 3.23 µg/m³ (annual mean).

2. **The total precursor emissions associated with the secondary $PM_{2.5}$ formation in Brazoria County are 14,264 tpy of NO_x and 1,682 tpy of SO_2 according to EPA's Air**

Emission Source (http://www.epa.gov/air/emissions/index.htm). The NO_x and SO_2 emissions from the proposed project are 77.8 tpy and 4.9 tpy, respectively, which are a small fraction of the NO_x and SO_2 emissions for the air-shed (0.53 % for NO_x and 0.29 % for SO_2). This indicates that the secondary $PM_{2.5}$ formation associated with the proposed NO_x and SO_2 emissions would be expected to be considerably smaller than the monitored concentrations of nitrates and sulfates, respectively. Therefore, only a very small portion of these NO_x and SO_2 impacts from the proposed sources would convert to $PM_{2.5}$.

3. **Highest secondary $PM_{2.5}$ concentrations from the BASF Freeport sources are expected to occur further downwind of the site since conversion of NO_x and SO_2 to secondary $PM_{2.5}$ pollutants (nitrates and sulfates) is expected to occur over time when the plume is further dispersed and farther from the sources. Conversely, highest primary $PM_{2.5}$ are expected to occur at or near the property boundary. This makes it unlikely that maximum primary and secondary $PM_{2.5}$ from the proposed sources will occur at the same time or location. Furthermore, there are only 3 facilities within a 30 kilometer (km) radius of the facility with emissions of $PM_{2.5}$ reported in 2014 EI more than the PSD significance threshold of 10 tpy and only 1 facility with reported emissions greater than 10 tpy in a 10 km radius of the facility. Therefore, secondary $PM_{2.5}$ impacts from the proposed BASF Freeport sources along with the impacts from primary $PM_{2.5}$ sources in the area are not expected to significantly contribute to the air quality in the air shed.**

4. **Additionally, the following conservative assumptions will be incorporated in the modeling of primary $PM_{2.5}$ emissions:**

    a. **Inherent conservatism is using "First Tier" approach to combining modeled primary $PM_{2.5}$ impacts with monitored $PM_{2.5}$ background concentrations; and**
    b. **Use of monitoring data from a conservative monitor with higher reported emissions of $PM_{2.5}$ from contributing sources.**

Based on the argument above, and consistent with current guidance, BASF believes that modeling of primary $PM_{2.5}$ emissions will be representative and there sufficient basis to conclude that the $PM_{2.5}$ NAAQS will be protected. Photochemical modeling is not required to evaluate secondary $PM_{2.5}$ formation for this permit application

ADMT Response: The applicant's methodology for addressing secondary formation of $PM_{2.5}$ is generally appropriate. The ADMT recommends supplementing step 2 by reviewing speciated $PM_{2.5}$ monitoring data from the Deer Park #2 monitor (EPA AIRS monitor 482011039) and showing that the total nitrates and sulfates are a small fraction of $PM_{2.5}$. The remaining steps outlined by the applicant are sufficient for addressing secondary formation of $PM_{2.5}$.

5.1 Pre-construction Monitoring

Original ADMT Comment: The protocol notes that preliminary modeling indicates that the

predicted concentrations for CO, NO_2, and PM_{10} are less than the applicable SMCs. If the preliminary results change and the model predictions of any of these pollutants are greater than or equal to an applicable SMC, then a revised protocol will need to be submitted that provides representative monitoring to address the pre-application analysis requirement. Existing ambient monitoring data that are used to address the PSD pre-application analysis requirement should be located in an area with similar types of sources and emissions as the project site.

For $PM_{2.5}$, the Houston Deer Park #2 monitor (EPA AIRS monitor 482011039) is being proposed to satisfy the pre-application analysis requirement. Since this monitor is located in a residential area, the ADMT recommends that the applicant select a different monitor that is located along the heavily industrialized Houston Ship Channel to better represent emissions near the project site. Please provide the monitor selection and monitoring data for this analysis prior to submitting the AQA.

Applicant's Response: Noted, BASF will submit a new modeling protocol if the predicted concentrations for CO, NO_2, and PM_{10} are greater than the applicable SMCs. BASF is of the opinion that ambient monitoring data that are used to address the PSD pre-application analysis requirement (Houston Deer Park #2) in this protocol are located in an area with similar types of sources and emissions as the project site. BASF is of the opinion that the selected monitor is conservative compared to the area surrounding the site since the reported emissions from source surrounding the monitor are higher than the sources surrounding the site.

ADMT Response: As noted in the original ADMT comment, the Deer Park #2 monitor is not appropriate to represent the project site for the pre-application analysis since the monitor is located in the middle of a residential neighborhood. Although a ten km quantitative assessment of emissions inventory data from around the monitor and around the project site show reported emissions are greater around the monitor, the emissions around the monitor occur at the edge of the ten km distance, whereas the emissions around the project site occur in closer proximity. The ADMT continues to recommend that the applicant select a different monitor that is located along the heavily industrialized Houston Ship Channel to better represent emissions near the project site. This information should be provided prior to submitting the AQA.

5.2 NAAQS Analysis Background Concentration

The response notes that the protocol has been updated to reflect the original ADMT comments in this section; however, the revised protocol still has some inconsistencies. Make sure that updated information provided in the revised protocol/AQA is accurate and consistent. For example, the revised protocol still notes that the only PM_{10} monitor in Harris County is the Deer Park #2 monitor; this statement is not correct. As another example, the revised protocol includes updated parts of the text to discuss using 2014 emissions inventory data; however, other parts of the text still note 2013 emissions inventory data being used. Please address these items in the AQA.

5.3 $PM_{2.5}$ SIL Justification for NAAQS Analysis

Original ADMT Comment: The methodology to justify the $PM_{2.5}$ de minimis levels for the NAAQS demonstration is appropriate; however, as mentioned above, the applicant should select a different monitor that is located along the heavily industrialized Houston Ship Channel to better represent emissions near the project site for justification of the de minimis levels. This information should be provided prior to submitting the AQA.

Applicant Response: BASF is of the opinion that ambient monitoring data that are used to address the PSD pre-application analysis requirement (Houston Deer Park #2) in this protocol are located in an area with similar types of sources and emissions as the project site. BASF is of the opinion that the selected monitor is conservative compared to the area surrounding the site since the reported emissions from source surrounding the monitor are higher than the sources surrounding the site.

ADMT Response: As noted above in the ADMT's response for section 5.1, the Deer Park #2 monitor is not appropriate. The ADMT continues to recommend that the applicant select a different monitor that is located along the heavily industrialized Houston Ship Channel to better represent emissions near the project site. This information should be provided prior to submitting the AQA.

5.4 $PM_{2.5}$ Justification for Increment Analysis

Original ADMT Comment: Since the monitor is not located nearby the project site, the procedure to justify the $PM_{2.5}$ de minimis levels for the increment analysis is not sufficient to be exempt from conducting a full increment analysis; however, the full increment analysis could be limited to significant receptors with some additional justification. In support of this approach, the ADMT recommends that the applicant demonstrate that predicted impacts are driven by the applicant's sources, are located close in to the project site, and fall off quickly with distance from the project site.

Applicant Response: BASF is of the opinion that ambient monitoring data that are used to address the PSD pre-application analysis requirement (Houston Deer Park #2) in this protocol are located in an area with similar types of sources and emissions as the project site. BASF is of the opinion that the selected monitor is conservative compared to the area surrounding the site since the reported emissions from source surrounding the monitor are higher than the sources surrounding the site.

ADMT Response: Utilizing a monitor located in a different county to justify the $PM_{2.5}$ de minimis levels for the increment analysis is not appropriate for this analysis. In order to use the procedures outlined in guidance to justify the de minimis levels, the monitor needs to be located near the project site. Therefore, a full increment analysis will be necessary. As stated in the original ADMT comment, the full increment analysis could be limited to significant receptors with some additional justification. In support of this approach, the ADMT recommends that the applicant demonstrate that predicted impacts are driven by the applicant's sources, are located close in to the project site, and fall off quickly with distance from the project site.

6.2 Off-property Sources

Original ADMT Comment: The protocol notes that primary inventory retrievals will be obtained based on the radius of impact (ROI) plus 50 kilometers (km). It should be noted that retrievals from the TCEQ's Air Permits Allowable Database (APAD) no longer provides primary and secondary options and the search is limited to 50 km.

Applicant Response: The protocol has been updated to reflect this change.

ADMT Response: The protocol has not been updated to reflect these changes and still notes that a "primary" search option was selected. As noted in the original ADMT, retrievals from the TCEQ's APAD no longer provide primary and secondary options and the search is limited to 50 km.

Original ADMT Comment: The protocol notes that for the $PM_{2.5}$ increment analysis, the applicant will review all PSD major projects in the AOI that have been submitted between the major source baseline date and the minor source baseline date. The applicant should review all PSD major projects out to 50 km since the major source baseline date. In addition, the applicant should use the date of this protocol response as the cutoff date for searching for increment sources instead of the application submittal date.

Applicant Response: Noted, BASF will consider all PSD major projects out to 50 km and use the date of this protocol response (April 19, 2016) as the cutoff date.

ADMT Response: Just to be clear, the applicant should consider all projects with increases in $PM_{2.5}$ at PSD sites (i.e. not just major projects but minor projects as well). In addition, the protocol notes that the applicant will review PSD major projects within 50 km of the site that have been submitted between the major source baseline date (October 20, 2010) and minor source baseline date (December 20, 2011). Please note that the applicant will need to consider projects that have been issued after the major source baseline date and not just projects submitted after this date.

As mentioned above in section 5.2, make sure that the information provided in the protocol/AQA is accurate and consistent. The last sentence for the second to last paragraph and the last paragraph do not reflect the recommendations suggested by the ADMT, and as noted by the applicant's responses.

6.2.1 Supplementing Data from APAD

Original ADMT Comment: The approach for limiting the search for off-property sources related to the permit search and 2014 emissions inventory data is generally acceptable. In addition to including sources from all regulated entities within 10 km or the ROI, whichever is greater, the ADMT recommends that all major sources out to 50 km be included. Furthermore, the ADMT recommends that the applicant provide a map that depicts the location of the sources to help support the case for limiting the search.

The protocol notes that data obtained from APAD was last updated in 2000. For clarification,

APAD did not exist in 2000. Retrievals were obtained from the TCEQ's Point Source Database (PSDB) during that time. However, many of the sources in APAD were populated with PSDB source data.

Applicant Response: Per guidance provided by EPA in Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard, pg. 16, March 1, 2011, considering all sources within a 50 km radius of the facility is likely to produce overly conservative results. Therefore, BASF is of the opinion that a data search to supplement APAD data with sources within 10km is appropriate.

ADMT Response: The ADMT agrees not all sources within a 50 km radius need to be modeled explicitly, but the ADMT does recommend that all major sources within a 50 km radius should be included in the evaluation. In addition, be sure to provide a discussion/evaluation with the AQA to show why limiting the search is reasonable.

7.1.2 Scenario Justification

Original ADMT Comment: The protocol notes that the hourly emissions from the emergency engines (EPNs 18-1-20 through 22) will be treated as intermittent (i.e. following EPA's intermittent guidance). It is not clear from the information provided that the emergency engines qualify as intermittent sources. Information such as the frequency of operation, the number of times per year, the duration for each event, and whether there are simultaneous operations with other sources should be provided prior to submitting the AQA. In addition, please note that the project area is located in the Houston-Galveston-Brazoria non-attainment area for ozone and testing for these types of engines are not allowed between 6 am to 12 pm. The reduced hours of operation will affect how the annual average emission rate is determined for modeling purposes.

The protocol notes that the hourly emissions from the MSS activities (1 cold startup and shutdown, 3 warm startup and shutdown per year) will be treated as intermittent (i.e. following EPA's intermittent guidance). It is not clear from the information provided that the MSS activities qualify as intermittent sources, nor is it clear which sources these MSS activities apply. Information such as the number of times per year, the duration for each event, and whether there are simultaneous operations with other sources should be provided prior to submitting the AQA. In addition, be sure to clearly identify which activities this approach is being used.

Be sure to document any operational limitations and/or scenarios used in the modeling demonstrations. Also note that the intermittent guidance only applies to the 1-hr NO_2 and 1-hr SO_2 NAAQS demonstrations. It should not be used for any other pollutant or averaging time, including the SO_2 State Property Line analysis.

Applicant Response: Intermittent Source Justification

<u>MSS Emissions from Flares (EPNs 18-1-11, 18-1-12, and 18-1-13)</u>: Typically only emissions from pilot flames are expected from the elevated flares (EPN 18-1-11 and 18-1-12) and the enclosed ground flare (EPN 18-1-13) during normal operations. The elevated flare and the

EGF may be used during startup and shutdown activities to control excess emissions. Startup and shutdown emissions from OPUS are infrequent events that occur on a limited number of days per year (we expect to have an explicit limit on the number of startups/shutdowns in the NSR permit). Estimated times for the events are as follows:

> **Cold startup: Approximately 48 hr duration, continuous event, 1x/yr**
> **Warm startup: Approximately 24 hr duration, continuous event, 3x/yr**
> **Cold shutdown: Approximately 14 hr duration, continuous event, 1x/yr**
> **Warm shutdown: Approximately 12 hr duration, continuous event, 2x/yr**

We further note that cold startups and shutdowns, which have higher emissions than warm startups and shutdowns, are likely to occur only once every 3-4 years (although we cannot permit for a frequency of less than once per year), further justifying the annualization of these emissions.

We believe that the flares are the exact types of sources described as "intermittent sources" in the EPA guidance, as they are on a random schedule, and typically will operate less than 2% of the year (158 hr/yr) if all the permitted events occur in a single year.

Per guidance included in EPA's memorandum titled Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard dated March 1, 2011, specifically pertaining to treatment of intermittent sources, MSS emissions from flares at the site will be modeled as intermittent sources. Therefore, annualized emission rate will be used for 1-hour NO_2 and 1-hour SO_2 NSR NAAQS analysis. Annualized emission rates will not be used for normal operation emissions, all other averaging periods, and other pollutants.

<u>Auxiliary Boilers (EPNs 18-1-5 and 18-1-6)</u>: The auxiliary boilers normally operate at a low firing rate (typically 25%) during normal operation, but are operated at near 100% load during startup / shutdown operations and other times during normal operations when steam is required. The normal operations and MSS emissions are proposed to be permitted separately in the NSR permit. BASF is proposing to model emissions from MSS activities from the auxiliary boilers as intermittent sources. We estimate that they may operate at this higher load for approximately 10 days/yr to support startup and shutdown operations and 8 days to provide supplemental steam during normal operations.

Per guidance included in EPA's memorandum titled Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard dated March 1, 2011, specifically pertaining to treatment of intermittent sources, the auxiliary boilers at the site will be modeled as intermittent sources. Therefore, annualized emission rate will be used for 1-hour NO_2 and 1-hour SO_2 NSR NAAQS analysis.

<u>Emergency generators (EPNs 18-1-20 through 18-1-22)</u>: Emergency generators proposed at the site are operated only for the purpose of testing and are not operated on a continuous basis. BASF is proposing to operate these engines for an hour per week for testing purposes

for up to a total annual operation time of 52 hours. BASF will only be testing one engine at a time. Consequently, the operation of these sources is not expected to contribute significantly to the annual distribution of daily maximum 1-hour contributions.

Per guidance included in EPA's memorandum titled Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard dated March 1, 2011, specifically pertaining to treatment of intermittent sources, the emergency generators (EPNs 18-1-20 through 22) at the site will be modeled as intermittent sources. Therefore, annualized emission rate will be used for 1-hour NO_2 and 1-hour SO_2 NSR NAAQS analysis.

If a cumulative impact analysis (full NAAQS) is required using Tier 3 analysis using Ozone Limiting Method (OLM) or Plume Volume Molar Ratio Method (PVMRM), the in-stack ratio of the intermittent sources would be set to 1 while the annualized emission rates are used for 1-hour NO_2 analysis.

The proposed BASF Freeport plant will be located in Houston-Galveston-Brazoria (HGB) ozone nonattainment area; therefore, testing of engines cannot be carried out between 6AM and noon. A total potential operating time of 6,570 hours per year representing the operating restrictions for this area will be used while annualizing NO_2 1-hour and SO_2 1-hour emission rates.

ADMT Response: The information provided for the MSS emissions for the flares and emergency generators to justify the use of EPA's intermittent guidance is reasonable. However, sufficient information was not provided to justify the MSS activities associated with the auxiliary boilers as intermittent. The duration of the events for the auxiliary boilers was not provided. This information should be provided prior to submitting the AQA.

8.3 PSD Increment Analysis Methodology

Original ADMT Comment: The protocol notes as a first step that the predicted high concentration from the PSD full NAAQS analysis will be compared to the increment. Please note that the H2H predicted concentration from the PSD full NAAQS modeling may also be used to compare to the applicable increment. In addition, and as noted above, utilizing the results from the NAAQS demonstration may not be appropriate for PM_{10} and $PM_{2.5}$, depending on the output metric used.

Applicant Response: Noted, BASF will report predicted concentrations for PSD increment analysis to meet guidance.

ADMT Response: The protocol still makes reference to reviewing off-property increment consuming sources to the AOI plus 50 km as opposed to the AOI out to 50 km. As noted in previous comments, make sure that the information provided in the protocol/AQA is accurate and consistent.

In addition, it is not clear what the applicant is proposing in the final paragraph of this section.

Please provide additional information to clarify. Be sure to provide justification for proposed approach. This information should be provided prior to submitting the AQA.

9.0 Land Use

Original ADMT Comment: The protocol notes that one year (2012) of on-site preprocessed meteorological data set will be used. Please note that if more than one year of on-site data is available, then the additional years should be included per EPA guidance. The protocol refers to a previously submitted modeling demonstration as justification for the use of the on-site meteorological data. Referring to previously submitted analyses is not sufficient justification. Please provide documentation detailing the justification for its use. If applicable, the same justification used in the previous modeling may be sufficient. Be sure to provide the justification prior to submitting the AQA. In addition, please provide the meteorological and AERSURFACE files for review prior to submitting the AQA.

Applicant Response: Currently only Quality Assured data for 2012 is available; therefore, BASF is proposing to use 2012 meteorological data for modeling analysis. Justification used for use of the meteorological data provided in support of modeling for 1733A permit amendment will be included in the AQA as justification for use of met data. AERSURFACE files were not used since this is on-site met data; however, the meteorological files proposed to be used in this modeling analysis are included with this response.

ADMT Response: According to BASF's "NO2 Monitoring Plan; Revision" dated November 1, 2011, raw meteorological monitoring data will be collected for the entire monitoring period. It is the TCEQ's understanding that more than one year of monitoring has been collected. If this is the case, then those additional years need to be included in the demonstration. Please clarify how many years of data have been collected prior to submitting the AQA. Be sure to provide all files associated with the AERMET processing of the on-site monitoring data with the AQA.

In addition, the applicant notes in the response above that AERSURFACE files were not used; however, AERSURFACE was used to obtain the site-specific parameters for surface roughness length, albedo, and Bowen ratio. Be sure all applicable files associated with the development of the meteorological data are provided.

Deliverables – All modeling and downwash input and output files should be sent electronically via email, FTP, or CD/DVD. Electronic copies of the modeling report, plot plan, and maps are also preferred.

If you have any questions, please contact Justin Cherry at (512) 239-0955 or by fax at (512) 239-1400, or by email at justin.cherry@tceq.texas.gov.

To: Donaldson, Guy[Donaldson.Guy@epa.gov]
Cc: McCorkle, Mark[MAC@adeq.state.ar.us]; Mohr, Ashley[Mohr.Ashley@epa.gov]; Snyder, Erik[snyder.erik@epa.gov]
From: Clark, David
Sent: Wed 5/25/2016 1:23:29 PM
Subject: RE: EPA R6 & Model Clearinghouse Submittal - Arkansas SO2 NAAQS Independence County Designation

Thank you Guy for checking on this. Any updates as the process moves forward would be great.

David

David W. Clark, M.S.

Epidemiologist

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From: Donaldson, Guy [mailto:Donaldson.Guy@epa.gov]
Sent: Tuesday, May 24, 2016 5:05 PM
To: Clark, David
Cc: McCorkle, Mark; Mohr, Ashley; Snyder, Erik
Subject: RE: EPA R6 & Model Clearinghouse Submittal - Arkansas SO2 NAAQS Independence County Designation

David, I have checked in with our folks. Your request is being reviewed by Regional Staff. We expect that we will complete the Regional Review in the next 6-10 days and send to HQs. It is difficult to predict how long HQs review will take because there seems to be a large number of request going through the system. We will contact you when we have a better idea after we send it up.

From: Clark, David [mailto:CLARKD@adeq.state.ar.us]
Sent: Tuesday, May 24, 2016 11:59 AM
To: Donaldson, Guy
Cc: McCorkle, Mark; Mohr, Ashley; Snyder, Erik
Subject: RE: EPA R6 & Model Clearinghouse Submittal - Arkansas SO2 NAAQS Independence County Designation

Thank you Guy.

David W. Clark, M.S.

Epidemiologist

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From: Donaldson, Guy [mailto:Donaldson.Guy@epa.gov]
Sent: Tuesday, May 24, 2016 11:16 AM
To: Clark, David
Cc: McCorkle, Mark; Mohr, Ashley; Snyder, Erik
Subject: RE: EPA R6 & Model Clearinghouse Submittal - Arkansas SO2 NAAQS Independence County Designation

I am checking on the status.

From: Clark, David [mailto:CLARKD@adeq.state.ar.us]
Sent: Tuesday, May 24, 2016 8:40 AM
To: Donaldson, Guy
Cc: McCorkle, Mark
Subject: RE: EPA R6 & Model Clearinghouse Submittal - Arkansas SO2 NAAQS Independence County Designation

Good morning Guy,

I'm contacting to inquire about the status of the AERMOD protocol/Clearinghouse request we submitted as part of our SO2 designations work for Independence County. Do you know or could you please see where this stands?

Thank you in advance for any information,

David

David W. Clark, M.S.

Epidemiologist

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From: Clark, David
Sent: Friday, April 29, 2016 8:55 AM
To: 'Donaldson, Guy'; Snyder, Erik
Cc: McCorkle, Mark; Spencer, Stuart
Subject: RE: EPA R6 & Model Clearinghouse Submittal - Arkansas SO2 NAAQS Independence County Designation

Hello Guy & Erik,

Attached find a SO2 NAAQS designation AERMOD protocol/Clearinghouse request for Independence County, Arkansas that ADEQ is submitting in response to Ron Curry's February 11, 2016 letter to Arkansas' Governor Hutchinson (also attached) regarding the insufficient information for an Unclassifiable/Attainment SO2 NAAQS designation for Independence County. We have also sent this protocol/Clearinghouse request to both of you as a hardcopy document via postal mail.

David

David W. Clark, M.S.

Epidemiologist

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From: Donaldson, Guy [mailto:Donaldson.Guy@epa.gov]
Sent: Thursday, April 21, 2016 1:06 PM
To: Clark, David; Snyder, Erik
Cc: McCorkle, Mark
Subject: RE: EPA R6 & Model Clearinghouse Submittal - Arkansas SO2 NAAQS Independence County Designation

Thx for the heads up.

From: Clark, David [mailto:CLARKD@adeq.state.ar.us]
Sent: Thursday, April 21, 2016 9:26 AM
To: Donaldson, Guy; Snyder, Erik
Cc: McCorkle, Mark
Subject: EPA R6 & Model Clearinghouse Submittal - Arkansas SO2 NAAQS Independence County Designation

Good morning Guy & Erik,

I'm sending this correspondence as follow-up to Ron Curry's February 11, 2016 letter to Arkansas' Governor Hutchinson regarding the insufficient information for an Unclassifiable/Attainment SO2 NAAQS designation for Independence County, Arkansas and the stated opportunity for ADEQ to submit additional information. As you will recall, this letter prompted a February 29, 2016 phone conversation that included EPA R6, the Model Clearinghouse, ADEQ, FutureFuel Chemical Company (FutureFuel) and Entergy Arkansas Independence Steam Electrical Station (Entergy) where a combined FutureFuel/Entergy AERMOD dispersion analysis and a potential Model Clearinghouse submittal was discussed. From FutureFuel, ADEQ has received, reviewed and intends to forward to EPA R6 for consideration a modeling protocol and Clearinghouse request to employ ADJ_U* in a combined FutureFuel/Entergy AERMOD dispersion analysis.

This protocol/request is awaiting the signature of ADEQ's Office of Air Quality Associate Director, Stuart Spencer, who is out of the office this week at a conference and will return Monday April 25, 2016. With Stuart's return next week we anticipate forwarding this protocol/request to both of you for consideration and desired concurrence submittal to the Model Clearinghouse. Please accept this message as an update to keep you abreast of our progress with this endeavor and I will follow-up with both of you next week.

Thank you in advance for your assistance,

David

David W. Clark, M.S.

Epidemiologist

Air Division – Planning & Air Quality Analysis Branch
Arkansas Department of Environmental Quality

5301 Northshore Drive

North Little Rock, AR. 72118

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To: tzvi.shalem@tceq.texas.gov[tzvi.shalem@tceq.texas.gov]
Cc: Sean.OBrien@tceq.texas.gov[Sean.OBrien@tceq.texas.gov]; Mohr, Ashley[Mohr.Ashley@epa.gov]; Snyder, Erik[snyder.erik@epa.gov]; Kordzi, Stephanie[Kordzi.Stephanie@epa.gov]; David Ayers[David.Ayers@cheniere.com]; Paul Newman[Paul.Newman@cheniere.com]; Andrew Chartrand[Andrew.Chartrand@cheniere.com]; R14APDMail@tceq.texas.gov[R14APDMail@tceq.texas.gov]
From: Joe Kupper
Sent: Mon 5/23/2016 7:58:10 PM
Subject: Air Quality Analysis Protocol
CCL Stage 3 AQA Protocol.pdf

Mr. Shalem,

As we discussed, attached is the Air Quality Analysis Protocol for the for Permit 139479 and PSD-TX-1496. Once we receive your feedback or comments on the protocol, we will submit the final Air Quality Analysis.

If you have any questions or need any additional information, please let me know.

Thanks, Joe

Joe M. Kupper, PE

Manager-Austin Office, *Principal*

DiSorbo Consulting, LLC

8501 N. MoPac Expy., Suite 300 | Austin, Texas 78759

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www.disorboconsult.com

To: Mohr, Ashley[Mohr.Ashley@epa.gov]
From: Daniel Menendez
Sent: Thur 5/19/2016 7:35:05 PM
Subject: RE: SO2 Modeling for Sandy Creek - Request for Recent Revised Modeling Files
AERMET.7z
AERSURFACE.7z

Hi Ashley,

Attached are the requested files. Please let me know if you have any questions.

Thanks,

Daniel

From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Thursday, May 19, 2016 12:31 PM
To: Daniel Menendez
Subject: RE: SO2 Modeling for Sandy Creek - Request for Recent Revised Modeling Files

Daniel,

Thanks again for providing the revised AERMOD files for Sandy Creek SO2 modeling. Could you also provide the AERSURFACE and AERMET files? I don't need the actual met input data since those files might be too large – more just wanting to verify how the AERMOD met data input was generated to confirm the approach outlined in the modeling report. Hopefully those file sizes aren't too large for email. If so, let me know if we need to go another route.

Thanks again for your assistance!

Ashley

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From: Daniel Menendez [mailto:daniel.menendez@tceq.texas.gov]
Sent: Friday, May 13, 2016 1:16 PM
To: Mohr, Ashley <Mohr.Ashley@epa.gov>
Subject: RE: SO2 Modeling for Sandy Creek - Request for Recent Revised Modeling Files

Hi Ashley,

Attached are the files. Please let me know if you have any questions.

Daniel

From: Mohr, Ashley [mailto:Mohr.Ashley@epa.gov]
Sent: Wednesday, May 11, 2016 8:54 AM
To: Daniel Menendez
Cc: Snyder, Erik
Subject: SO2 Modeling for Sandy Creek - Request for Recent Revised Modeling Files

Daniel,

Forgive me if TCEQ has already provided these files to the Region. I have been reviewing the most recent submittal from Texas related to the CD sources that included revised modeling results for Sandy Creek, but I have not been able to locate the actual modeling files. Could you provide these files? Not sure if email will allow or not based on file size. Let me know if you have any questions or how to best obtain the files.

Thanks,

Ashley

Ashley N.Q. Mohr
Environmental Scientist
Air Permits Section (6MM-AP)
U.S. Environmental Protection Agency
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consulting ♦ training ♦ data systems

April 12, 2016

Mr. Benjamin Hansen
Permit Engineer, Air Permits Division
Texas Commission on Environmental Quality
12100 Park 35 Circle, MC-163
Austin, Texas 78753

via Hand Delivery

AIR PERMITS DIVISION
APR 12 2016
HAND-DELIVERED

RE: Air Quality Impacts Analysis Modeling Protocol
Permit Nos. 7369, PSD-TX-120M4
Capitol Aggregates, Inc.
Capitol Cement Plant
Regulated Entity Number RN100211507

Dear Mr. Hansen:

On behalf of Capitol Aggregates, Inc., Zephyr Environmental Corporation submits the enclosed air quality analysis modeling protocol. The methods proposed within this modeling protocol are in accordance with standard United States Environmental Protection Agency (EPA) and Texas Commission on Environmental Quality guidance.

If you have any further questions on this issue, please call me at (512) 579-3820 or at dcastro@zephyrenv.com.

Sincerely,
Zephyr Environmental Corporation

for David L. Castro
Senior Project Engineering Associate

Enclosure

cc: Mr. Paul Detterline, Capitol Aggregates, Inc.
Ms. Stephanie Kordzi, EPA Region 6 (electronic copy by email)
Mr. Larry Moon, P.E.; Zephyr Environmental Corporation

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www.ZephyrEnv.com • www.HazMatAcademy.com

MODELING PROTOCOL
IN SUPPORT OF AN AIR PERMIT AND PREVENTION OF SIGNIFICANT DETERIORATION AMENDMENT APPLICATION REVISION FOR PERMIT 7369/PSD-TX-120M4 FOR CAPITOL AGGREGATES, INC. CAPITOL CEMENT PLANT SAN ANTONIO, TEXAS

SUBMITTED TO:
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
OFFICE OF AIR
AIR PERMITS DIVISION
P. O. BOX 13087
AUSTIN, TEXAS 78711-3087

AIRPERMITS DIVISION
APR 12 2016
HAND-DELIVERED

SUBMITTED BY:
CAPITOL AGGREGATES, INC.
P.O. BOX 13087
AUSTIN, TEXAS 78711-3087

PREPARED BY:
ZEPHYR ENVIRONMENTAL CORPORATION
TEXAS REGISTERED ENGINEERING FIRM F-102
2600 VIA FORTUNA, SUITE 450
AUSTIN, TEXAS 78746-6544

APRIL 2016

zephyr

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ATTACHMENT 1 PLOT PLAN
ATTACHMENT 2 AREA MAP
ATTACHMENT 3 MAP OF NEAREST TCEQ MONITOR STATIONS
ATTACHMENT 4 MONITOR COMPARISONS
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ATTACHMENT 6 OFF-PROPERTY SOURCE LOCATIONS
ATTACHMENT 7 MAPS OF PROJECT-RELATED CONCENTRATION GRADIENTS
ATTACHMENT 8 SECONDARY $PM_{2.5}$ ESTIMATE
ATTACHMENT 9 ELECTRONIC FILES

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1.0 PROJECT IDENTIFICATION INFORMATION

This document presents the proposed Prevention of Significant Deterioration (PSD) and State New Source Review (NSR) air dispersion modeling protocol for evaluating the air quality impacts resulting from the addition of a new preheater, precalciner kiln line and associated equipment at an existing Portland cement production plant. This modeling protocol is submitted in support of the *Air Permit and Prevention of Significant Deterioration Amendment Application Revision for Permit 7369/PSD-TX-120M4 for Capitol Aggregates, Inc. Capitol Cement Plant; San Antonio, Texas; October 30, 2015* with revisions/addenda.

Zephyr Environmental Corporation (Zephyr) has prepared this protocol following written and verbal methodologies and procedures of the Texas Commission on Environmental Quality (TCEQ) and United States Environmental Protection Agency (EPA).

To simplify the review of this protocol, it has been written to closely follow the order of the items listed in the Reporting Requirements (Appendix P) of the TCEQ's *Air Quality Modeling Guidelines, APDG 6232, April 2015 (AQMG)*.

Applicant:	Capitol Aggregates, Inc.
Facility:	Capitol Cement Plant
Regulated Entity Number:	RN100211507
Permit Application Numbers:	7369, PSD-TX-120M4
Nearest City:	San Antonio
County in Which Plant Located:	Bexar
Applicant's Modeler:	Zephyr Environmental Corporation

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2.0 PROJECT OVERVIEW

Capitol Aggregates, Inc. (Capitol) owns and operates a Portland cement production plant (Capitol Cement Plant) in San Antonio, Bexar County, Texas. Air emission sources at the Capitol Cement Plant are authorized by a TCEQ Air Permit, various permits by rule (PBR) and standard permit authorizations. The existing cement kiln (Kiln No. KS -1a) is authorized under Air Permit Nos. 7369 and PSD -TX-120M4. Capitol has submitted a PSD/NSR air quality permit amendment application to authorize a new preheater, precalciner kiln line, and associated equipment.

An air quality analysis (AQA) will be conducted to demonstrate that associated emissions with this project will not cause or contribute to an exceedance of the National Ambient Air Quality Standards (NAAQS), PSD increment consumption limits, or TCEQ property line standards.

2.1 TYPE OF PERMIT REVIEW

The applicability of federal permitting to the pending permit application is discussed in Sections IX.D and IX.E of the application. Table 2-1 provides a summary of the combined projects' PSD emission significance, as applicable to the air quality analysis for this project.

Table 2-1
PSD Significance Summary

Contaminant	PSD Emission Significant?
Nitrogen Oxides (NO_X)	Yes
Carbon Monoxide (CO)	Yes
Sulfur Dioxide (SO_2)	Yes
Particulate Matter (PM)	Yes
Particulate Matter, Diameter < 10 microns (PM_{10})	Yes
Particulate Matter, Diameter < 2.5 microns ($PM_{2.5}$)	Yes
Volatile Organic Compounds (VOC)	Yes
Sulfuric Acid Mist (H_2SO_4)	Yes

2.2 CONSTITUENTS EVALUATED

The following air contaminants will be evaluated for the PSD AQA: nitrogen dioxide (NO_2), CO, SO_2, PM_{10}, $PM_{2.5}$, and H_2SO_4. The proposed project will have net emission increases of VOC and NO_X less than 100 tons per year, each. Therefore, an AQA and the gathering of air quality (monitoring) data is not required for ozone [40 CFR 51.166(i)(5)(i)(f)].

The following pollutants will be evaluated for the State health effects analysis: ammonia (CAS 7664-47-7), Portland cement (CAS 65997-15-1), limestone (CAS 1317-65-3), coal dust (CAS 125612-26-2), petroleum coke (CAS 64741-79-3), gypsum (CAS 778-18-9), silica crystalline/quartz (CAS 14808-60-7), hydrogen chloride (CAS 7647-01-0), and mercury (inorganic, no CAS number).

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3.0 PLOT PLAN

A plot plan showing the names and locations of emission points relative to the Capitol Cement Plant's property boundary is provided as Attachment 1 to this protocol. A detailed plot plan showing the names and locations of all modeled sources and structures will be provided in the AQA report.

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4.0 AREA MAPS

The following maps and figures illustrate the area surrounding the proposed project:

- An **area map** showing a 3,000 -foot radius around the plant's property boundaries is provided as Attachment 2. There are no schools located within 3,000 feet of the Capitol Cement Plant property boundary.
- The nearest **residential areas** are illustrated on the area map included as Attachment 2.
- The nearest **non-industrial receptor** corresponds to an undeveloped parcel of land south of the proposed equipment at the corner of Wurzbach Parkway and Nacogdoches Road.
- There are no **PSD Class I areas** within 100 kilometers. The nearest Class I area is Big Bend National Park which is over 430 kilometers west of the facility. A figure illustrating the location of all nearby Class I areas will be provided in the air quality analysis (AQA).
- An area map illustrating the **urban and topographical features** within the Area of Significant Impact (AOI) will be provided in the AQA.
- A map showing the **nonattainment areas** near the project will be provided in the AQA.
- The locations of local **meteorological stations** will be provided in the AQA.
- The locations of the **ambient air monitoring sites** nearest the facility is included as Attachment 3.

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5.0 AIR QUALITY MONITORING DATA

Estimates for the current ambient air background concentrations at the proposed project site may be required for two distinct and separate purposes: (1) to demonstrate that the ambient air concentrations of PSD -significant pollutants are currently in compliance with the NAAQS and (2) for use in a full impact NAAQS modeling analysis. Capitol proposes to use ambient air quality data from existing air quality monitoring stations to establish background concentrations for these contaminants.

5.1 AVAILABLE BACKGROUND CONCENTRATIONS

Based on a review of the TCEQ's *Air Quality Data* website and the EPA's *AirData* website (http://www.epa.gov/air/data/), Capitol proposes using data collected at the following monitoring stations to establish representative background concentrations to be used in the NAAQS compliance demonstrations:

- NO_2 – Heritage Middle School [Continuous Air Monitoring Station (CAMS) 622, EPA ID 48-029-0622]
- CO – Heritage Middle School (CAMS 622, EPA ID 48-029-0622)
- SO_2 – Heritage Middle School (CAMS 622, EPA ID 48-029-0622)
- PM_{10} – Selma (CAMS 301, EPA ID 48-029-0053)
- $PM_{2.5}$ (total) – Selma (CAMS 301, EPA ID 48-029-0053)
- $PM_{2.5}$ Nitrates – Houston Aldine (CAMS 8, EPA ID 48-201-0024)
- $PM_{2.5}$ Sulfates – Houston Aldine (CAMS 8, EPA ID 48-201-0024)

The appropriateness of using data from these monitoring stations to establish background concentrations is discussed in Section 5.2.

Guidance from the TCEQ's *AQMG* was followed in selecting the form of the monitored concentration for each pollutant and averaging period. The proposed background concentrations are summarized in Table 5-1.

These background concentration estimates were calculated based on hourly data obtained from the TCEQ website. Following guidance received from the TCEQ Modeling Staff (for a different but recent analysis), the calculations: (1) include hourly data from days that do not meet EPA's definition of completeness and (2) no rounding was conducted at any step of the calculations. Therefore, the calculated concentration values are more conservative than values that may be available elsewhere.

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Table 5-1
Proposed Background Concentrations

Contaminant	Monitoring Station	County	Averaging Period	Concentration (µg/m^3)	Form
NO_2	Heritage Middle School	Bexar	1-Hour	64.71	3-Year Average of 98th Percentiles of the Daily Maximums 2013-2015
			Annual	8.836	1st High, 2015
CO	Heritage Middle School	Bexar	1-Hour	3,546	2nd High, 2015
			8-Hour	586.2	2nd High, 2015
SO_2	Heritage Middle School	Bexar	1-Hour	56.21	3-Year Average of 99th Percentiles of the Daily 1-Hour Maximums 2014-2015
			3-Hour	32.59	2nd High, 2015
			24-Hour	6.939	2nd High, 2015
			Annual	0.6865	1st High, 2015
PM_{10}	Selma	Bexar	24-Hour	66.00	2nd High, 2013-2015
$PM_{2.5}$	Selma	Bexar	24-Hour	22.13	3-Year Average of 98th Percentiles of the Daily Maximums 2013-2015
			Annual	8.647	3-Year Average of 1st Highs 2013-2015
$PM_{2.5}$ Nitrates	Houston Aldine	Harris	24-Hour	1.991	1st High, 2012-2014*
			Annual	0.3349	1st High, 2012-2014*
$PM_{2.5}$ Sulfates	Houston Aldine	Harris	24-Hour	7.890	1st High, 2012-2014*
			Annual	2.588	1st High, 2012-2014*

* 2015 data not yet available

The data collected from the Heritage Middle School, Selma, and Houston Aldine monitors meet the EPA requirements for completeness . Electronic copies of the ambient air concentration calculations are included in Attachment 9 of this submittal.

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5.2 REPRESENTATIVENESS OF THE SELECTED MONITORING STATIONS

Following guidance contained in TCEQ's *AQMG and Background Concentration Determination for Use in NAAQS Analyses* (September 2, 1998) and EPA's *Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD), EPA-450/4-87-007* (May 1987); Capitol concludes, as described below, that the air quality monitoring data used to establish background concentrations is representative of the area around the Capitol Cement Plant.

5.2.1 NO_2, CO, SO_2, PM_{10}, and $PM_{2.5}$ Monitoring Stations

Each of the proposed monitoring stations are located outside of the "same general area" of the Capitol Cement Plant. However, each of the proposed monitoring stations are located within the same county. TCEQ modeling guidance for demonstrating conservative representativeness of data collected at these monitors (*AQMG*, Appendix D) states that the nearest monitoring station can be selected for each pollutant. However, the magnitudes of reported emissions within 15 km of each site were compared to determine which Bexar County monitoring stations is most representative of the Capitol Cement Plant location.

There are two PM_{10} and two $PM_{2.5}$ monitoring stations in the immediate vicinity (i.e. within 16 km) of the Capitol Cement Plant. Reported emissions from stationary sources located within 15 km of each site were obtained from the TCEQ point source emissions inventory (EI) database workbook (2013statesum.xlsx) for the year 2013. Emissions from stationary sources located within 15 km of each site are summarized in Table 5-2. Detailed emission rate information is provided in Attachment 4.

Table 5-2
Comparison of PM Emissions from Stationary Sources Located within 15 Km

Location	CAMS	County	Distance (km)	Air Emission Estimates for 2014 (tpy)	
				PM_{10}	$PM_{2.5}$
Capitol Cement Plant	-	Bexar	0	221	106
Selma	301	Bexar	11	175	79
CPS Pecan Valley	648	Bexar	15	-	31
Frank Wing Municipal Court	-	Bexar	16	39	-

The Selma monitoring station is located within 11 km of the Capitol Cement Plant and is the nearest PM_{10} and $PM_{2.5}$ monitoring station. Due to its proximity to the Capitol Cement Plant and the comparable magnitudes of nearby emissions, it offers more representative PM_{10} data than the nearby Frank Wing Municipal Court monitoring station and more representative $PM_{2.5}$ data than the nearby CPS Pecan Valley monitoring station.

There are four NO_2, three CO and three SO_2 monitoring stations with three years of recent monitoring data located in Bexar County. Reported emissions from stationary sources located within 15 km of each site were obtained from the TCEQ point source EI database workbook

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(2013statesum.xlsx) for the year 2013. Emissions from stationary sources located within 15 km of each site are summarized in Table 5-3. Detailed emission rate information is provided in Attachment 4.

Table 5-3
Comparison of Emissions from Stationary Sources Located within 15 Km

Location	CAMS	County	Distance (km)	Air Emission Estimates for 2014 (tpy)		
				NO_2	CO	SO_2
Capitol Cement Plant	-	Bexar	0	3,193	1,691	658
CPS Pecan Valley	648	Bexar	15	118	193	11
San Antonio Northwest	23	Bexar	20	316	-	-
Heritage Middle School	622	Bexar	23	7,422	5,852	17,150
Calaveras Lake	59	Bexar	32	7,342	-	17,140

Reported emissions near the Heritage Middle School monitoring station are much greater than those near the Capitol Cement Plant location. Therefore, this monitor offers extremely conservative estimates for ambient NO_2, CO and SO_2 concentrations than any other Bexar County NO_2, CO and SO_2 monitoring stations.

5.2.2 $PM_{2.5}$ Nitrates and $PM_{2.5}$ Sulfates Monitoring Station

Each of the proposed monitoring stations are located outside of the "same general area" of the Capitol Cement Plant. Therefore, in accordance with TCEQ modeling guidance for demonstrating conservative representativeness of data collected at these monitors, population and air emission information compiled for the counties in which the monitor resides (i.e., Harris County) were compared to Bexar County.

5.2.2.1 Topography

Capitol Cement Plant and the Houston Aldine monitor locations share similar topography. The area surrounding each location (within several kilometers) is relatively flat. The area surrounding each location are heavily residential with some commercial activities.

5.2.2.2 Population Density

Population estimates were obtained from the United States Census Bureau for year 2013 (http://quickfacts.census.gov/qfd/index.html). The population data for Bexar and Harris counties is summarized in Table 5-4.

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Table 5-4
Population Comparison Analysis

County	Population Estimate for year 2014
Bexar	1,855,866
Harris	4,441,370

Harris County has a significantly greater population than Bexar County. Air emissions associated with population density (e.g. automobile traffic) near the Houston Aldine monitor are greater than the emissions associated with population density in Bexar County. Therefore, the proposed monitoring station offers conservative estimates of ambient concentration contributions associated with population density in Bexar County.

As SO_2 and NO_X are precursors to the formation of secondary $PM_{2.5}$, the Houston Aldine monitoring station also offers conservative estimates for $PM_{2.5}$ nitrates and $PM_{2.5}$ sulfates ambient air concentrations in Bexar County.

5.2.2.3 County-wide Emissions

Air emission rate data for Harris County was obtained from the EPA National Emissions Inventory (NEI) Database through the EPA *AirData* website (http://www.epa.gov/airdata/). The data provides estimates of the point source and non-point/mobile source emissions in each county. The total air emissions for each county are summarized in Table 5-5.

Table 5-5
Comparison of County-wide Air Emissions

County	Location	County-wide Air Emission Estimates (tpy) (EPA 2011 NEI Data)		
		$PM_{2.5}$	NOx	SO_2
Bexar	Capitol Cement Plant	9,199	47,156	24,671
Harris	Houston Aldine	21,987	98,469	15,911

Secondary $PM_{2.5}$ emissions are formed through the emission of gaseous compounds such as SO_2 and NO_X. Portions of these gaseous emissions can form fine particulates in the atmosphere through chemical reactions or condensation. These chemical transformations occur in the atmosphere gradually over time (hours or days depending on atmospheric conditions and other variables). Therefore, secondary $PM_{2.5}$ impacts are expected to occur at some distance from the source of its gaseous emission precursors. Due to the required formation distances, comparison of nearby SO_2 and NO_X emissions (i.e. within 10 km) is not appropriate. County-wide emissions are proposed as an appropriate and conservative estimate of the air shed emissions for this comparison. As shown on Table 5-5, the NEI database SO_2 and NO_X air emissions for Harris County are comparable to those found in Bexar County. Therefore, the Houston Aldine

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monitoring station offers conservative estimates for $PM_{2.5}$ nitrates and $PM_{2.5}$ sulfates background concentrations.

Based on the discussion presented above concerning the topography, population density, and county-wide emissions; ambient air monitoring data from the Houston Aldine monitoring station is representative and appropriate for use as conservative background concentration estimates for $PM_{2.5}$ nitrates and $PM_{2.5}$ sulfates the Capitol Cement Plant location.

5.3 PSD AMBIENT MONITORING REQUIREMENT

The *New Source Review Workshop Manual -Prevention of Significant Deterioration and Nonattainment Area Permitting; USEPA, Draft October 1990* (page C.16) states that continuous ambient monitoring data may be required unless "either (1) the predicted ambient impact, i.e., the highest modeled concentration for the applicable averaging time, caused by the proposed significant emissions increase (or significant net emissions increase), or (2) the existing ambient pollutant concentrations , are less than the prescribed significant monitoring value" (i.e. SMC value).

On January 22, 2013, the United States Court of Appeals for the District of Columbia Circuit granted a request from the EPA to vacate and remand to the EPA the portions of two PSD $PM_{2.5}$ rules [40 CFR 51.166(k)(2) and 40 CFR 52.21(k)(2)] addressing select provisions of the $PM_{2.5}$ Significant Impact Levels (SILs) so that the EPA could voluntarily correct an error in these provisions. The EPA amended its regulations and removed the vacated $PM_{2.5}$ SILs effective December 9, 2013 – requiring all applicants to compile $PM_{2.5}$ monitoring data.

The proposed project will emit PSD -significant amounts of NO_2, SO_2, CO, PM_{10}, $PM_{2.5}$, and H_2SO_4. The applicant believes the nearby Selma and Heritage Middle School monitoring stations offer conservative estimates of the background concentrations for the area . Therefore, the applicant proposes to utilize the Selma and Heritage Middle School monitoring data in lieu of performing pre-construction monitoring for $PM_{2.5}$ and any pollutant with preliminary impacts analysis results greater than the NO_2, SO_2, CO, and PM_{10} SMC values.

NAAQS do not exist for H_2SO_4. Capitol proposes to satisfy the pre-application analysis requirement for this PSD pollutant by demonstrating compliance with the State property line standard.

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6.0 MODELING EMISSIONS INVENTORY

The proposed emissions, operating parameters and design parameters for the proposed project are defined and discussed in the air quality permit application. The application submitted to the TCEQ includes detailed information regarding the items addressed in this section.

6.1 ON-PROPERTY SOURCES

Proposed and existing Capitol Cement Plant sources are identified in this section. The modeling will be conducted utilizing the conservative modeling assumptions described in Section 6.4.

6.1.1 Current Project Sources

Capitol is submitting this air permit amendment application to authorize a new preheater, precalciner kiln line and associated equipment. This air permit amendment application for Air Permit Nos. 7369 and PSD-TX-120M4 authorizes the following:

- The addition of a new kiln [Facility Identification Number (FIN) KL-870 and Emission Point Number (EPN) SK-880] and associated equipment with a proposed production rate of 803,000 tons per year. The addition of the new kiln will not affect the existing kiln or solid fuel (Coal/Petcoke) processing, as the existing solid fuel mill is currently sized for two kilns

- New kiln support equipment which will include: new raw material storage and transport equipment, new clinker storage and transport equipment, a new finish mill, a new inline raw mill, and a new emergency engine.

- Alternative fuels are being proposed for the new kiln based on currently permitted fuel types at other Portland cement plants in Texas. Equipment for handling these fuels is also included in this application.

- The addition of two new truck unloading stations which will receive raw materials from off site sources.

- The proposed increase in existing crusher and raw material handling throughputs so that the existing quarry could support the new kiln, if necessary. Physical modification of this existing equipment may be required.

- The addition of planned maintenance, startup, and shutdown (MSS) emissions related to the new kiln and its supporting equipment.

- With this amendment, Capitol would like operational flexibility to use the existing raw mill to feed the new kiln or the new raw mill to feed the existing kiln. The existing raw mill allowable throughputs are not proposed to be changed.

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- With this application, Capitol is also requesting to lower the nitrogen oxide (NO_x) and volatile organic compound (VOC) authorized emission limits for the existing kiln (EPN: KS 1A). We are proposing a combined annual limit for NO_x for both kilns.

With this application, Capitol also wishes to clarify or update current permit information as follows:

- Updating EPNs for most of the currently authorized sources. The name changes are to allow the EPNs to better match actual plant nomenclature;

- Clarify that EPN F-P-RMS1 (formerly F-P-7) represents the existing raw material storage building. Some confusion occurred on this source during a 2011 permit amendment. The name in the current MAERT needs to be corrected. In addition, material drop point EPN F-R-7 should be removed from the permit as this drop point occurs at the material pile inside the building and is accounted for in the emission limits for the (current) EPN F-P-7. The Cement Kiln Dust Drop to Pile which occurs in the quarry should be re-named EPN F-P-CKD. The emissions for this source should be the emissions that were permitted for EPN F-P-7 prior to the 2011 amendment, 0.01 lb/hr and 0.01 tpy for both PM and PM10; and

- Adding an emission point which authorizes the operation of moving cement kiln dust (CKD) from the CKD pile at the quarry with a front-end loader and loading into customer trucks near the pile. The new EPN would be F-L-CKD and will include CKD from both the existing and new kiln.

A complete list of project-related emission sources and emissions will be documented in the AQA. A copy of the most recent TCEQ Table 1(a) submitted for this project is included as Attachment 5. This table includes the project sources and their exhaust parameters (in English units).

6.1.2 Contemporaneous Project Sources

For PSD-significant pollutants, sources associated with projects that were conducted within the project's contemporaneous time period will be included in the preliminary impacts analysis as "project" sources. The proposed increases in emissions from contemporaneous emission sources will be included in the preliminary impacts analysis. A complete list of contemporaneous emission sources and emissions will be documented in the AQA.

6.1.3 Existing Sources

A large number of existing Capitol Cement Plant sources are not affected by this application. Emissions from these existing sources will be included in the full impact modeling analyses. A complete list of existing emission sources and emissions will be documented in the AQA.

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6.1.4 Capitol SkyMine, LLC Sources

Capitol SkyMine, LLC (SkyMine) owns and operates a carbon mineralization plant under TCEQ PBR 94176. The facility harvest s CO_2 from Capitol Cement Plant flue gas and coverts it into useful products such as sodium bicarbonate,sodium hypochlorite andhydrochloric acid. SkyMine leases property from Capitol and is located within Capitol's overall property boundary.

The SkyMine Plant is considered to be a separate stationary source from the adjoining Capit ol Cement Plant for PSD permitting purposes because it is not under common control as the cement plant and it is under separate industrial grouping (different two digit SIC code). Some exceptions to the common control and industrial grouping criteria have been made by EPA in the past where one facility is a "support facility" for an adjoining facility. Representatives of SkyMine met with EPA Region 6 prior to completion of an environmental assessm ent for the U.S. Department of Energy and received verbal confirmation that EPA would not consider the SkyMine Plant to be a "support facility" for the Capitol's cement plant.

As specified in the EPA's memorandum from Stephen D. Page, Office of Air Qualit y Planning & Standards to Regional Air Division Directors entitled "Interpretation of "Ambient Air" In Situations Involving Lease Land Under the Regulations for Prevention of Significant Deterioration (PSD)" dated June 22, 2007, when two or more companiesoperate separate sources on property owned by one company and leased in part to the other, and the lessor retains control over public access to the entire property, the air over the entire property (including the leased portion) is not ambient air to the lessor. In this situation, Capitol is the lessor and maintains control over the public access to the entire property. Therefore, the air over the leased property to Sky Mine will not be considered ambient air for the purposes of Capitol 's PSD application. However, the emission sources associated with Sky Mine will be included in the full impact PSD modeling analyses for this application.

For purposes of State-only air dispersion modeling analyses, Capitol and Capitol SkyMine, LLC have an approved Single Property Designation from the TCEQ. Therefore, the emission sources associated with SkyMine will be included in the sitewide State modeling analyses for this application.

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6.2 OFF-PROPERTY SOURCES

6.2.1 NAAQS Analysis Sources

Guidance from EPA's *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard, March 1, 2011* and *Clarification on the Use of AERMOD Dispersion Modeling for Demonstrating Compliance with the NO2 National Ambient Air Quality Standard, September 30, 2014* will be followed to develop a cumulative NAAQS impact assessment that includes both monitored and modeled contributions. In the 2011 document, the EPA states that the Guideline on Air Quality Models (40 CFR 51 Appendix W) implies a preference for use of ambient air quality data to account for background concentrations where possible (i.e. instead of explicate modeling of off-property sources). Based on the locations of the proposed representative ambient air monitoring stations, Capitol believes that explicate modeling of off-property sources will be required in order to obtain conservative NAAQS modeling results.

Identification of nearby off-property sources and the development of the off-property NAAQS source inventory is discussed in Section 6.2.1.1. Identification of off-property sources with impacts that are adequately represented by the proposed ambient air quality data is discussed in Section 6.2.1.2.

6.2.1.1 Off-Property NAAQS Source Inventory Development

The TCEQ Air Permits Allowable Database (APAD) provides an inventory of non-project sources and includes permitted, PBR and exempt emission sources. The APAD retrieval inventories contain permit allowable emission rates and stack parameter information for off-property sources located within 50 kilometers of the requested location. An inventory of nearby NAAQS sources will be developed using the TCEQ APAD system retrievals and a review of the TCEQ air permit files.

Retrievals from the APAD will be obtained for NAAQS pollutants with preliminary impact analysis results greater than the EPA's Significant Impact Level (SIL). The TCEQ APAD does not contain a complete inventory of $PM_{2.5}$ emissions. Therefore, the APAD PM_{10} retrieval will be utilized in the development of the $PM_{2.5}$ NAAQS source inventory, when necessary.

Source identifiers within the APAD system are unique. Within this protocol, APAD source identifiers may also be referred to as "APAD IDs". If a source appears in multiple retrievals, the source identifier is the same. Additionally, the stack parameters are identical for a given source identifier. The individual APAD retrievals obtained from the TCEQ for each applicable pollutant will be combined into a single APAD source inventory. This single APAD source inventory will contain every NAAQS and PSD increment consuming source from all the provided retrievals along with each NAAQS and PSD increment consuming emission rate associated with each source.

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Before using the TCEQ APAD retrieval information in the dispersion modeling analyses, the information will be examined for completeness and obvious errors. An initial review will be conducted to correct obvious errors such as:

- Sources with release heigh ts of less than 1 meter will be revised to a release height of 1 meter.
- Sources with release heights greater than 65 meters will be revised to release heights of 65 meters.
- Sources with zero velocities will be revised to a conservative velocity of 0.001 meter per second.
- Sources with zero stack diameters will be revised to a conservative diameter of 0.001 meter.
- Sources with no stack temperature information will be revised to conservatively be modeled using ambient hourly temperatures.
- Sources provided with area source parameters will be conservatively modeled as pseudo point sources.

All revisions to the TCEQ APAD inventories will be documented in the AQA.

After this initial review, a more detailed review will be conducted on the APAD retrieval information. Material obtained from the TCEQ permit file system will be reviewed to ensure that a complete inventory of recently permitted and pending off-property sources is utilized in the full NAAQS modeling analysis. The TCEQ's online Information Management System (IMS) NSR database will be used to identify recent permitting actions for off-property sources. Information obtained from the TCEQ public files for emission sources that are documented in the IMS will be compared against the APAD inventory listing for accuracy/consistency.

Minor sources of emissions that are located far from the project site are not expected to have a major impact at any location (i.e. modeling receptor) significantly impacted by the project. In the EPA modeling guidance memorandum (*Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard; Tyler Fox, Leader Air Quality Modeling Group, C439 -01; March 1, 2011*), EPA recommends focusing on the area within 10 km of the project location when determining which nearby sources to include in the full impact modeling analysis. Additionally, EPA states that the inclusion of all sources within 50 km of the project location "is likely to produce an overly conservative result in most cases." The concentration gradient of modeling impacts from off-property sources are expected to diminish quickly with distance. Therefore, in-depth review of the APAD information will be focused on the sources that are located within 10 km of the project location. However, all the sources listed on the APAD retrieval will be reviewed and all APAD retrieval sources will be included in applicable full impact modeling analyses – including sources located farther than 10 km from the project location. Additionally, in-depth review of the APAD information will also be

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conducted within areas outside of 10 km for pollutants with preliminary modeling results greater than the SILs.

The following review will be conducted for sources located within 10 km of the project location:

- APAD source emission rates will be compared to PSD Permit and NSR Construction Permit information from material obtained from the TCEQ public files and updated, if necessary. For sources authorized via methods other than PSD Permit and NSR Construction Permit, APAD source emission rates will be compared to information obtained from material obtained from the TCEQ's GroupWise Remote Document Server, and updated if necessary.

- Sources identified in the IMS as being authorized via PSD Permit, NSR Construction Permit and PBR that are not currently included in the APAD inventorywill be added to the modeling inventory of off-property sources using emission rates and exhaust paramete r values obtained from the TCEQ public files.

- Sources identified in the IMS as pending TCEQ review for a PSD Permit or NSR Construction Permit will be added to the modeling inventory of off-property sources using the proposed emission rates and the exhaust parameter values obtained from the TCEQ public files.

Additionally, the following review will be conducted for APAD retrievalsources located farther than 10 km of the project location:

- For sources located within 50 km and within a preliminary modeling analysis AOI:

    - APAD source emission rates will be compared to PSD Permit and NSR Construction Permit information from material obtained from the TCEQ public files and updated, if necessary. For sources authorized via methods other than PSD Permit and NSR Co nstruction Permit, APAD source emission rates will be compared to information obtained from material obtained from the TCEQ's GroupWise Remote Document Server, and updated if necessary.

    - Sources identified in the IMS as being authorized via PSD Permit and NSR Construction Permit that are not currently included in the APAD inventory will be added to the modeling inventory of off-property sources using emission rates and exhaust parameter values obtained from the TCEQ public files.

    - Sources identified in the IMS as pending TCEQ review for a PSD Permit or NSR Construction Permit will be added to the modeling inventory of offproperty sources using the proposed emission rates and the exhaust parameter values obtained from the TCEQ public files.

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- For sources located within 50 km and outside preliminary modeling analysis AOIs:
  - APAD source emission rates will be compared to information obtained from material obtained from the TCEQ's GroupWise Remote Document Server, and updated if necessary.
  - Sources identified in the IMS as being authorized via PSD Permit that are not currently included in the APAD inventory will be added to the modeling inventory of off-property sources using emission rates and exhaust parameter values obtained from the TCEQ public files.
  - Sources identified in the IMS as pending TCEQ review for a PSD Permit will be added to the modeling inventory of off-property sources using the proposed emission rates and the exhaust parameter values obtained from the TCEQ public files.

For off-property sources with no specific $PM_{2.5}$ emission estimates, it will be conservatively assumed that the $PM_{2.5}$ emissions are equal to the PM_{10} emissions. All revisions and additions to the TCEQ APAD inventories will be documented in the AQA.

6.2.1.2 Use of Ambient Air Quality Data to Account for Background Concentrations

As discussed previously, the EPA has stated that the Guideline on Air Quality Models implies a preference for use of ambient air quality data to account for background concentrations where possible (i.e. instead of explicate modeling of off-property sources). As stated in Section 5.1, Capitol proposes the use of the Heritage Middle School monitoring station for background NO_2, CO, and SO_2 concentrations and the Selma monitoring station for background PM_{10} and $PM_{2.5}$ concentrations. The locations of these monitoring stations along with the off-property sources that were identified following the methods described in Section 6.6.1.1 are illustrated on the figure included as Attachment 6. The prevalent wind direction in San Antonio is also indicated by the wind rose included on this figure.

1-hour NO_2, CO, and SO_2 concentration gradients associated with project-related emissions are illustrated on the figures included as Attachment 7. The maximum project-related impacts for each pollutant are located near toor to the northwest of the Capitol Cement Plant. Project-related impacts upwind (south and southeast) of the Plant are much lower.

A number of sources are located upwind of the Heritage Middle School monitoring station and the Capitol Cement Plant. Concentration gradients associated with these sources are expected to be similar to those associated with the project-related sources. The maximum impacts associated with these off-property sources are expected to be near to and to the northwest of their locations. Ambient air quality data from the Heritage Middle School provides conservative NO_2, CO, and SO_2 background concentrations for all existing sources located upwind (i.e. south and southeast) of its location. Explicate modeling of NO_2, CO, and SO_2 emissions from these sources increases the potential of double-counting these source's impacts in the cumulative impacts analysis.

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Therefore, Capitol proposes to utilize the ambient air quality data from the Heritage Middle School to represent the full NO_2, CO, and SO_2 impact contributions from existing sources upwind (south and southeast) of that monitor.

NO_2, CO, and SO_2 emissions from sources that have been constructed or modified after the ambient air quality data dates or that have been recently proposed would not be represented by the existing air quality data. NO_2, CO, and SO_2 emissions from such sources will be explicitly modeled in the full impact NAAQS analyses.

6.2.2 PSD Increment Consumption Analysis Sources

An inventory of PSD increment -consuming sources will be obtained using the TCEQ APAD system and a detailed review of the TCEQ air permit files. The TCEQ APAD inventories will be examined for completeness following the methodology discussed in Section 6.2.1.

6.2.2.1 NO_2, SO_2, and PM_{10} Analyses

A conservative full-impact PSD increment consumption analysis will be conducted for applicable NO_2, SO_2, and PM_{10} emissions using the off -property source inventories developed for the full - impact NAAQS analysis. The development of this inventory is discussed in Section 6.2.1. The results from this analysis will be extremely conservative since (1) emissions listed in the NAAQS inventory correspond to the current permitted allowable emissions instead of increases (and decreases) in emissions after the respective minor source baseline dates and (2) increment consumption is based on increases in actual emissions and not allowable emissions. If the predicted results from this initial analysis are greater than the increment consumption limits, a more detailed review of select sources will be conducted to estimate their increment consuming emissions.

6.2.2.2 $PM_{2.5}$ Analysis

The TCEQ APAD does not contain accurate estimates for $PM_{2.5}$ increment consuming emissions. $PM_{2.5}$ increment is consumed only by (1) actual emission increases from new or modified major sources which begin construction after the major source baseline date and (2) actual emission increases from new or modified minor sources which begin operation after the minor source baseline date. The major source baseline date for $PM_{2.5}$ is October 20, 2010. The minor source baseline date is the date that the first $PM_{2.5}$-significant application is submitted in this area after the trigger date of October 20, 2011. A review of the TCEQ IMS database indicates that Alamo Cement Company (RN100220474) submitted the first PSD application in Bexar County after the $PM_{2.5}$ trigger date. Since the application was significant for $PM_{2.5}$, the minor source baseline date for this area is the application submittal date – September 2, 2015. Material obtained from the TCEQ permit file system will be reviewed to ensure that a complete and accurate inventory of off-property sources will be utilized in the full impact PSD increment consumption modeling analysis.

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The off-property source inventory developed for the full-impact NAAQS analysis will be used as the basis for the $PM_{2.5}$ increment consumption inventory. The development of this inventory is discussed in Section 6.2.1. However, a detailed review will be conducted for all sources with authorizations dated near and after the $PM_{2.5}$ major source baseline date (October 20, 2010) to determine if recent permitting actions included any increases in $PM_{2.5}$ emissions. The TCEQ's online IMS Title V Federal Operating Permits database will be used to identify the federal status of each facility. It will be assumed that facilities with Title V permits are major facilities.

For major facilities, $PM_{2.5}$ increment is potentially consumed for projects which begin construction after the major source baseline date. Start of construction dates are not readily available from the TCEQ public records. Therefore, all permitting actions authorized 18 months prior to the major source baseline date (i.e. April 20, 2009) at major sources will be reviewed. This 18-month buffer corresponds to the maximum time that is allowed between project approval and start of construction prior to obtaining additional authorization. This review will be conservative since it assumes that all permitting actions approved 18 mo nths prior to the major source review date start construction after the major source baseline date.

For major facilities with permitting actions after April 20, 2009, i nformation will be obtained from the TCEQ public files for each permitting action to determine if that action included any increases in $PM_{2.5}$. Sources with no increases in $PM_{2.5}$ emissions will be excluded in the full PSD increment consumption source inventory. Sources with increases in $PM_{2.5}$ emissions will be included in the full PSD increment consumption source inventory. The permit allowable emission rate will be conservatively modeled for these sources. The results from this analysis will be extremely conservative since increment consumption is based on increases in actual emissions and not on allowable emissions. If the predicted results from this initial analysis are greater than the increment consumption limits, a more detailed review of select sources will be conducted to estimate their increment consuming emissions (see Section 6.2.2.3).

For minor facilities, $PM_{2.5}$ increment is consumed by projects which begin operation after the minor source baseline date. Start of operation dates are not readily available from the TCEQ public records. Therefore, all NSR construction permitting actions authorized 18 months prior to the minor source baseline date (i.e. March 2 , 20 14) will be reviewed. This 18-month period corresponds to the maximum time that is allowed between project approval and start of construction prior to obtain ing additional authorization. This review will be conservative since it assumes that all NSR construction permitting actions approved 18 months prior to the minor source review date begin operation after the minor source baseline date . Additionally, all applicable PBR permitting actions registered on or after the minor source baseline date (September 2, 2015) will be reviewed. The minor source baseline date was utilized since select PBR actions can operate immediately upon registration submittal.

For minor facilities with NSR construction permitting actions afterMarch 2, 2014 and PBR actions after September 2, 2015 , information will be obtained from the TCEQ public files for each permitting action to determine if that action included any increases in $PM_{2.5}$. Sources with no increases in $PM_{2.5}$ emissions will be excluded in the full PSD increment consumption source inventory. Sources with increases in $PM_{2.5}$ emissions will be included in the full PSD increment

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consumption source inventory. The permit allowable emission rate will be conservatively modeled for these sources. The results from this analysis will be extremely conservative since increment consumption is based on increases in actual emissions and not on allowable emissions. If the predicted results from this initial analysis are greater than the increment consumption limits, a more detailed review of select sources will be conducted to estimate their increment consuming emissions (see Section 6.2.2.3).

Additionally, information will be obtained from the TCEQ public files for each permitting action that is undergoing TCEQ review on the date of the IMS survey to determine if that action included any increases in $PM_{2.5}$. Sources with no proposed increases in $PM_{2.5}$ emissions will be excluded in the full PSD increment consumption source inventory. Sources with proposed increases in $PM_{2.5}$ emissions will be included in the full PSD increment consumption source inventory. The permit allowable emission rate will be conservatively modeled for these sources. The results from this analysis will be extremely conservative since increment consumption is based on increases in actual emissions and not on allowable emissions. If the predicted results from this initial analysis are greater than the increment consumption limits, a more detailed review of select sources will be conducted to estimate their increment consuming emissions (see Section 6.2.2.3).

6.2.2.3 Increment Modeling Tiers

The APAD increment retrieval sources can also be adjusted as suggested in the TCEQ's *AQMG*:

- *Increment Modeling Tier I.* Model all sources using their allowable emission rates, as adjusted in Step 4. This approach is conservative since the "difference" in increment is the entire allowable emission rate. Compare the predicted concentration to the appropriate increment (Appendix A, Appendix H). If the increment is not exceeded, the demonstration is complete. Otherwise, go to Tier II.
- *Increment Modeling Tier II.* Model selected sources with $Actual_{MD}$ (actual at modeling date) emission rates and all other sources with allowable emission rates. The selected sources are usually the applicant's, since actual emission rates may be difficult to obtain for off-property sources. This assumes that the "difference" in increment for the selected sources is the entire actual emission rate. If the increment is not exceeded, the demonstration is complete. Otherwise, go to Tier III.
- *Increment Modeling Tier III.* Model selected sources that existed and were in operation at the baseline date with the difference between $Actual_{MD}$ and $Actual_{BD}$ (actual at baseline date). (Additional instructions omitted).

All revisions and additions to the TCEQ APAD inventories will be documented in the AQA.

Capitol proposes to utilize Tier II and Tier III emissions for the Capitol Cement Plant sources. The proposed allowable emissions will be modeled for all new Capitol Cement Plant sources. Actual emissions ($Actual_{MD}$) will be modeled for some existing Capitol Cement Plant sources. The difference in actual emissions since the major source baseline dates ($Actual_{MD}$ minus $Actual_{BD}$)

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will be modeled for some existing Capitol Cement Plant sources. The actual emissions utilized in the analysis will be documented in the AQA.

The Capitol Cement Plant was operating prior to 1975 (the earliest major source baseline date). A wet kiln along with a number of sources relating to the wet kiln line were shut down on December 15, 2006. These shutdown sources were in operation prior to 1975. The Tier III emissions associated with these sources correspond to an expansion of available increment. Baseline actual CO, SO_2 and PM_{10} emissions associated with these shutdown sources will be estimated and modeled as credits in the full impact PSD increment analysis The actual emissions utilized in the analysis will be documented in the AQA.

6.3 SOURCE IDENTIFIERS

A table providing a Capitol Cement Plant source cross-reference between the modeling identification numbers, the Emission Point Numbers (EPNs) listed on the Table 1(a) and the EPNs for existing sitewide sources will be provided in the AQA. As discussed in Section VII.A.3. of the permit amendment application, the EPNs for many existing sources are being revised to match current plant nomenclature as part of this amendment. The cross-reference table will include the previous and current EPNs/FINs for these sources.

6.4 STACK PARAMETER JUSTIFICATION

6.4.1 Good Engineering Practice Stack Height

Each source will be modeled at its physical release height or at the BPIP-calculated good engineering practice height, whichever is lower.

6.4.2 Stack Parameters – Capitol Cement Plant Sources

The physical exhaust parameters of each stack are provided in the permit application. The modeled kiln parameters during kiln MSS activities are described in Section 6.4.5.

6.4.3 Stack Parameters – Off-Property Sources

The physical exhaust parameters provided from the APAD retrievals or updated physical exhaust parameters obtained from TCEQ public record material will be modeled. Any revisions to the TCEQ APAD inventories will be documented in the AQA.

Exhaust parameters provided on Table 1(a) forms obtained from the TCEQ public files will be modeled for recently permitted or pending emissions sources that are not listed in the APAD retrievals. Ground-level (i.e. 1.0 meters) pseudo point source parameters will be conservatively utilized for sources with no Table 1(a) forms or exhaust descriptions within the TCEQ public records.

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6.4.4 Operating Load Levels

Capitol expects to operate the proposed Capitol Cement Plant with both the new kiln and the existing kiln operating continuously at full load. The preliminary and full impact modeling will be conducted assuming worst-case operations corresponding to both kilns operating simultaneously.

6.4.5 Kiln Startup and Shutdown Scenario

Planned startup and shutdown of the proposed kiln will occur infrequently. NO_x, CO, and SO_2 emissions are not expected to exceed the short-term emission allowable emission rates during startup and shutdown periods. In addition, controls for particulate matter emissions are still in place during kiln startup and shutdown. Therefore, PM emissions are not expected to exceed the normal operation hourly emission rates.

Full impact modeling will be conducted assuming worst-case operations corresponding to both kilns undergoing startup/shutdown operations simultaneously. Diesel engines will be utilized to rotate each kiln during startup and shutdown periods.

Cold startup operations occur over a 24- to 48-hour period. Stack tests were conducted during the March 2015 startup of the existing kiln and alkali bypass. Data obtained during this startup period will be utilized in the modeling of the startup operations of the new kiln, existing kilns and existing alkali bypass stack. Note that the proposed alkali bypass exhaust is directed back into the proposed kiln's stream instead of to atmosphere through a dedicated stack. The length of the March 2015 cold startup was approximately 25 to 26 hours. A 24-hour startup period will be assumed for this modeling analysis.

In order to obtain accurate estimates of the off-property concentrations during kiln startup and shutdown operations, the 24-hour startup/shutdown period was divided into six 4-hour periods. The emission rates and exhaust properties expected during each 4-hour period were then modeled as separate emission sources. The modeled NO_2, CO, and SO_2 will correspond to the average March 2015 stack test emission rates during each of the 4-hour periods during kiln or alkali bypass startup. Kiln feed from the in-line Raw Mill is not introduced into the kiln during startup until the kiln reaches a predetermined temperature. The startup period ends when feed has been fed continuously to the kiln for a period of at least 120 minutes or when the kiln feed rate exceeds 60 percent of the kiln design limitation rate, whichever occurs first. Therefore, the maximum amount of time that kiln feed will be introduced into the kiln during a 24-hour startup is 2 hours. A conservative PM_{10} and $PM_{2.5}$ estimate equal to ten percent of normal operating emissions will be modeled for each 4-hour startup/shutdown period. The modeled exhaust velocities correspond to the average March 2015 stack test exhaust velocities during each of the 4-hour periods during kiln or alkali bypass startup. The stack test exhaust temperatures during the entire startup period were relatively constant for the kiln and alkali bypass stack. These startup/shutdown emission sources will then be modeled with other applicable sources within appropriate modeling source groups.

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In order to obtain accurate 1-hour and 3-hour off-property concentration estimates during kiln startup and shutdown operations, six separate startup/shutdown modeling scenarios will be modeled. Each scenario will include one of the six 4-hour startup/shutdown sources described above.

- Short-term Modeling Scenario 1 – The expected emissions and exhaust properties associated with the first four hours (hours one through four) of startup.
- Short-term Modeling Scenario 2 – The expected emissions and exhaust properties associated with the next four hours (hours five through eight) of startup.
- Short-term Modeling Scenario 3 – The expected emissions and exhaust properties associated with the next four hours (hours nine through 12) of startup.
- Short-term Modeling Scenario 4 – The expected emissions and exhaust properties associated with the next four hours (hours 13 through 16) of startup.
- Short-term Modeling Scenario 5 – The expected emissions and exhaust properties associated with the next four hours (hours 17 through 20) of startup.
- Short-term Modeling Scenario 6 – The expected emissions and exhaust properties associated with the final four hours (hours 21 through 24) of startup.

The EPA's *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard; March 1, 2011* states that the intermittent nature of the actual emissions associated with startup/shutdown in many cases, when coupled with the probabilistic form of the 1-hr NO_2 and SO_2 standards, could result in modeled impacts being significantly higher than actual impacts would realistically be expected to be for these emission scenarios. The potential overestimation in these cases results from the implicit assumption that worst-case emissions will coincide with worst-case meteorological conditions based on the specific hours on specific days of each of the years associated with the modeled design value based on the form of the hourly standard. EPA stated in the guidance that the probabilistic form of the standard is explicitly intended to provide a more stable metric for characterizing ambient air quality levels by mitigating the impact that outliers in the distribution might have on the design value. Given the implications of the probabilistic form of the 1-hour NO_2 NAAQS, the EPA stated they were concerned that assuming continuous operations for intermittent emissions would effectively impose an additional level of stringency beyond that intended by the level of the standard itself. EPA stated in the guidance that compliance demonstrations for the 1-hour NO_2 and SO_2 NAAQS should be based on emission scenarios that can logically be assumed to be relatively continuous or which occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations. The EPA guidance recommended an approach to model impacts from intermittent emissions based on an average hourly rate, rather than the maximum hourly emission rate. The example given in the guidance was if a proposed permit includes a limit of 500 hours/year or less of intermittent operation, a modeling analysis could be based on assuming continuous operation at the average hourly rate, i.e., the maximum hourly rate times 500/8760. This approach would account for

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potential worst-case meteorological conditions associated with intermittent operation emissions by assuming continuous operation, while use of the average hourly emission represents a simple approach to account for the probability of kiln startup/shutdown actually occurring in a given hour.

A cold startup is not expected to occur more than twice per year, for a total number of 48 startup hours a year (i.e. spanning two to four calendar days per year). The 1-hour NO_2 and SO_2 emissions associated with conventional cold starts matches the criteria of an intermittent source. These intermittent emissions will be modeled per EPA guidelines, multiplying the maximum proposed hourly emission rate by the ratio of the proposed hours per year and total hours per year. These 1-hour NO_2 and SO_2 emissions will be modeled at the exhaust velocities and temperatures expected for this operation.

In order to obtain accurate 8-hour estimates for the off-property concentrations during kiln startup and shutdown operations, three separate startup/shutdown modeling scenarios will be modeled. Each scenario will include two of the 4-hour startup/shutdown sources described above. Each startup/shutdown source will be modeled using an 8-hour average emission rate. Since each startup/shutdown source corresponds to the emissions during a 4-hour period, the 8-hour average emission rate for each source is obtained using a ratio of 4/8.

- 8-Hour Modeling Scenario 1 – The expected emissions and exhaust properties associated with the first eight hours (hours one through eight) of startup.
- 8-Hour Modeling Scenario 2 – The expected emissions and exhaust properties associated with the next eight hours (hours nine through 16) of startup.
- 8-Hour Modeling Scenario 3 – The expected emissions and exhaust properties associated with the final eight hours (hours 17 through 24) of startup.

In order to obtain accurate 24-hour estimates for the off-property concentrations during kiln startup and shutdown operations, one startup/shutdown modeling scenario will be modeled. This scenario will include all six 4-hour startup/shutdown sources described above. Each startup/shutdown source will be modeled using a 24-hour average emission rate. Since each startup/shutdown source corresponds to the emissions during a 4-hour period, the 24-hour average emission rate for each source is obtained using a ratio of 4/24.

- 24-Hour Modeling Scenario 1 – The expected emissions and exhaust properties associated with the entire 24 hours (hours one through 24) of startup.

6.4.6 Emergency Equipment Emissions

No emergency engines are included in the proposed application. There is one existing diesel fuel-fired emergency fire water pump engine (EPN D-3) and one emergency generator (EPN GEN-100) on site. An existing diesel fuel-fired generator engine (EPN D-2) has been mislabeled as an emergency device in the air permit. Emissions associated with the emergency readiness testing of the existing fire water pump engine and emergency generator will be modeled. These

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testing emissions will be conservatively modeled with Capitol Cement Plant sources operating under normal and kiln startup conditions.

Capitol will test the emergency equipment according to the manufacturer recommended testing schedules. A typical testing schedule for emergency engines is testing each engine once per month for a period of approximately 60 minutes. The modeling will include a maximum of 60 minutes of testing emissions for the following modeled averaging periods: 1-hour, 3-hour, 8-hour and 24-hour.

The EPA's *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard; March 1, 2011* states that compliance demonstrations for the 1-hour NO_2 and SO_2 NAAQS be based on emission scenarios that can logically be assumed to be relatively continuous or which occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations. As such, the 1-hour NO_2 and 1-hour SO_2 emissions associated with these intermittent sources will be modeled per EPA guidelines, multiplying the maximum hourly emission rate by the ratio of the proposed hours per year and total available hours per year. Although expected operations correspond to each engine being tested a total of twelve hours per year, the application includes a conservative annual emissions estimate corresponding to 100 hours per year. Therefore, the modeling of 1-hour NO_2 and 1-hour SO_2 emissions associated with these intermittent sources will be conservatively modeled using these higher annual emission assumptions. These emergency testing emissions will be modeled concurrent with the kiln emissions corresponding to normal and startup operations.

The emissions associated with emergency equipment operating during an actual emergency will not be modeled because the proposed authorization does not include such emissions.

6.4.7 Separator Baghouse Emissions

Capitol Cement Plant's current air permit authorization includes emissions associated with two separator baghouses [EPNs SK-606 (previously 41A) and SK-602 (previously 41B)]. As noted on the permit's Maximum Allowable Emission Rate Table, these sources do not operate simultaneously. Therefore, modeling source groups will be used to model each of these sources (plus applicable sitewide sources) separately.

6.4.8 Outdoor Storage Pile Emissions

Capitol Cement Plant's current air permitauthorization (7369) includes emissions associated with outdoor material storage piles (EPN F-P-OMAT, previously F-P-3). Prior to the May 20, 2011 permit amendment, this single source was comprised of seven individual sources [EPNs F-A-7, F-P-3, F-P-4, F-P-5, F-P-8 (currently F-P-CKD), F-P-9 and TMH-5 (currently F-P-SYN)]. In order to correctly account for applicable baseline actual emissions associated with F-P-OMAT, the seven original EPNs will be included in all emission rate summary tables. However, these seven sources will not be included in any modeling analysis. When applicable, emissions associated

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with these individual sources will be summed together and compared with the proposed allowable emission rate for source F-P-OMAT. Applicable F-P-OMAT emissions will then be included in the modeling analyses.

6.4.9 Mislabeled EPNs

Capitol Cement Plant's 2008 air permit authorization included a "Kiln Drop to Pile" source with EPN F-P-7. This pile was to be renamed in the 2011 air permit. The EPN "F-P-7" was to be used to describe the "RMS Building Fugitive" in the 2011 air permit. These errors are being corrected within the current permit amendment. For the current analysis, the emissions from this existing source (now "CKD Pile") will be referred to as EPN F-P-CKD.

Capitol Cement Plant's 2008 air permit authorization included two emission sources within the RMS Building: "RMS Shuttle Belt to Pile"[EPN F-R-7 (currently F-C-301)] and "RMS Feeder Drop to Belt" [EPN F-R-8 (currently F-C-RM)]. These sources were to be combined into a new source "RMS Building Pile" with EPN F-P-7 in the 2011 air permit. The correct emissions for this source were listed in the 2011 permit as EPN F-P-7 (currently F-P-RMS1). However, this source was incorrectly described (named) "Kiln Drop to Pile" instead of "RMS Building Pile". Additionally, EPNs F-R-7 and F-R-8 were not removed from the permit. These errors are being corrected within the current permit amendment. For the current analysis, the emissions from this existing source (now "RMS Building Pile No 1") will be referred to as EPN F-P-RMS1.

6.4.10 Maintenance Emissions

Capitol Cement Plant's current air permit authorization includes emissions associated with numerous Inherently Low Emitting (ILE) maintenance activities. The proposed project includes one new ILE maintenance activity (FIN LQFLTK). Additionally, the emissions associated with several existing ILE maintenance activities have been revised within the current amendment application. New ILE maintenance activities will be modeled as project-related emission sources. The emissions increase associated with revised ILE maintenance activities will also be modeled as project-related emission sources. All ILE maintenance activities will be conservatively modeled as occurring at any given hour of the day or night during normal plant operations.

ILE maintenance activities are represented as a combined source on the Table 1(a) (EPN MSSFUG). These activities will be modeled using the emissions and exhaust parameters corresponding to the individual maintenance activities included in the combined MSS source. The individual ILE maintenance activities included in EPN MSSFUG are summarized in Table 6-2.

Table 6-2
Inherently Low Emitting Maintenance Activities

EPN	FIN	MODELING ID.	INDIVIDUAL MAINTENANCE ACTIVITIES
MSSFUG	VACLOAD	MVLOAD	Vacuum truck loading
	VACULOAD	MVUNLOAD	Vacuum Truck Unloading

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EPN	FIN	MODELING ID.	INDIVIDUAL MAINTENANCE ACTIVITIES
	MSSFUG1	MFUG1	Conveyor Belt Clearing
	MSSFUG2	MFUG2	Mill Table Cleaning and maintenance
	MSSFUG3	MFUG3	Clinker Drop tests
	MSSFUG4	MFUG4	Clinker Cooler Cleanout
	MSSFUG5	MFUG5	Castable Refractory Mixing
	MSSFUG6	MFUG6	Empty Screws
	MSSFUG7	MFUG7	Pump Rebuild
	MSSFUG8	MFUG8	Poppet/Ductwork Replacement
	MSSFUG9	MFUG9	Mill Ball Charge Dumping and general repair
	MSSFUG10	MFUG10	Crusher hammer change outs and maintenance
	MSSFUG11	MFUG11	Mill Ball Charge Sorting
	MSSFUG12	MFUG12	Misc. kiln maintenance with baghouse not running
	MSSFUG13	MFUG13	Regular maintenance on hoppers, belt conveyors, apron feeders, screw conveyors, weigh belts, transfer points, cyclones, reclaimers, air slides, spin off tables, bucket elevators, air slides, etc.
	MSSFUG14	MFUG14	Cement Coolers cleaning and repair
	MSSFUG15	MFUG15	Bin Cleaning and repair
	MSSFUG16	MFUG16	Hopper Cleaning and repair
	MSSFUG17	MFUG17	Silo Cleaning and repair
	MSSFUG20	MFUG20	Castable Refractory Application
	MSSFUG21	MFUG21	Air lancing
	EQUIP DROP	MEQPDROP	Drop inside equipment
	CHUTE DROP	MCHTDROP	Drop to chute
	OUTSIDE DROP	MOUTDROP	Bobcat drop to truck outside
	CARDOX	MCARDOX	Descaling Operation Emissions
	SMBAG1	MSMBAG1	Small bag drop inside compartment
	SMBAG2	MSMBAG2	Small bag drop to ground
	LGBAG1	MLGBAG1	Large bag drop inside compartment
	LGBAG2	MLGBAG2	Large bag drop to ground
	KILNBAG	MKILNBAG	Kiln bag drop inside compartment
	KILNBAG	MKILNDRP	Kiln bag drop to ground
	CAL GAS	MCALGAS	Analyzer Calibration Emissions
	GASTK	MTNKGAS	Gasoline Tank vessel maintenance
	DIESELTK	MTNKDSL	Diesel Tank vessel maintenance
	OILTK	MTNKOIL	Oil Tank vessel maintenance
	GRINDTK	MTNKGRND	Grinding Aid Tank vessel maintenance
	LUBE MAINT	MLUBE	Lube Oil Emissions
	LQFLTK	LQFLTK	Liquid Fuel Tank vessel maintenance
	FUEL	MGASPURG	Gaseous Fuel Venting

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Maintenance activities corresponding to FINs EQUIP DROP, CARDOX , and CAL GAS occur within the kilns. The emissions associated with these activitieswill be modeled using the location and exhaust properties associated with the existing kiln. Maintenance activities corresponding to FINs GASTK, DIESELTK, OILTK, GRINDTK,LUBE MAINT, LQFLTK, and FUEL occur as specific locations and vents. The emissions associated with these activities will be modeled using the locations, vent diameters and release heights of theseindividual sources. A pseudo point source exhaust velocity (0.001 m/s) will be conservatively modeled for these fugitive sources. The remaining maintenance activities can occur as more than one location. These sources were modeled at a single, worst -case location using the release heights of each individual source. Pseudo point source exhaust velocities (0.001 m/s) and exhaust diameters (0.001 m) were conservatively modeled for these fugitive sources.

6.4.11 Fugitive Source Parameters

Fugitive EPNs NH3FUG and NH3FUG2 correspond to piping fugitives associated with the ammonia distribution system. The majority of this piping is uniformly distributed throughout the existing preheat tower and new preheat tower. These piping fugitives will be modeled as two volume sources, one at each preheat tower location. The modeled dimensions correspond to the dimensions of each preheat tower since these areas encompasses the uniformly distributed piping sources associated with the ammonia piping equipment.

Fugitive EPN F-P-OMAT (previously F-P-3) corresponds to outdoor material storage piles. These piles are located southwest of all process equipment between the plant equipment and the quarry. The modeled dimensions correspond to the area that encompasses the uniformly distributed piles within this area. The average height of these piles will be modeled.

EPN F-P-RMS1 (previously F-R-7 and F-R-8) corresponds to fugitive emissions from the existing (and modified) RMS Building No 1. These fugitives exit the building through doorways along the west, south and east wall of the structure. These emissions will be modeled as three pseudo point sources – one at the center of the western wall, one at the center of the southern wall and one at the center of the eastern wall of the structure. The total emissions will be equally distributed between these sources. The modeled height was set equal to the center of physical doorways located at or near these locations.

EPN F-P-RMS2 corresponds to fugitive emissions from the proposed RMS Building No 2. These fugitives will exit the building through doorways along the west, north and east wall of the structure. These emissions will be modeled as three pseudo point sources – one at the center of the western wall, one at the center of the northern wall and one at the center of the eastern wall of the structure. The total emissions will be equally distributed between these sources. The modeled height was set equal to the center of physical doorways located at or near these locations.

EPN F-C-701 (previously F-P-1) corresponds to fugitive emissions from the existing Solid Fuel Storage Building. These fugitives exit the building through doorways along the west and east wall

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of the structure. These emissions will be modeled as two pseudo point sources – one at the center of the western wall and one at the center of the eastern wall of the structure. The total emissions will be equally distributed between these sources. The modeled height was set equal to the center of physical doorways located at these locations.

EPN F-RC-700 (previously F-R-700) corresponds to fugitive emissions from the existing Coal Railcar Unloading Building. These fugitives exit the building through doorways along the south and north wall of the structure. These emissions will be modeled as two pseudo point sources – one at the center of the southern wall and one at the center of the northern wall of the structure. The total emissions will be equally distributed between these sources. The modeled height was set equal to the center of physical doorways located at these locations.

EPN F-U-805 corresponds to fugitive emissions from the proposed Raw Material Truck Unloading Station No 1. These fugitives will exit the building through doorways along the south and north wall of the structure. These emissions will be modeled as two pseudo point sources – one at the center of the southern wall and one at the center of the northern wall of the structure. The total emissions will be equally distributed between these sources. The modeled height was set equal to the center of physical doorways located at these locations.

EPN F-U-810 corresponds to fugitive emissions from the proposed Raw Material Truck Unloading Station No 2. These fugitives will exit the building through doorways along the south and north wall of the structure. These emissions will be modeled as two pseudo point sources – one at the center of the southern wall and one at the center of the northern wall of the structure. The total emissions will be equally distributed between these sources. The modeled height was set equal to the center of physical doorways located at these locations.

6.4.12 Short-term Emissions

6.4.12.1 CO, SO_2, PM_{10} and $PM_{2.5}$ Analyses

Maximum hourly emission rates will be modeled for all applicable averaging periods for continuously operating sources. For sources with non-continuous options, the average 3-hour, 8-hour and 24-hour emissions will be modeled for these averaging periods. Additionally, the source specific short-term emission rates described in Sections 6.4.5 and 6.4.6 will be utilized.

6.4.12.2 NO_2 Analyses

The proposed hourly NO_X emission rate listed on the TCEQ Table 1a for the new kiln (EPN SK-880) is a 30-day rolling average value. However, maximum hourly NO_X emission rates will be included in all 1-hour NO_2 modeling analyses for the proposed new kiln. Two modeling scenarios will be included in all 1-hour NO_2 modeling analyses:

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- The maximum hourly NO_X emission rate that is expected during normal operations will be modeled. The maximum hourly NO_X emissions will be conservatively modeled as being emitted every hour of the year.
- During rare operational events, NO_X emissions greater than the expected maximum hourly emission rate may occur. Therefore, a peak hourly NO_X emission rate will also be modeled.

  The EPA's *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard; March 1, 2011* states that compliance demonstrations for the 1-hour NO_2 and SO_2 NAAQS be based on emission scenarios that can logically be assumed to be relatively continuous or which occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations. These operating events are expected to occur fewer than 50 hours per year and match the criteria of an intermittent source. These intermittent NO_X emissions will be modeled per EPA guidelines, multiplying the proposed peak hourly emission rate by the ratio of the proposed hours per year and total hours per year.

6.4.13 NO_X to NO_2 Conversion

Following guidance included in the EPA's memorandum entitled *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour National Ambient Air Quality Standard, Tyler Fox, March 1, 2011*; the Tier 2 default NO_X to NO_2 conversion factor of 80 percent will be applied to hourly emissions. The Appendix W default NO_X to NO_2 conversion factor of 75 percent will be applied to annual emissions. Both hourly and annual emission will be entered into AERMOD as NO_X and will be converted to NO_2 by AERMOD using the ARMRATIO keyword option.

6.4.14 Front-Half, Back-Half Particulate Matter Emissions

Front-half and back-half particulate matter emissions estimates will be modeled for the PM_{10} and $PM_{2.5}$ analyses.

6.4.15 $PM_{2.5}$ Emissions

$PM_{2.5}$ is either directly emitted from a source (i.e., primary emissions) or formed through chemical reactions with pollutants already in the atmosphere (i.e., secondary formation). The EPA has not developed or recommended a near-field air dispersion model that includes the chemistry algorithms necessary to estimate secondary $PM_{2.5}$ impacts in an ambient air analysis. The EPA has provided secondary formation $PM_{2.5}$ modeling guidance in *Guidance for $PM_{2.5}$ Permit Modeling; Stephen D. Page, Director; May 20, 2014*. Guidance obtained from this document and the TCEQ's *AQMG* were utilized to account for contributions from direct $PM_{2.5}$ emissions and from secondarily formed $PM_{2.5}$ resulting from the project sources $PM_{2.5}$ precursor emissions.

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Secondary $PM_{2.5}$ emissions are formed through the emission of gaseous compounds such as SO_2 and NO_X. Portions of these gaseous emissions can form fine particulates in the atmosphere through chemical reactions or condensation. These chemical transformations occur in the atmosphere gradually over time (hours or days depending on atmospheric conditions and other variables). Therefore, secondary $PM_{2.5}$ impacts are expected to occur at some distance from the source of its gaseous emission precursors. Secondary $PM_{2.5}$ impacts associated with the proposed project sources are anticipated to occur outside of the Area of Significant Impacts defined by the primary $PM_{2.5}$ emissions.

The proposed direct $PM_{2.5}$ emissions associated with this project are greater than the 10 tpy significant emission rate (SER). Therefore, the direct $PM_{2.5}$ emissions were modeled following guidance for a PSD NAAQS analysis. The proposed SO_2 and NO_X emissions associated with this project are each greater than their respective 40 tpy SER. Therefore, a qualitative analysis was conducted using sulfate $PM_{2.5}$ and nitrate $PM_{2.5}$ monitoring data from representative ambient air monitoring stations.

As discussed in Section 5.0, the Houston Aldine monitor in Harris County offers estimates of speciated $PM_{2.5}$ that are representative of the project site. The use of actual emissions from Harris County provides a conservative (i.e. small) estimate of the total emissions within the monitor's air shed for this qualitative analysis. The most recent county-wide emissions data available corresponds to calendar year 2011. Therefore, calendar year 2011 emissions data were used in this qualitative analysis.

Total $PM_{2.5}$, $PM_{2.5}$ nitrates and $PM_{2.5}$ sulfates concentrations from the Houston Aldine monitor are summarized in the table included as Attachment 8. The maximum 24-hour concentrations and annual average concentrations were utilized for this analysis. The maximum percentage of $PM_{2.5}$ nitrates to total $PM_{2.5}$ and the maximum percentage of $PM_{2.5}$ sulfates to total $PM_{2.5}$ were determined for the 24-hour and annual averaging periods. These percentages are then compared to the reported NO_X and SO_2 emissions in the air shed of the monitor. The use of actual emissions from Harris County provides a conservative (i.e. small) estimate of the total emissions within the monitor's air shed for this qualitative analysis. The proposed NO_X and SO_2 emissions associated with the Capitol Cement Plant project are provided for comparison with the air shed emissions. $PM_{2.5}$ nitrates and $PM_{2.5}$ sulfates concentrations corresponding to the air shed emissions are a small percentage of the total $PM_{2.5}$ concentrations. The project emissions are less than three percent of the air shed emissions. Since the Capitol Cement Plant $PM_{2.5}$ precursor emissions are small compared to those within the air shed near the representative monitor and secondary $PM_{2.5}$ emissions at the representative monitor are a small portion of the total $PM_{2.5}$ concentration, secondary $PM_{2.5}$ formation due to the proposed $PM_{2.5}$ precursor emissions is not expected to be significant at any location near the Capitol Cement Plant.

As previously stated, the secondary $PM_{2.5}$ concentrations are not expected to occur near the Capitol Cement Plant and they are not expected to increase the predicted concentration results associated with the modeling of direct $PM_{2.5}$ emissions. At distances where secondary $PM_{2.5}$ would be expected to form: (1) contributions from the project's direct $PM_{2.5}$ emissions would be

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negligible and (2) the estimated $PM_{2.5}$ concentration would be far below $PM_{2.5}$ significant impact value.

6.5 SCALING FACTORS

Scaling factors are not expected to be utilized in the modeling analysis.

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7.0 MODELS PROPOSED AND MODELING TECHNIQUES

The American Meteorological Society / Environmental Protection Agency Regulatory Model (AERMOD), Version 15181, will be used to perform the dispersion modeling in this AQA. AERMOD is the latest generation of atmospheric dispersion models suitable for industrial sources and is the model preferred by the EPA for such applications. To facilitate the running of AERMOD, the Providence/ORIS, LLC's "BEE-Line BEEST for Windows" graphic user interface (Version 11.02) will be used.

The following model options will be used in the application of the AERMOD modeling:

A. Regulatory default option will be enabled.
B. A medium roughness length meteorological data was used based on the results of the analysis described in Section 8.0 of this protocol.
C. Elevated terrain will be used for modeling the area around the facility.
D. The proposed emissions will be modeled at their actual stack heights. None of the proposed Capitol Cement Plant stacks exceed the calculated GEP height or 65 meters, whichever is greater.
E. The profile base elevation will be set to the San Antonio International Airport meteorological station base elevation of 246.6 meters.

Modeling receptors will be placed to a distance that clearly identifies the area of impact. The receptor grid spacing is discussed in Section 11 of this protocol.

7.1 MODELING APPROACH – GENERAL DISCUSSION

The modeling analysis will be conducted in four parts to demonstrate compliance with applicable NAAQS, PSD, State property line regulations and State effects evaluation analysis. A general description of these analyses is included within this section. Details regarding the specific modeling methods that will be used for the proposed project are included in Sections 7.2 and 7.3.

7.1.1 NAAQS Analysis

NAAQS have been established for NO_2, CO, SO_2, PM_{10}, and $PM_{2.5}$. Compliance with the NAAQS must be demonstrated for sources with PSD-significant emissions. As discussed in Section 2.1, PSD applies for proposed emissions of NO_2, CO, SO_2, PM_{10}, $PM_{2.5}$, and H_2SO_4.

A NAAQS has not been established for H_2SO_4. For this non-criteria pollutant, a demonstration of compliance with the State property line standards will be used in place of a NAAQS analysis.

The EPA revoked the 24-hour and annual SO_2 NAAQS effective August 23, 2011 (40 CFR Part 50, 53 and 58; Federal Register Vol. 75, No. 119; June 22, 2010). However, these SO_2 NAAQS

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will remain in effect for one year following the effective date of the initial designations under 107(d)(1) for the new 1-hour SO_2 NAAQS. The EPA's process of designating nonattainment areas for 1-hour SO_2 has not been completed. EPA has indicated thatseveral areas in Texas will be designated nonattainment for the 1-hour SO_2 but the decision has not been made final. Therefore, SO_2 NAAQS analyses will be conducted for the 24-hour and annual averaging periods.

A preliminary impacts analysis will first be conducted using project-related emissions to determine if a detailed NAAQS analysis is required. This process is described in greater detail in Section 7.2.1 and 7.2.4.

7.1.2 PSD Increment Consumption Analysis

PSD increment consumption limits currently exist for NO_2, SO_2, PM_{10}, and $PM_{2.5}$. Compliance with the PSD increment consumption limits must be demonstrated for sources with PSD-significant emissions. As discussed in Section 2.1, PSD applies to the proposed emissions of NO_2, SO_2, PM_{10}, and $PM_{2.5}$.

A preliminary impacts analysis will first be conducted using project-related emissions to determine if a detailed PSD increment consumption analysis is required. This process is described in greater detail in Sections 7.2.1 and 7.2.4.

7.1.3 State Property Line Analysis

TCEQ Regulation §112.3 sets the net ground-level concentration limits of SO_2 in Bexar County at 0.4 ppmv (1,021 µg/m^3) for a 30-minute average. TCEQ Regulation §112.41 sets the net ground-level concentration limits of H_2SO_4 at 50 µg/m^3 for a one-hour average and 15 µg/m^3 for a 24-hour average.

This modeling is described in Section 7.3.3.

7.1.4 State Health Effects Analysis

VOC and inorganic compounds are evaluated for the State health effects analysis. A state health effects analysis applies to the proposed ammonia, Portland cement, limestone, coal dust, petroleum coke, gypsum, crystalline silica (quartz), hydrogen chloride and mercury emissions.

This modeling is described in Section 7.2.3 and 7.3.4.

7.2 MODELING APPROACH – PRELIMINARY IMPACT ANALYSIS

A preliminary impact analysis will be conducted to commence the AQA. The purpose of the preliminary analysis is to determine whether proposed emissions from the project sources have

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a "significant" impact on the existing air quality. The various preliminary modeling analyses are described in the sections below.

7.2.1 Area of Significant Impact (AOI) Analysis

For PSD analyses, a preliminary impact analysis is conducted to determine if the predicted off-property concentrations associated with the proposed increase in PSD-significant emissions are greater than the EPA's SILs. No further modeling is required to demonstrate compliance if the maximum predicted concentration is below the SIL. If the maximum predicted concentration is equal to or greater than the SIL, all on-site sources must be included in a full impact modeling analysis. Contributions from off-site sources that may impact the AOI are accounted for using ambient air monitoring data or by direct inclusion in the full impact modeling analysis. The AOI is defined as all locations with predicted concentrations that are equal to or greater than the established SILs. An ambient background concentration is added to the full impact modeling results to complete the NAAQS demonstration.

Preliminary modeling will be conducted for allowable NO_2, CO, PM_{10}, $PM_{2.5}$, and SO_2 emissions to determine whether a full impact modeling analysis is required for each pollutant and averaging period. The modeling results will be used to determine whether the predicted concentrations are greater than the SIL for each pollutant and time period.

7.2.2 PSD Pre-application

For PSD analyses, a preliminary impact analysis is conducted to determine if the predicted off-property NO_2, CO, SO_2, and PM_{10} concentrations associated with the proposed increase in PSD-significant emissions are greater than the EPA's SMCs. If the maximum predicted concentration is less than the SMC, the demonstration is complete. If the maximum concentration is greater than the SMC, representative monitoring background concentrations are collected to establish the existing air quality for the area.

A preliminary impact analysis will not be conducted for $PM_{2.5}$. Representative monitoring background $PM_{2.5}$ concentrations will be collected to establish the existing air quality for the area.

7.2.3 State Effects Evaluation Analysis

Guidance from the TCEQ Air Permits Division guidance document entitled *Modeling and Effects Applicability: How to Determine the Scope of Modeling and Effects Review for Air Permits, APDG 5874v3, July 2009* (MERA) will be utilized to review the project-related VOC and inorganic compounds emissions. No additional analysis is required for any compound that meets requirements listed in this guidance document. Sitewide modeling will be conducted for compounds that do not meet the MERA modeling exemption requirements.

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7.2.4 SIL Justification Analysis

On January 22, 2013, the United States Court of Appeals for the District of Columbia Circuit granted a request from the EPA to vacate and remand to the EPA the portions of two PSD $PM_{2.5}$ rules [40 CFR 51.166(k)(2) and 40 CFR 52.21(k)(2)] addressing select provisions of the $PM_{2.5}$ SILs so that the EPA could voluntarily correct an error in these provisions. The EPA amended its regulations and removed the vacated $PM_{2.5}$ SILs effective December 9, 2013.

The Federal rule that defines when a major source or major modification is considered to cause or contribute to a violation of a NAAQS [40 CFR 51.165(b)(2)] was not vacated in the January 22, 2013 decision or December 9, 2013 amendment. In the EPA's *Circuit Court Decision on $PM_{2.5}$ Significant Impact Levels and Significant Monitoring Concentrations, Questions and Answers, March 4, 2013* document, the EPA states that applicants can continue to demonstrate that proposed $PM_{2.5}$ emissions do not contribute to existing violations of the NAAQS by demonstrating that the proposed source's $PM_{2.5}$ impacts do not "significantly" contribute to existing $PM_{2.5}$ NAAQS violations. In support of this requirement, the difference between the $PM_{2.5}$ NAAQS and the representative modeling background concentrations are summarized in Table 7-1.

Table 7-1
NAAQS SIL Justification

POLLUTANT	AVERAGING PERIOD	NAAQS (µg/m³)	MONITORING CONCENTRATION (µg/m³)	DIFFERENCE (µg/m³)	SIGNIFICANT IMPACT LEVEL (SIL) (µg/m³)
$PM_{2.5}$	24-Hour	35	22.13	12.87	1.2
	Annual	12	8.647	3.353	0.3

The differences between the NAAQS and the current ambient air monitor concentrations are far greater than the EPA SIL values for all pollutants and averaging periods. The EPA states that it would be sufficient in most cases for permitting authorities to conclude that a proposed source with a predicted impact below the EPA SIL value will not cause or contribute to a violation of the NAAQS. Based on this EPA guidance, the proposed Capitol Cement Plant $PM_{2.5}$ emissions will not contribute significantly to existing ambient air concentrations at locations where the project-related impacts are less than the EPA SILs. Therefore, the EPA SILs were utilized to define the scope of the full $PM_{2.5}$ impact modeling analysis.

The TCEQ provides guidance regarding $PM_{2.5}$ SIL justification for use in PSD increment consumption analyses in Appendix A of the *AQMG*. This guidance was followed in comparing the PSD increment consumption limit with a conservative estimate for the amount of increment consumed between the major source baseline year and the most recent year of available data from the representative monitoring station The analysis is conservative since the monitoring data includes impacts from non-increment consuming sources in addition to increment consuming sources. The results of this comparison are provided in Table 7-2. Note that monitoring data indicated a decrease in annual $PM_{2.5}$ concentrations since the major source baseline year. An

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annual value of zero was conservatively utilized in the justification analysis for the annual $PM_{2.5}$ SIL.

Table 7-2
PSD Increment SIL Justification for $PM_{2.5}$

POLLUTANT	AVERAGING PERIOD	PSD INCREMENT CONSUMPTION LIMIT ($\mu g/m^3$)	INCREMENT CONSUMED 2010 TO 2013* ($\mu g/m^3$)	DIFFERENCE ($\mu g/m^3$)	SIGNIFICANT IMPACT LEVEL (SIL) ($\mu g/m^3$)
$PM_{2.5}$	24-Hour	9	4.22	4.78	1.2
	Annual	4	0	4	0.3

* Conservative estimate.

The differences between the $PM_{2.5}$ PSD increment consumption limits and the current ambient air monitor $PM_{2.5}$ concentrations are far greater than the EPA $PM_{2.5}$ SIL values for both averaging periods. The TCEQ states that it would be sufficient in most cases to conclude that a proposed source with a predicted impact below the EPA $PM_{2.5}$ SIL values will not cause or contribute to a violation of the PSD increment consumption limits. Based on this TCEQ guidance, the proposed Capitol Cement Plant $PM_{2.5}$ emissions will not contribute significantly to existing ambient air concentrations at locations where the project -related impacts are less than the EPA SILs. Therefore, the EPA SILs were utilized to define the scope of the full $PM_{2.5}$ increment consumption analysis.

7.3 MODELING APPROACH – FULL IMPACT ANALYSIS

Full impact modeling analyses will be conducted for comparison with the NAAQS and PSD increment consumption limits for pollutants and averaging periods with preliminary impacts equal to or greater than the SIL. These modeling analyses are described in the sections below.

7.3.1 NAAQS Analysis

A full impact modeling analysis will be performed for applicable NO_2, CO, SO_2, PM_{10}, and $PM_{2.5}$ emissions to predict ambient concentrations for comparison to the NAAQS. This analysis will include emissions from the Capitol Cement Plant sources and from existing and proposed sources affecting the project's impact area, as listed in the TCEQ APAD inventory system and provided in the TCEQ permit file system (see Section 6.2.1).

The full impact modeling analysis will utilize receptor grids following the TCEQ guidelines. Only receptors with predicted concentrations equal to or greater than the SIL in the preliminary modeling analysis will be used. Background concentrations will then be added to the full impact modeling results.

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7.3.2 PSD Increment Consumption Analysis

A full impact analysis will be performed for applicable NO_2, SO_2, PM_{10}, and $PM_{2.5}$ emissions for comparison to the PSD increment consumption limits. This analysis will include PSD increment-consuming emissions from Capitol Cement Plant sources and from existing and proposed PSD increment-consuming emission sources affecting the project's impact area, as listed in the TCEQ APAD inventory system and provided in the TCEQ permit file system (see Section 6.2.2).

The full impact modeling analysis will utilize receptor grids following the TCEQ guidelines. Only receptors with predicted concentrations equal to or greater than the SIL in the preliminary modeling analysis will be used.

7.3.3 State Property Line Analysis

Sitewide modeling will be conducted for SO_2 and H_2SO_4 emissions for comparison to the TCEQ State property line standards.

7.3.4 State Health Effects Analysis

As stated in Section 7.2.3, sitewide modeling will be conducted for compounds that do not meet the MERA modeling exemption requirements for comparison with the TCEQ ESL guideline values.

7.4 MODELING APPROACH – OZONE ANALYSIS

An ozone impacts analysis may be required for PSD projects with the potential to emit 100 tpy or more of NO_x and/or VOC emissions. Since the proposed net increase of NO_X and VOC emissions are each less than 100 tpy, an ozone analysis is not required.

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8.0 INFORMATION ON URBAN/RURAL CHARACTERISTICS

A determination of the albedo, Bowen ratio, and surface roughness length of the modeling domain must be made before an atmospheric dispersion model can be run. The TCEQ has determined the albedo values and Bowen ratios for each county in T exas. In order to maintain consistency in the modeling of all proposed projects in Texas, the TCEQ has created pre -processed meteorological data sets for the three general roughness lengths that cover each county in Texas. The modeling method preferred by the TCEQ is to choose one of these three roughness lengths based on a review of the modeling domain.

TCEQ modeling staff has provided *Air Dispersion Modeling Team Initiative to Update Meteorological Data, Update – October 2013* as a reference in determ ining the appropriate roughness length for meteorological data set selection. Following this guidance, the EPA's AERSURFACE tool was utilized to determine the surface roughness length for this project. A surface roughness of 0.306 meters was obtained for the Capitol Cement Plant location. This is within the 0.1 to 0. 7 range stated in the referenced TCEQ AERMOD Training document for Category 2 for the TCEQ's "medium surface roughness" meteorological dataset. Therefore, the "medium surface roughness" meteorological data set will be utilized in the modeling analysis. All AERSURFACE files will be included in electronic form in the AQA submitted to the TCEQ.

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9.0 BUILDING WAKE EFFECTS

Building downwash effects will be included in the modeling based on guidance provided in the *User's Guide to the Building Profile Input Program* (EPA, October 1993). The EPA currently requires that all building downwash be determined using the EPA Building Profile Input Program (BPIPPRM) subroutine. Providence/ORIS, LLC's "BEE-Line BEEST for Windows" will be used for calculating downwash parameters for this analysis. This program includes downwash software which uses the latest BPIPPRM subroutine (version 04274) in its calculations.

Information regarding Capitol Cement Plant structures will be entered into the BPIP -based software program. The downwash parameters will be calculated for each point source by the software program and inserted into the AERMOD input files in the appropriate locations and formats.

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10.0 RECEPTOR GRIDS

The receptor grids that will be used in the preliminary and full impact analyses will follow the guidelines provided by the TCEQ in their *AQMG*. The NAD83 datum will be used for the receptor UTM coordinates. Providence/ORIS, LLC's "BEE-Line BEEST for Windows" will be used to calculate the appropriate domain boundaries. The EPA AERMAP program will be used to calculate (interpolate) the terrain elevations and local terrain maximums using 1-arc-second (~30 meter) United States Geological Survey (USGS) National Elevation Dataset (NED) data.

10.1 PRELIMINARY IMPACT MODELING RECEPTOR GRIDS

The receptor coverage utilized for the preliminary impacts analyses will consist of the following:

- 1,000-meter spaced receptors to a distance of 50 kilometers from the Capitol Cement Plant emission sources,
- 500-meter spaced receptors to a distance of 5 kilometers from the Capitol Cement Plant emission sources,
- 100-meter spaced receptors to a distance of 1 kilometer from the Capitol Cement Plant emission sources,
- 25-meter spaced receptors to a distance of 300 meters from any Capitol Cement Plant emission sources,
- 25-meter spaced receptors along the Capitol Cement Plant fenceline to a distance of 300 meters from any Capitol Cement Plant emission sources, and
- 100-meter spaced receptors along the Capitol Cement Plant fenceline at distances greater than 300 meters from any Capitol Cement Plant emission sources.

These receptor grids will be designed to capture the maximum off-property ground-level concentrations for all pollutants, operating scenarios and review types.

10.2 FULL IMPACT MODELING RECEPTOR GRIDS

Only receptors with predicted concentrations greater than or equal to the respective SILs will be included in the full impact NAAQS and PSD increment consumption analyses. Full impact modeling receptor grids will be developed using the preliminary modeling output. If the maximum predicted preliminary modeling results is equal to or greater than the SIL, the modeling results for that pollutant, averaging period and meteorological data set will be imported into electronic spreadsheets for further review.

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The modeling output includes an ASCII formatted data file containing the maximum predicted concentration at each model receptor and for each modeling scenario (group). Using electronic spreadsheets, the maximum predicted highest 1 st-high (H1H) concentrations for the 5 -modeled years of meteorological data will be determined for each receptor and modeling scenario for the annual NO_2, 1 -hour CO, 8 -hour CO, 24 -hour PM_{10}, annual PM_{10} (increment), 24-hour $PM_{2.5}$ (increment), annual $PM_{2.5}$ (increment), 3-hour SO_2, 24-hour SO_2, and annual SO_2 concentrations. A similar analysis will be conducted for the predicted 5-year average 1-hour NO_2, 1-hour SO_2, 24-hour $PM_{2.5}$ (NAAQS), and annual $PM_{2.5}$ (NAAQS) concentrations. Both H1H and 5-year average $PM_{2.5}$ analyses are conducted to match the (different) forms of the PSD increment consumption limit and NAAQS. These spreadsheet analyses will be used to determine whether an individual receptor has "significant" concentrations at any time during the modele d (5-year) period. If so, the receptor will be included in the full impact modeling analysis.

Emissions associated with nearby sources will be included in the refined modeling runs. These nearby sources may be located within theCapitol Cement Plant AOI. Air quality impacts analyses are conducted for locations outside of a given source's fenceline. If necessary, Capitol will estimate the fencelines associated with nearby (non -Capitol Cement Plant) sources. AOI modeling receptors that are located withi n a nearby source's fenceline may be excluded from refined modeling runs which include emissions from that source. An additional refined modeling run will then be conducted on the AOI modeling receptors located within that source's fenceline – minus that source's emissions. Details regarding all receptor grids used in refined modeling analyses will be documented in the AQA.

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11.0 METEOROLOGICAL DATA

Current TCEQ guidance will be followed concerning meteorological data for AERMOD modeling for sources located in Bexar County. Pre-processed meteorological data will be obtained from the TCEQ. Pre-processed meteorological data consisted of surface data from the San Antonio International Airport meteorological station and upper air data from the Corpus Christi International Airport National Weather Service station. The TCEQ processed the data using AERMET version 12345, and incorporates the AERMINUTE data along with the low wind speed threshold of 0.5 m/s. More details regarding the pre-processed meteorological data are available on the TCEQ website (http://www.tceq.texas.gov/permitting/air/modeling/aermod-datasets.html). For PSD modeling, the most recent five years of representative National Weather Service (NWS) meteorological data available from the TCEQ on the date of the AQA will be utilized (2008, 2009, 2010, 2011 and 2012). For State NSR modeling, a single year of representative NWS meteorological data will be used (2012).

The TCEQ preprocessed meteorological data associated with a "medium" surface roughness value will be utilized, as discussed in Section 8.0.

The base elevation for the San Antonio International Airport station is 246.6 meters.

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12.0 MODELING RESULTS

Guidance from the EPA's *Guidance on Air Quality Models* (40 CFR 51, Appendix W) will be followed in selecting the predicted concentrations used to determine compliance with the NAAQS and PSD increment consumption limits.

12.1 PRELIMINARY IMPACT ANALYSIS

12.1.1 Area of Significant Impact (AOI) Analysis Results

As described in Section 7.2.1, this modeling will be conducted for proposed allowable emissions to determine whether full impact modeling is required and, if so, to determine the AOI. The form of the predicted ground-level concentrations and SILs are summarized in Table 12-1.

Table 12-1
AOI Analysis Results

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED CONCENTRATIONS AT EACH RECEPTOR ($\mu g/m^3$)		SIGNIFICANT IMPACT LEVEL (SIL) ($\mu g/m^3$)
NO_2	1-Hour	5-Year Average of 1st High	---	7.5
	Annual	1st High (of 5 Years)	---	1
CO	1-Hour	1st High (of 5 Years)	---	2,000
	8-Hour	1st High (of 5 Years)	---	500
SO_2	1-Hour	5-Year Average of 1st High	---	7.8
	3-Hour	1st High (of 5 Years)	---	25
	24-Hour	1st High (of 5 Years)	---	5
	Annual	1st High (of 5 Years)	---	1
PM_{10}	24-Hour	1st High (of 5 Years)	---	5
PM_{10} (Increment)	Annual	1st High (of 5 Years)	---	1
$PM_{2.5}$ (Increment)	24-Hour	1st High (of 5 Years)	---	1.2
	Annual	1st High (of 5 Years)	---	0.3
$PM_{2.5}$ (NAAQS)	24-Hour	5-Year Average of 1st High	---	1.2
	Annual	5-Year Average of 1st High	---	0.3

12.1.2 PSD Pre-application Analysis Results

As described in Section 7. 2.2, this modeling will be conducted for the proposed allowable emissions to determine whether the project is exempt from the pre-construction ambient monitoring data gathering requirements. The form of the predicted ground-level concentrations and respective SMC's are summarized in Table 12-2.

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Table 12-2
PSD Pre-construction Monitoring Requirement Analysis Results

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED CONCENTRATIONS AT EACH RECEPTOR ($\mu g/m^3$)		SIGNIFICANT MONITORING CONCENTRATION (SMC) ($\mu g/m^3$)
NO_2	Annual	1st High (of 5 Years)	---	14
CO	8-Hour	1st High (of 5 Years)	---	575
SO_2	24-Hour	1st High (of 5 Years)	---	13
PM_{10}	24-Hour	1st High (of 5 Years)	---	10

As discussed in Section 5.3, the January 22, 2013 Court decision does allow the exemption of a $PM_{2.5}$ pre-construction monitoring analysis . Capitol proposes the use of existing ambient air monitoring data from a representative monitor to meet the $PM_{2.5}$ pre-construction monitoring data requirement.

A summary of the existing ambient air monitoring data is provided in Section 5.1.

12.1.3 State Effects Evaluation Analysis Results

As described in Section 7.2.2 , the TCEQ's MERA will be utilized in the review of the project - related VOC and inorganic compound emissions. No additional analysis is required for any compound that meets requirements listed in this guidance document . A copy of the MERA flowchart completed for this project will be included in the AQA. The form of the predicted ground-level concentrations and respective ESL's are summarized in Table 12-3.

Table 12-3
Start Health Effects Guideline Values

POLLUTANT	AVERAGING PERIOD	EFFECT SCREENING LEVEL (ESL) ($\mu g/m^3$)
Ammonia	1-Hour	180
	Annual	92
Hydrogen Chloride	1-Hour	190
	Annual	7.9
Portland Cement (PM_{10})	1-Hour	50
	Annual	5
Limestone	1-Hour	Compliance With PM_{10} NAAQS
	Annual	
Petroleum Coke (PM_{10})	1-Hour	50
	Annual	5
Coal Dust	1-Hour	Compliance With PM_{10} NAAQS
	Annual	

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POLLUTANT	AVERAGING PERIOD	EFFECT SCREENING LEVEL (ESL) (µg/m^3)
Coal Dust (PM_{04})	Annual	0.9
Gypsum	1-Hour	Compliance With PM_{10} NAAQS
	Annual	
Silica, Crystalline/Quartz (PM_{10})	1-Hour	14
Silica, Crystalline/Quartz (PM_{04})	Annual	0.27
Mercury (PM_{10})	1-Hour	0.25
	Annual	0.025

In place of a comparison with TCEQ ESL guideline values for specified averaging periods, emissions of limestone, coal dust and gypsum must demonstrate compliance with the PM_{10} NAAQS. The PM_{10} (and $PM_{2.5}$) emissions in the NAAQS modeling analysis include contributions from limestone, coal dust and gypsum from sitewide sources.

Sitewide modeling will be conducted for inorganic compounds that do not meet the MERA modeling exemption requirements. The results of that modeling will be include in Section 12.3.4.

12.2 FULL IMPACT ANALYSIS

12.2.1 NAAQS Analysis Results

This modeling will be conducted for applicable NO_2, CO, SO_2, PM_{10} and $PM_{2.5}$ emissions. The form of the predicted ground-level concentrations from the NAAQS modeling, the background concentrations for the project area and the sum of the two values are summarized in Table 12-4.

Table 12-4
NAAQS Analysis – Form of Modeling Results and Background Concentration

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED CONCENTRATIONS AT EACH RECEPTOR (µg/m^3)	BACKGROUND CONCENTRATION (µg/m^3)	NAAQS (µg/m^3)
NO_2	1-Hour	5-Year Average of 98th Percentiles of the Daily 1-Hour Maximums	3-Year Average of 98th Percentiles of the Daily 1-Hour Maximums, 2013-2015	188
	Annual	1st High (of 5 Years)	1st High, 2015	100
CO	1-Hour	2nd High (of 5 Years)	2nd High, 2015	40,000
	8-Hour	2nd High (of 5 Years)	2nd High, 2015	10,000

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POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED CONCENTRATIONS AT EACH RECEPTOR ($\mu g/m^3$)	BACKGROUND CONCENTRATION ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
SO_2	1-Hour	5-Year Average of 99th Percentiles of the Daily 1-Hour Maximums	3-Year Average of 99th Percentiles of the Daily 1-Hour Maximums, 2013-2015	196
	3-Hour	2nd High (of 5 Years)	2nd High, 2015	1,300
	24-Hour	2nd High (of 5 Years)	2nd High, 2015	365
	Annual	1st High (of 5 Years)	1st High, 2015	80
PM_{10}	24-Hour	6th High (of Single 5-Year Period)	2nd High, 2013-2015	150
$PM_{2.5}$	24-Hour	5-Year Average of 98th Percentiles of the Daily Maximums	3-Year Average of 98th Percentiles of the Daily Maximums 2013-2015	35
	Annual	5-Year Average of 1st Highs	3-Year Average of 1st Highs 2013-2015	12

12.2.2 PSD Increment Consumption Analysis Results

This modeling will be conducted for proposed increases of applicable increment-consuming NO_2, SO_2, PM_{10}, and $PM_{2.5}$ emissions for comparison to the PSD increment consumption limits. The predicted ground-level concentrations and PSD increment consumption limits are summarized in Table 12-5.

Table 12-5
PSD Increment Consumption Analysis Results

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED CONCENTRATIONS AT EACH RECEPTOR ($\mu g/m^3$)		PSD INCREMENT CONSUMPTION LIMIT ($\mu g/m^3$)
NO_2	Annual	1st High (of 5 Years)	---	25
SO_2	3-Hour	2nd High (of 5 Years)	---	512
	24-Hour	2nd High (of 5 Years)	---	91
	Annual	1st High (of 5 Years)	---	20
PM_{10}	24-Hour	2nd High (of 5 Years)	---	30
	Annual	1st High (of 5 Years)		17
$PM_{2.5}$	24-Hour	2nd High (of 5 Years)	---	9
	Annual	1st High (of 5 Years)	---	4

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12.2.3 State Property Line Analysis Results

This modeling will be conducted for sitewide allowable emissions of SO_2 and H_2SO_4. The predicted ground-level concentrations and property line standards are summarized in Table 12-6.

Table 12-6
State Property-Line Analysis Results

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED CONCENTRATIONS AT EACH RECEPTOR ($\mu g/m^3$)		STATE PROPERTY LINE STANDARD ($\mu g/m^3$)
SO_2	30-Minutes	1st High (of 1 Year)	---	1,021
H_2SO_4	1-Hour	1st High (of 1 Year)	---	50
	24-Hour	1st High (of 1 Year)	---	15

12.2.4 State Health Effects Analysis Results

This modeling will be conducted for sitewide allowable emissions of VOC and inorganic compounds that do not meet the MERA modeling exemption requirements . The predicted ground-level concentrations and TCEQ ESL guideline values are summarized in Table 12-7.

Table 12-7
State Health Effects Analysis Results

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED CONCENTRATIONS AT EACH RECEPTOR ($\mu g/m^3$)		TCEQ ESL ($\mu g/m^3$)
Ammonia	1-Hour	1st High (of 1 Year)	---	180
	Annual	1st High (of 1 Year)	---	92
Hydrogen Chloride	1-Hour	1st High (of 1 Year)	---	190
	Annual	1st High (of 1 Year)	---	7.9
Portland Cement (PM_{10})	1-Hour	1st High (of 1 Year)	---	50
	Annual	1st High (of 1 Year)	---	5
Petroleum Coke (PM_{10})	1-Hour	1st High (of 1 Year)	---	50
	Annual	1st High (of 1 Year)	---	5
Coal Dust (PM_4)	Annual	1st High (of 1 Year)	---	0.9
Silica, Cristobalite/Quartz (PM_{10})	1-Hour	1st High (of 1 Year)	---	14
Silica, Cristobalite/Quartz (PM_4)	Annual	1st High (of 1 Year)	---	0.27
Mercury (PM_{10})	1-Hour	1st High (of 1 Year)	---	0.25
	Annual	1st High (of 1 Year)	---	0.025

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12.3 ADDITIONAL IMPACT ANALYSIS

An analysis of the impairment to visibility, soils and vegetation that would occur as a result of the project and general commercial, residential, industrial and other growth associated with the project will be included in the AQA.

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13.0 MODELING INPUT AND OUTPUT FILES

As required by the *AQMG*, electronic copies of the following items will be provided in the AQA submitted to the TCEQ:

- All input and output modeling files
- All files produced by a software entry program
- All automatic downwash program input and output files
- All meteorological data files
- All boundary property files
- All spreadsheet files used for comparison of predicted concentrations with standards or guidelines

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ATTACHMENT 1
PLOT PLAN

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ED_001261_00097329

Sources: ESRI Streets Basemap & NAIP TX 2014 Imagery Datum: GCS NAD83 UTM Zone 14

Feet: 0 — 1,500 — 3,000

Meters: 0 — 500 — 1,000

zephyr

PLOT PLAN - OVERVIEW

Capitol Cement Plant - Capitol Aggregates, Ltd.
San Antonio, Texas

Document Path: H:\Capitol Cement\GIS\ArcMap Documents\PlotPlan_20'5_OVERVIEW.mxd

Drafted By: J. Knowles	Reviewed By: L. Mocn	Project No.: 015022	Date: 9/15/2015

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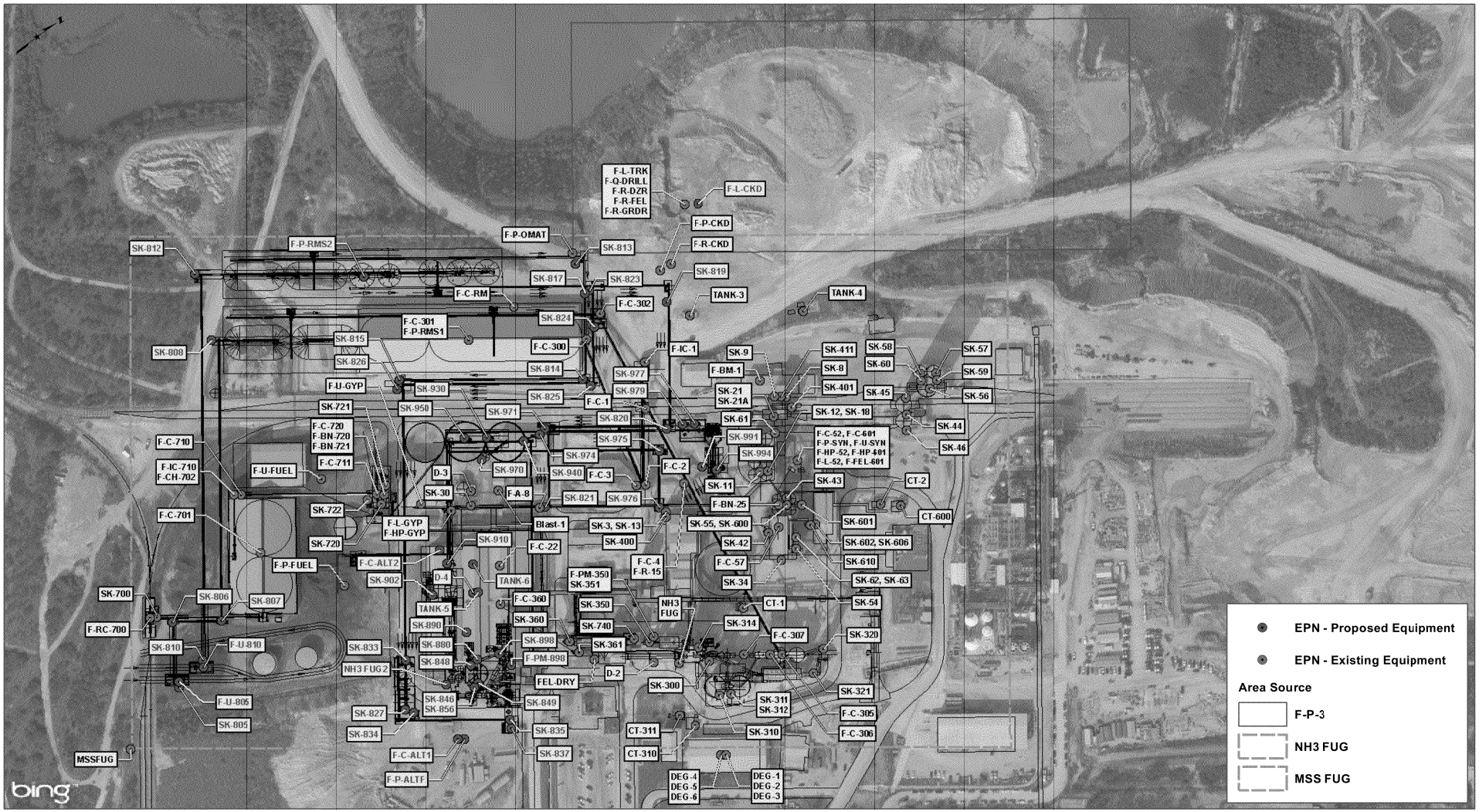


Sources: ESRI Streets Basemap & NAIP TX 2014 Imagery Datum: GCS NAD83 UTM Zone 14

Feet: 0 250 500

Meters: 0 100 200

zephyr

PLOT PLAN - DETAIL

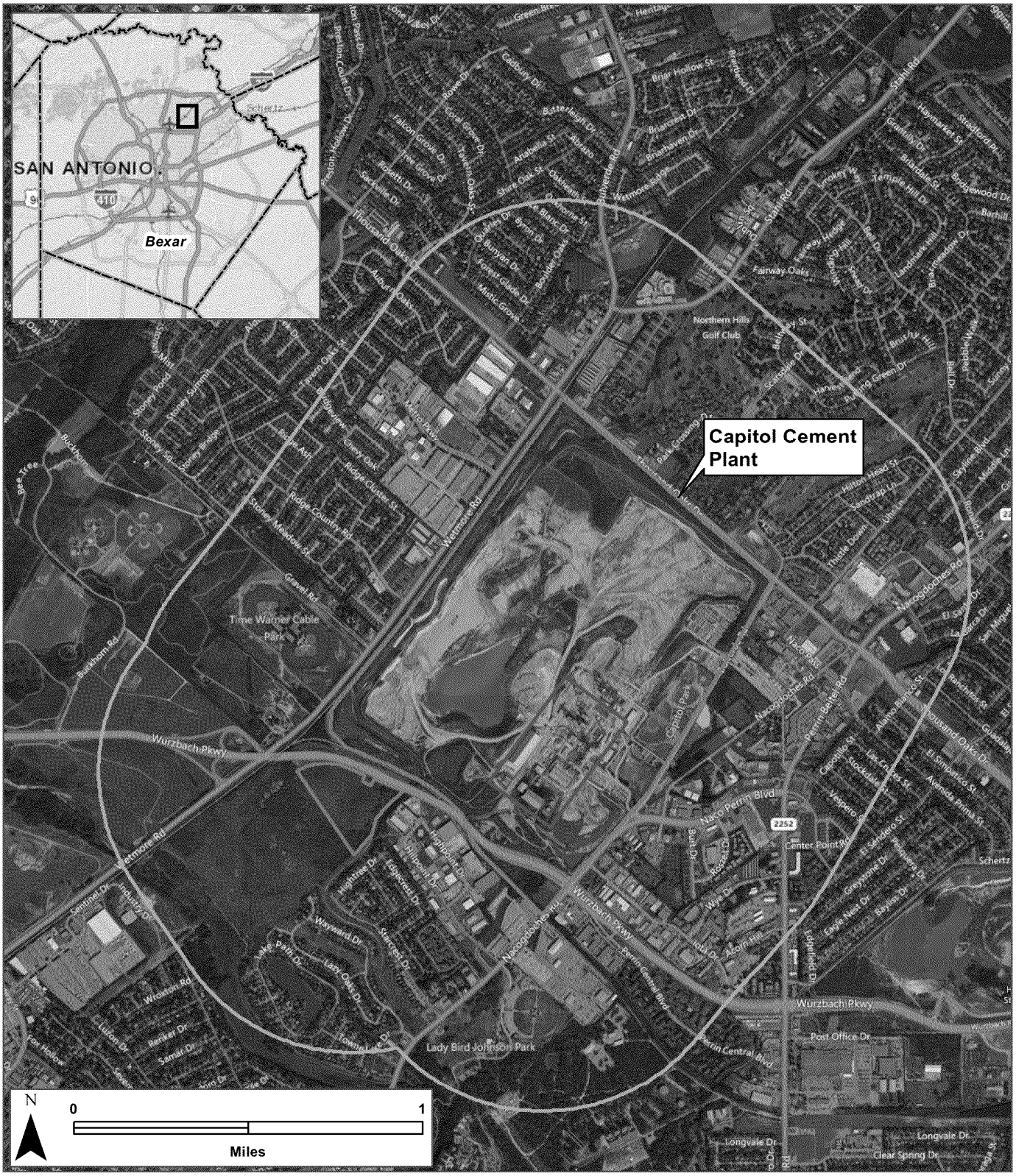
Capitol Cement Plant - Capitol Aggregates, Ltd.
San Antonio, Texas

Document Path: H:\Capitol Cement\GIS\ArcMap Documents\PlotPlan_2015_DETAIL.mxd

Drafted By: J. Knowles	Reviewed By: L. Mocn	Project No.: 015022	Date: 11/1/2015

ATTACHMENT 2
AREA MAP

ED_001261_00097329



Datum: GCS NAD83 Map Sources: ESRI- Streets & Bing Hybrid Basemaps

Project Area

Property Boundary

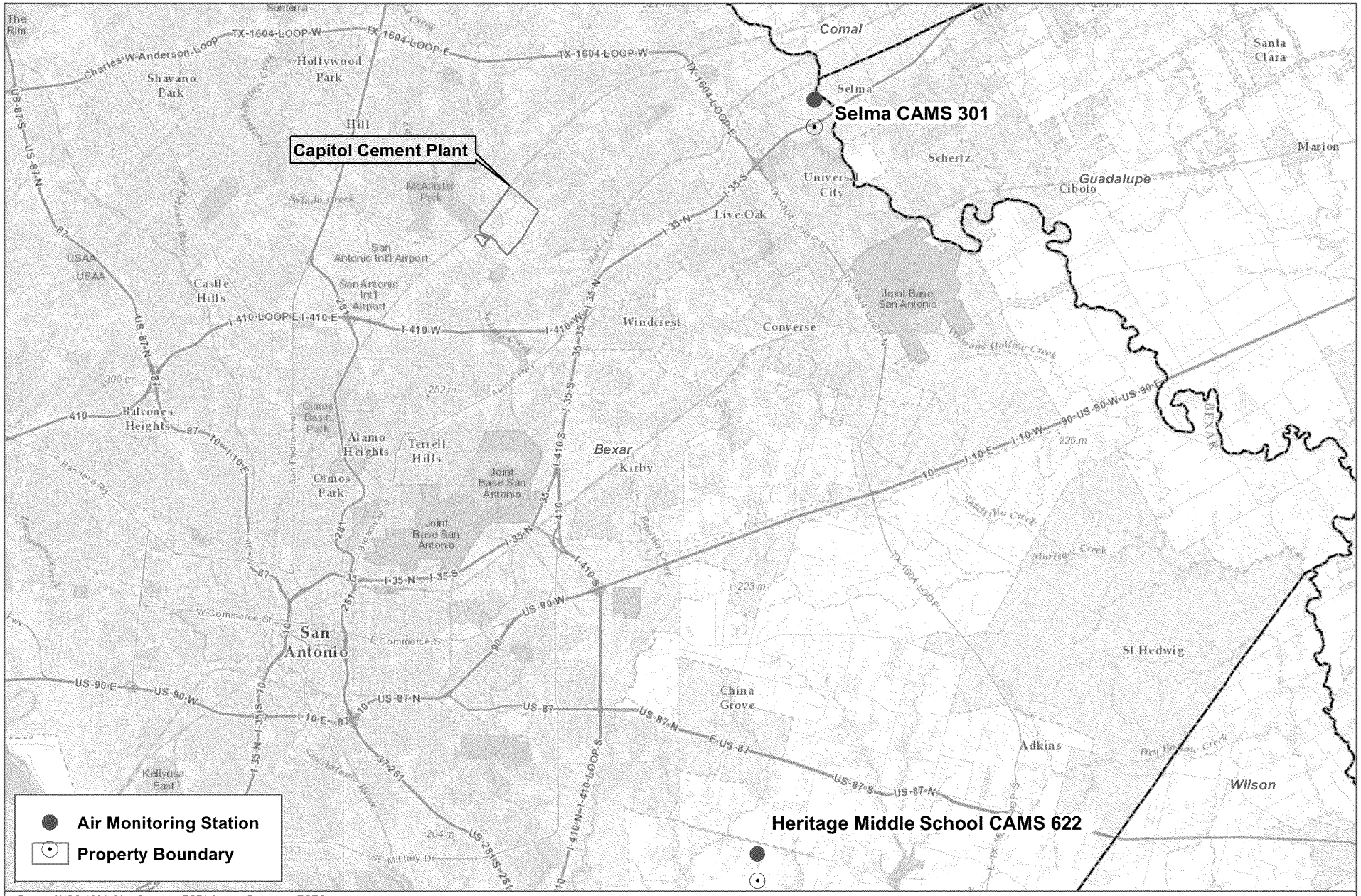
3000 Feet Radius

zephyr

AREA MAP			
CAPITOL CEMENT PLANT			
Capitol Aggregates, Ltd. San Antonio, Texas			
H:\Capitol Cement\GIS\ArcMap Documents\Area_Map.mxd			
Drafted By: J. Knowles	Reviewed By: L. Moon	Project ID: 015022	Date: 9/15/2015

ATTACHMENT 3
MAP OF NEAREST TCEQ MONITOR STATIONS

ED_001261_00097329



Datum: WGS 1984 Map Sources: ESRI-Streets Basemap; TCEQ

0 2.5 5 Kilometers

0 2.5 5 Miles

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Air Monitoring Station Locations

Capitol Cement Plant - Capitol Aggregates, Inc.
San Antonio, Texas

H:\Capitol Cement\015022 New Kiln 2015\GIS\ArcMap Documents\Modeling Report Fugures\Air Monitoring Station Locations.mxd

Drafted By:	Reviewed by:	Project No.:	Date:
J. Knowles	D. Castro	15022.002	4/7/2016

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ATTACHMENT 4
MONITOR COMPARISONS

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Capitol Aggregates, INC.
Capitol Cement Plant - San Antonio, Texas
Emissions from Stationary Sources Located within 15 Km

Emissions from Stationary Sources Located within 15 km of Capitol Cement Plant (Source 2014 TCEQ EI)

ACCOUNT	RN	COMPANY	SITE	CO TPY	NOX TPY	PM10 TPY	PM2.5 TPY	SO2 TPY
BG0045E	RN100211507	CAPITOL AGGREGATES INC	PORTLAND CEMENT	796.47	622.86	86.43	45.15	649.16
BG0063C	RN102071131	NUSTAR LOGISTICS LP	SAN ANTONIO TERMINAL EAST	9.93	3.79	0.21	0.21	0.0005
BG0083T	RN101677003	EXXONMOBIL CORPORATION	SAN ANTONIO TERMINAL	0	0	0	0	0
BG0098G	RN101073013	CITGO PETROLEUM CORP	CITGO SAN ANTONIO TERMINAL	0	0	0	0	0
BG0170A	RN100220094	US DEPT OF AIR FORCE	JBSA RANDOLPH	11.74	7.91	1.28	1.05	0.30
BG0218U	RN100519214	MOTIVA ENTERPRISES LLC	SAN ANTONIO MARKET TERMINAL	11.82	4.73	0.25	0.25	0
BG0249J	RN100542679	AGGREGATE PLANT PRODUCTS CO	AGGREGATE PLANT PRODUCTS	0.24	0.29	0	0	0.0017
BG0259G	RN100220474	ALAMO CEMENT COMPANY	1604 PLANT	714.98	2486.30	87.65	33.02	3.18
BG0488M	RN101058733	FLINT HILLS RESOURCES CORPUS CHRISTI LLC	SAN ANTONIO TERMINAL	1.35	0.55	0	0	0.0001
BG0734U	RN100212422	BFI WASTE SYSTEMS OF NORTH AMERICA LLC	TESSMAN ROAD LANDFILL	6.9	2.79	38.52	21.26	0.57
BG0899K	RN100851625	FLOWERS BAKING CO OF SAN ANTONIO LLC	FLOWERS SAN ANTONIO BAKERY	2.40	2.84	2.13	0.47	0.017
BG1233R	RN100632629	BIO ENERGY AUSTIN LLC	TESSMAN RD LFG POWER STATION	128.67	46.55	1.95	1.95	5.17
BG1306P	RN101966075	UNITED SERVICES AUTOMOBILE ASSOC	NORTH & SOUTH PLANTS	6.67	14.59	2.73	2.70	0.03
GLA002B	RN104444526	ARMORTEX INC	SAFEGUARD SECURITY SERVICES	0	0	0	0	0
			Total Emissions	**1,691.18**	**3,193.21**	**221.15**	**106.06**	**658.42**

Emissions from Stationary Sources Located within 15 km of Selma Monitor (Source 2014 TCEQ EI)

ACCOUNT	RN	COMPANY	SITE	PM10 TPY	PM2.5 TPY
BG0045E	RN100211507	CAPITOL AGGREGATES INC	PORTLAND CEMENT	86.43	45.15
BG0170A	RN100220094	US DEPT OF AIR FORCE	JBSA RANDOLPH	1.28	1.05
BG0259G	RN100220474	ALAMO CEMENT COMPANY	1604 PLANT	87.65	33.02
GLA002B	RN104444526	ARMORTEX INC	SAFEGUARD SECURITY SERVICES	0	0
			Total Emissions	**175.36**	**79.22**

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Capitol Aggregates, INC.
Capitol Cement Plant - San Antonio, Texas
Emissions from Stationary Sources Located within 15 Km

Emissions from Stationary Sources Located within 15 km of CPS Pecan Valley Monitor (Source 2014 TCEQ EI)

ACCOUNT	RN	COMPANY	SITE	CO TPY	NOX TPY	PM2.5 TPY	SO2 TPY
BG0063C	RN102071131	NUSTAR LOGISTICS LP	SAN ANTONIO TERMINAL EAST	9.93	3.79	0.21	0.0005
BG0083T	RN101677003	EXXONMOBIL CORPORATION	SAN ANTONIO TERMINAL	0	0	0	0
BG0098G	RN101073013	CITGO PETROLEUM CORP	CITGO SAN ANTONIO TERMINAL	0	0	0	0
BG0103P	RN101485183	CALUMET SAN ANTONIO REFINING LLC	PETROLEUM REFINERY	22.77	26.95	2.78	4.39
BG0218U	RN100519214	MOTIVA ENTERPRISES LLC	SAN ANTONIO MARKET TERMINAL	11.82	4.73	0.254	0
BG0249J	RN100542679	AGGREGATE PLANT PRODUCTS CO	AGGREGATE PLANT PRODUCTS	0.24	0.29	0	0.002
BG0253S	RN102310901	NUSTAR LOGISTICS LP	SAN ANTONIO SOUTH TERMINAL	1.53	3.80	0	0
BG0488M	RN101058733	FLINT HILLS RESOURCES CORPUS CHRISTI LLC	SAN ANTONIO TERMINAL	1.35	0.55	0	0.0001
BG0734U	RN100212422	BFI WASTE SYSTEMS OF NORTH AMERICA LLC	TESSMAN ROAD LANDFILL	6.90	2.79	21.26	0.57
BG0899K	RN100851625	FLOWERS BAKING CO OF SAN ANTONIO LLC	FLOWERS SAN ANTONIO BAKERY	2.40	2.84	0.47	0.02
BG1102K	RN100215854	BOEING COMPANY	THE BOEING COMPANY - SAN ANTONIC	0.70	1.40	0.10	0.05
BG1176E	RN100854256	KELLY AVIATION CENTER LP	KELLY AVIATION CENTER	6.68	23.93	2.41	1.17
BG1199P	RN100542828	ZEE MANUFACTURING LTD	CABINET MFG FACILITY	0.24	0.29	1.43	0.002
BG1233R	RN100632629	BIO ENERGY AUSTIN LLC	TESSMAN RD LFG POWER STATION	128.67	46.55	1.95	5.17
			Total Emissions	**193.25**	**117.92**	**30.86**	**11.37**

Emissions from Stationary Sources Located within 15 km of Frank Wing Municipal Court Monitor (Source 2014 TCEQ EI)

ACCOUNT	RN	COMPANY	SITE	PM10 TPY
BG0059Q	RN100217439	CITY PUBLIC SERVICE	LEON CREEK PLANT	1.90
BG0063C	RN102071131	NUSTAR LOGISTICS LP	SAN ANTONIO TERMINAL EAST	0.21
BG0075S	RN100542729	US DEPT OF AIR FORCE	JBSA LACKLAND	15.97
BG0083T	RN101677003	EXXONMOBIL CORPORATION	SAN ANTONIO TERMINAL	0
BG0098G	RN101073013	CITGO PETROLEUM CORP	CITGO SAN ANTONIO TERMINAL	0
BG0103P	RN101485183	CALUMET SAN ANTONIO REFINING LLC	PETROLEUM REFINERY	3.39
BG0218U	RN100519214	MOTIVA ENTERPRISES LLC	SAN ANTONIO MARKET TERMINAL	0.25
BG0249J	RN100542679	AGGREGATE PLANT PRODUCTS CO	AGGREGATE PLANT PRODUCTS	0
BG0253S	RN102310901	NUSTAR LOGISTICS LP	SAN ANTONIO SOUTH TERMINAL	0
BG0346K	RN100222983	SOUTHWEST RESEARCH INSTITUTE	SOUTHWEST RESEARCH INSTITUTE	7.68
BG0488M	RN101058733	FLINT HILLS RESOURCES CORPUS CHRISTI LLC	SAN ANTONIO TERMINAL	0
BG0526G	RN102459393	INTERTEK AUTOMOTIVE RESEARCH	INTERTEK AUTOMOTIVE RESEARCH	0.49
BG0899K	RN100851625	FLOWERS BAKING CO OF SAN ANTONIO LLC	FLOWERS SAN ANTONIO BAKERY	2.13
BG1102K	RN100215854	BOEING COMPANY	THE BOEING COMPANY - SAN ANTONIC	0.73
BG1176E	RN100854256	KELLY AVIATION CENTER LP	KELLY AVIATION CENTER	2.41
BG1199P	RN100542828	ZEE MANUFACTURING LTD	CABINET MFG FACILITY	1.43
BG1306P	RN101966075	UNITED SERVICES AUTOMOBILE ASSOC	NORTH & SOUTH PLANTS	2.73
			Total Emissions	**39.33**

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Capitol Aggregates, INC.
Capitol Cement Plant - San Antonio, Texas
Emissions from Stationary Sources Located within 15 Km

Emissions from Stationary Sources Located within 15 km of San Antonio Northwest Monitor (Source 2014 TCEQ EI)

ACCOUNT	RN	COMPANY	SITE	NOX TPY	PM2.5 TPY
BG0346K	RN100222983	SOUTHWEST RESEARCH INSTITUTE	SOUTHWEST RESEARCH INSTITUTE	213.03	7.68
BG0406R	RN100579069	MAXIM INTEGRATED PRODUCTS INC	WESTOVER HILLS	15.34	1.10
BG0526G	RN102459393	INTERTEK AUTOMOTIVE RESEARCH	INTERTEK AUTOMOTIVE RESEARCH	33.28	0.49
BG0579I	RN100852615	WIN SAM INC	UTSA CENTRAL ENERGY PLANT	15.84	0.63
BG1176E	RN100854256	KELLY AVIATION CENTER LP	KELLY AVIATION CENTER	23.93	2.41
BG1199P	RN100542828	ZEE MANUFACTURING LTD	CABINET MFG FACILITY	0.29	1.43
BG1306P	RN101966075	UNITED SERVICES AUTOMOBILE ASSOC	NORTH & SOUTH PLANTS	14.59	2.70
			Total Emissions	**316.30**	**16.44**

Emissions from Stationary Sources Located within 15 km of Heritage Middle School Monitor (Source 2014 TCEQ EI)

ACCOUNT	RN	COMPANY	SITE	CO TPY	NOX TPY	PM2.5 TPY	SO2 TPY
BG0057U	RN100217975	CITY PUBLIC SERVICE	CALAVERAS PLANT	5,581.37	6,856.61	352.49	17,133.29
BG0063C	RN102071131	NUSTAR LOGISTICS LP	SAN ANTONIO TERMINAL EAST	9.93	3.79	0.21	0.0005
BG0083T	RN101677003	EXXONMOBIL CORPORATION	SAN ANTONIO TERMINAL	0	0	0	0
BG0098G	RN101073013	CITGO PETROLEUM CORP	CITGO SAN ANTONIO TERMINAL	0	0	0	0
BG0103P	RN101485183	CALUMET SAN ANTONIO REFINING LLC	PETROLEUM REFINERY	22.77	26.95	2.78	4.39
BG0186I	RN100217835	CITY PUBLIC SERVICE	VH BRAUNIG PLANT	59.28	437.68	65.69	5.96
BG0218U	RN100519214	MOTIVA ENTERPRISES LLC	SAN ANTONIO MARKET TERMINAL	11.82	4.73	0.25	0
BG0249J	RN100542679	AGGREGATE PLANT PRODUCTS CO	AGGREGATE PLANT PRODUCTS	0.24	0.29	0	0.002
BG0253S	RN102310901	NUSTAR LOGISTICS LP	SAN ANTONIO SOUTH TERMINAL	1.53	3.80	0	0
BG0488M	RN101058733	FLINT HILLS RESOURCES CORPUS CHRISTI LLC	SAN ANTONIO TERMINAL	1.35	0.55	0	0.0001
BG0535F	RN100221373	ALCOA INC	ALCOA SAN ANTONIO WORKS	26.18	35.59	23.51	0.20
BG0734U	RN100212422	BFI WASTE SYSTEMS OF NORTH AMERICA LLC	TESSMAN ROAD LANDFILL	6.90	2.79	21.26	0.57
BG0899K	RN100851625	FLOWERS BAKING CO OF SAN ANTONIO LLC	FLOWERS SAN ANTONIO BAKERY	2.40	2.84	0.47	0.02
BG1233R	RN100632629	BIO ENERGY AUSTIN LLC	TESSMAN RD LFG POWER STATION	128.67	46.55	1.95	5.17
			Total Emissions	**5,852.45**	**7,422.17**	**468.60**	**17,149.59**

Emissions from Stationary Sources Located within 15 km of Calaveras Lake Monitor (Source 2014 TCEQ EI)

ACCOUNT	RN	COMPANY	SITE	NOX TPY	PM2.5 TPY	SO2 TPY
BG0057U	RN100217975	CITY PUBLIC SERVICE	CALAVERAS PLANT	6,856.61	352.49	17,133.29
BG0064A	RN100668573	ENTERPRISE HYDROCARBONS LP	SAN MARTIN GAS PLANT	12.49	0.49	0.10
BG0186I	RN100217835	CITY PUBLIC SERVICE	VH BRAUNIG PLANT	437.68	65.69	5.96
BG0210N	RN102301280	CALUMET SAN ANTONIO REFINING LLC	ELEMENDORF TERMINAL	0.0001	0	0.0001
BG0535F	RN100221373	ALCOA INC	ALCOA SAN ANTONIO WORKS	35.59	23.51	0.20
			Total Emissions	**7,342.37**	**442.18**	**17,139.54**

ATTACHMENT 5
TCEQ TABLE 1(A)

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	October 30, 2015	Permit No.:	7369	Regulated Entity No.:	RN100211507
Area Name:	Capitiol Cement Plant			Customer Reference No.:	CN604033142

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate	
EPN	FIN	NAME		lb/hr	TPY
SK-320	KS-1A	Dry Kiln Dust Collector	VOC	97.55	83.81
			SO2 (Combined emission limit with Alkali Bypass, EPN SK-350)	750.00	1043.42
SK-350	DC-350	Alkali Bypass Dust Collector Stack	NOx	60.00	219.00
SK-360	DC-360	Clinker Cooler Dust Collector Stack	PM	7.00	29.16
			PM10	7.00	29.16
			PM2.5	0.44	1.83
F-IC-1	FIC-1 CRSH	Quarry Primary Crusher	PM	0.03	0.05
			PM10	0.01	0.02
			PM2.5	<0.01	<0.01
SK-880/SK-320	KL-870 / DC-893 / KS-1A	Combined Kiln Stacks NOx limit	NOx	--	1075.70
SK-880	KL-870	Kiln 870 Stack	PM	18.00	59.62
			PM10	17.68	58.56
			PM2.5	16.90	55.98
			NOx	150.00	--
			SO2	40.00	161.28
			VOC	50.00	112.42
			CO	300.00	1205.37
			H2SO4	138.00	81.48
			HCl	2.64	11.58
			NH3	52.21	38.70
			Hg	<0.01	<0.01

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	October 30, 2015	Permit No.:	7369	Regulated Entity No.:	RN100211507
Area Name:	Capitiol Cement Plant			Customer Reference No.:	CN604033142

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate	
EPN	FIN	NAME		lb/hr	TPY
SK-902	KC-900	KC-900 Clinker Cooler	PM	2.00	8.33
			PM10	2.00	8.33
			PM2.5	0.13	0.52
SK-805	DC-805	Truck Unloading Station 805	PM	<0.01	<0.01
			PM10	<0.01	<0.01
			PM2.5	<0.01	<0.01
SK-806	DC-806	1st Transport to RMS No. 1 building	PM	<0.01	<0.01
			PM10	<0.01	<0.01
			PM2.5	<0.01	<0.01
SK-807	DC-807	2nd Transport to RMS No. 1 building	PM	<0.01	<0.01
			PM10	<0.01	<0.01
			PM2.5	<0.01	<0.01
SK-808	DC-808	3rd Transport to RMS No. 1 building	PM	<0.01	<0.01
			PM10	<0.01	<0.01
			PM2.5	<0.01	<0.01
SK-810	DC-810	Truck Unloading station 810	PM	0.02	0.02
			PM10	<0.01	0.01
			PM2.5	<0.01	<0.01
SK-812	DC-812	1st Transport to RMS No. 2 building	PM	0.02	0.02
			PM10	<0.01	0.01
			PM2.5	<0.01	<0.01
SK-813	DC-813	Transport from RMS No. 2 building	PM	<0.01	<0.01
			PM10	<0.01	<0.01
			PM2.5	<0.01	<0.01

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	October 30, 2015	Permit No.:	7369	Regulated Entity No.:	RN100211507
Area Name:	Capitiol Cement Plant			Customer Reference No.:	CN604033142

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate	
EPN	FIN	NAME		lb/hr	TPY
SK-823	DC-823	Transport from RMS No. 2 building	PM	<0.01	<0.01
			PM10	<0.01	<0.01
			PM2.5	<0.01	<0.01
SK-824	DC-824	Transport from storage buildings	PM	<0.01	0.02
			PM10	<0.01	0.01
			PM2.5	<0.01	<0.01
SK-825	DC-825	Transport from storage buildings	PM	<0.01	0.02
			PM10	<0.01	0.01
			PM2.5	<0.01	<0.01
SK-826	DC-826	Transport to Raw Mill	PM	<0.01	0.02
			PM10	<0.01	0.01
			PM2.5	<0.01	<0.01
SK-827	DC-827	Raw Mill Feed Bins	PM	0.32	1.41
			PM10	0.32	1.41
			PM2.5	0.05	0.21
SK-821	DC-821	Transport to Finish mill	PM	<0.01	<0.01
			PM10	<0.01	<0.01
			PM2.5	<0.01	<0.01
SK-817	DC-817	Transport from RMS No. 2 building	PM	<0.01	<0.01
			PM10	<0.01	<0.01
			PM2.5	<0.01	<0.01
SK-814	DC-814	Transport from RMS No. 2 building	PM	<0.01	<0.01
			PM10	<0.01	<0.01
			PM2.5	<0.01	<0.01
SK-819	DC-819	Transport from RMS No. 2 building	PM	<0.01	<0.01
			PM10	<0.01	<0.01
			PM2.5	<0.01	<0.01

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	October 30, 2015	Permit No.:	7369	Regulated Entity No.:	RN100211507
Area Name:	Capitiol Cement Plant			Customer Reference No.:	CN604033142

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate	
EPN	FIN	NAME		lb/hr	TPY
SK-820	DC-820	Transport from RMS No. 2 building	PM	<0.01	<0.01
			PM10	<0.01	<0.01
			PM2.5	<0.01	<0.01
SK-815	DC-815	Transport to Raw Mill	PM	<0.01	<0.01
			PM10	<0.01	<0.01
			PM2.5	<0.01	<0.01
SK-833	DC-833	Raw Mill Feed Belt 1	PM	0.63	2.75
			PM10	0.63	2.75
			PM2.5	0.09	0.41
SK-834	DC-834	Raw Mill Feed Belt 2	PM	0.67	2.92
			PM10	0.67	2.92
			PM2.5	0.10	0.44
SK-835	DC-835	Raw Mill Bucket Elevator	PM	0.56	2.44
			PM10	0.56	2.44
			PM2.5	0.08	0.37
SK-837	DC-837	Raw Mill Rejects	PM	0.37	1.64
			PM10	0.37	1.64
			PM2.5	0.06	0.25
SK-849	DC-849	Raw Meal Bucket elevator	PM	0.12	0.54
			PM10	0.12	0.54
			PM2.5	0.02	0.08
SK-848	DC-848	Blend Silo	PM	0.08	0.37
			PM10	0.08	0.37
			PM2.5	0.01	0.06
SK-846	DC-846	Blend Silo Bucket Elevator	PM	0.10	0.45
			PM10	0.10	0.45
			PM2.5	0.02	0.07

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	October 30, 2015	Permit No.:	7369	Regulated Entity No.:	RN100211507
Area Name:	Capitiol Cement Plant			Customer Reference No.:	CN604033142

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate	
EPN	FIN	NAME		lb/hr	TPY
SK-856	DC-856	Raw Meal from mill	PM	0.16	0.69
			PM10	0.16	0.69
			PM2.5	0.02	0.10
SK-890	DC-890	Blend Silo Buffer Bin	PM	0.09	0.41
			PM10	0.09	0.41
			PM2.5	0.01	0.06
SK-898	DC-898	Byp. Dust Bin	PM	0.19	0.82
			PM10	0.19	0.82
			PM2.5	0.03	0.12
SK-910	DC-910	Transport to Clinker Silo	PM	0.35	1.55
			PM10	0.35	1.55
			PM2.5	0.05	0.23
SK-950	DC-950	Clinker Silo 950	PM	0.34	1.50
			PM10	0.34	1.50
			PM2.5	0.05	0.22
SK-930	DC-930	Clinker Silo 960	PM	0.29	1.28
			PM10	0.29	1.28
			PM2.5	0.04	0.19
SK-940	DC-940	to Clinker Silos from existing line	PM	0.07	0.29
			PM10	0.07	0.29
			PM2.5	<0.01	0.04
SK-970	DC-970	Clinker Silo 970	PM	0.49	2.16
			PM10	0.49	2.16
			PM2.5	0.07	0.32
SK-971	DC-971	Cement additives	PM	0.54	2.37
			PM10	0.54	2.37
			PM2.5	0.08	0.36

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	October 30, 2015	Permit No.:	7369	Regulated Entity No.:	RN100211507
Area Name:	Capitiol Cement Plant			Customer Reference No.:	CN604033142

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate	
EPN	FIN	NAME		lb/hr	TPY
SK-974	DC-974	clinker and additives to new FM Feed Bins	PM	0.33	1.44
			PM10	0.33	1.44
			PM2.5	0.05	0.22
SK-975	DC-975	Clinker transport to existing FM Feed Bins 1	PM	0.28	1.22
			PM10	0.28	1.22
			PM2.5	0.04	0.18
SK-976	DC-976	Clinker transport to existing FM Feed Bins 2	PM	0.28	1.22
			PM10	0.28	1.22
			PM2.5	0.04	0.18
SK-977	DC-977	FM Bucket Elevator	PM	0.54	2.36
			PM10	0.54	2.36
			PM2.5	0.08	0.35
SK-979	DC-979	FM Feed Conveyor	PM	0.54	2.35
			PM10	0.54	2.35
			PM2.5	0.08	0.35
SK-994	DC-994	Cement Transport	PM	0.18	0.78
			PM10	0.18	0.78
			PM2.5	0.03	0.12
SK-991	DC-991	Finish Mill # 7 Stack	PM	12.67	55.50
			PM10	12.67	55.50
			PM2.5	1.90	8.32
SK-700	DC-700	Solid Fuel Railcar Unloading Baghouse	PM	<0.01	<0.01
			PM10	<0.01	<0.01
			PM2.5	<0.01	<0.01

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	October 30, 2015	Permit No.:	7369	Regulated Entity No.:	RN100211507
Area Name:	Capitiol Cement Plant			Customer Reference No.:	CN604033142

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate	
EPN	FIN	NAME		lb/hr	TPY
F-U-805	F-U-805	Raw Material Truck Unloading Station 1	PM	0.05	0.14
			PM10	0.03	0.06
			PM2.5	<0.01	<0.01
F-U-810	F-U-810	Raw Material Truck Unloading Station 2	PM	0.05	0.07
			PM10	0.03	0.03
			PM2.5	<0.01	<0.01
F-C-ALT1	F-C-ALT1	Alternative fuel Transport Fugitive 1	PM	0.03	<0.01
			PM10	0.01	<0.01
			PM2.5	<0.01	<0.01
F-C-ALT2	F-C-ALT2	Alternative fuel Transport Fugitive 2	PM	0.03	<0.01
			PM10	0.01	<0.01
			PM2.5	<0.01	<0.01
F-L-CKD	F-L-CKD	Loader Drop to Truck at CKD Pile	PM	0.15	0.01
			PM10	0.07	<0.01
			PM2.5	0.01	<0.01
F-PM-898	F-PM-898	Pug Mill drop to loader	PM	0.01	<0.01
			PM10	<0.01	<0.01
			PM2.5	<0.01	<0.01
F-C-1	F-C-1	Primary Crush Conveyor Drop to Conveyor	PM	0.05	0.09
			PM10	0.02	0.04
			PM2.5	<0.01	<0.01
F-C-2	F-C-2	Conveyor Drop to Transfer	PM	0.05	0.09
			PM10	0.02	0.04
			PM2.5	<0.01	<0.01
F-C-300	F-C-300	Conveyor Drop to RMS Shuttle Conveyor	PM	0.05	0.09
			PM10	0.02	0.04
			PM2.5	<0.01	<0.01

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	October 30, 2015	Permit No.:	7369	Regulated Entity No.:	RN100211507
Area Name:	Capitiol Cement Plant			Customer Reference No.:	CN604033142

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate	
EPN	FIN	NAME		lb/hr	TPY
F-P-RMS2	F-P-RMS2	RMS Building No. 2 Pile	PM	--	0.50
			PM10	--	0.25
			PM2.5	--	0.04
F-P-RMS1	F-P-RMS1	RMS Building No. 1 Pile	PM	--	0.94
			PM10	--	0.47
			PM2.5	--	0.07
F-P-ALTF	F-P-ALTF	Alternative Fuel Pile	PM	--	0.36
			PM10	--	0.18
			PM2.5	--	0.03
D-4	D-4	Tier 4 Engine	PM	0.02	0.01
			PM10	0.02	0.01
			PM2.5	0.02	0.01
			NOx	0.48	0.21
			SO2	<0.01	<0.01
			VOC	0.23	0.10
			CO	4.19	1.84
MSSFUG	MSSFUG	All MSSFUG FINs	PM	3.57	1.01
			PM10	1.80	0.81
			PM2.5	0.46	0.37
			NOx	0.02	<0.01
			SO2	0.03	<0.01
			VOC	6.81	0.04
			CO	0.12	<0.01
NH3 FUG2	NH3 FUG2	Ammonia Piping Fugitives	NH3	0.06	0.28
TANK-5	TANK-5	Engine Fuel Tank Vent	VOC	0.02	<0.01
TANK-6	TANK-6	Alternative Liquid Fuel Tank Vent	VOC	0.64	0.03

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	October 30, 2015	Permit No.:	7369	Regulated Entity No.:	RN100211507
Area Name:	Capitiol Cement Plant			Customer Reference No.:	CN604033142

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate	
EPN	FIN	NAME		lb/hr	TPY
SK-880	KL-870	Kiln 870 Stack	CO2e	--	782573.78
			CO2	--	779714.39
			CH4	--	41.85
			N2O	--	6.08
D-4	D-4	Tier 4 Engine	CO2e	--	114.06
			CO2	--	113.67
			CH4	--	<0.01
			N2O	--	<0.01
MSSFUG	MSSFUG	Inherently Low Emitting Sitewide MSS Activities(ILE Activities)	CO2e	--	2.58
			CO2	--	<0.01
			CH4	--	0.10

EPN = Emission Point Number
FIN = Facility Identification Number
* combined limit with EPN 9a
** The hourly emission limit is based on a 30-day rolling emissions average.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	October 30, 2015	Permit No.:	7369	Regulated Entity No.:	RN100211507
Area Name:	Capitiol Cement Plant			Customer Reference No.:	CN604033142

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA			EMISSION POINT DISCHARGE PARAMETERS										
1. Emission Point						Source							
			4. UTM Coordinates of Emission Point			5. Building	6. Height Above	7. Stack Exit Data			8. Fugitives		
EPN	FIN	Name	Zone	East	North	Height	Ground	Diameter	Velocity	Temperature	Length	Width	Axis
(A)	(B)	(C)		(Meters)	(Meters)	(Ft.)	(Ft.)	(Ft.) (A)	(FPS) (B)	(°F) (C)	(Ft.) (A)	(Ft.) (B)	Degrees (C)
SK-360	DC-360	Clinker Cooler Dust Collector Stack	14	556,103	3,268,593		75.0	6.0	134.0	164			
SK-700	DC-700	Solid Fuel Railcar Unloading Baghouse	14	555,893	3,268,341		10	1.5	53.6	Amb			
SK-350	DC-350	Alkali Bypass Dust Collector Stack	14	556,141	3,268,643		150.0	4.0	69.5	485			
D-4	D-4	Tier 4 Engine	14	556,027	3,268,555		15.00	0.4	439.30	1025			
SK-805	DC-805	Truck Unloading Station 805	14	555,949	3,268,322		58	1.7	26.9	95			
SK-806	DC-806	1st Transport to RMS No. 1 building	14	555,904	3,268,349		37	1.3	29.4	95			
SK-807	DC-807	2nd Transport to RMS No. 1 building	14	555,926	3,268,381		93	1.3	29.4	95			
SK-808	DC-808	3rd Transport to RMS No. 1 building	14	555,742	3,268,507		55	1.7	30.8	95			
SK-810	DC-810	Truck Unloading station 810	14	555,942	3,268,351		58	1.7	26.9	95			
SK-812	DC-812	1st Transport to RMS No. 2 building	14	555,692	3,268,528		80	1.7	30.6	95			
SK-813	DC-813	Transport from RMS No. 2 building	14	555,865	3,268,775		32	1.3	28.2	95			
SK-814	DC-814	Transport from RMS No. 2 building	14	555,942	3,268,725		53	1.5	29.5	95			
SK-815	DC-815	Transport to Raw Mill	14	555,856	3,268,608		114	1.5	27.0	95			
SK-817	DC-817	Transport from RMS No. 2 building	14	555,888	3,268,767		63	1.7	27.8	95			
SK-819	DC-819	Transport from RMS No. 2 building	14	555,932	3,268,815		42	1.3	28.0	95			
SK-820	DC-820	Transport from RMS No. 2 building	14	556,013	3,268,755		93	1.1	29.3	95			
SK-821	DC-821	Transport to Finish mill	14	556,006	3,268,641		55	1.2	26.9	95			
SK-823	DC-823	Transport from RMS No. 2 building	14	555,888	3,268,771		27	1.7	28.5	95			
SK-824	DC-824	Transport from storage buildings	14	555,914	3,268,757		46	1.1	27.6	95			
SK-825	DC-825	Transport from storage buildings	14	555,950	3,268,727		35	1.0	29.7	95			
SK-826	DC-826	Transport to Raw Mill	14	555,861	3,268,602		24	1.0	29.7	95			
SK-827	DC-827	Raw Mill Feed Bins	14	556,069	3,268,456		98	1.2	30.9	95			
SK-833	DC-833	Raw Mill Feed Belt 1	14	556,038	3,268,480		114	1.7	29.4	95			
SK-834	DC-834	Raw Mill Feed Belt 2	14	556,075	3,268,460		51	1.8	28.5	95			
SK-835	DC-835	Raw Mill Bucket Elevator	14	556,125	3,268,518		123	1.8	28.8	212			
SK-837	DC-837	Raw Mill Rejects	14	556,131	3,268,515		63	1.5	26.4	212			
SK-846	DC-846	Blend Silo Bucket Elevator	14	556,088	3,268,511		41	9.0	0.2	248			
SK-848	DC-848	Blend Silo	14	556,072	3,268,519		205	8.0	0.2	248			
SK-849	DC-849	Raw Meal Bucket elevator	14	556,087	3,268,515		205	10.0	0.2	248			
SK-856	DC-856	Raw Meal from mill	14	556,088	3,268,511		41	1.0	26.4	248			
SK-880	KL-870	Kiln 870 Stack	14	556,069	3,268,525		221	9.0	39.7	355			
SK-890	DC-890	Blend Silo Buffer Bin	14	556,049	3,268,532		74	9.0	0.2	392			
SK-898	DC-898	Byp. Dust Bin	14	556,078	3,268,542		53	1.1	31.0	392			
SK-902	KC-900	KC-900 Clinker Cooler	14	556,009	3,268,528		215	5.0	27.0	250			
SK-910	DC-910	Transport to Clinker Silo	14	555,996	3,268,552		29	1.7	28.2	482			
SK-930	DC-930	Clinker Silo 960	14	555,934	3,268,637		170	1.5	28.9	482			
SK-940	DC-940	to Clinker Silos from existing line	14	555,954	3,268,659		170	8.0	0.2	482			
SK-950	DC-950	Clinker Silo 950	14	555,924	3,268,622		170	1.7	27.2	482			

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	October 30, 2015	Permit No.:	7369	Regulated Entity No.:	RN100211507
Area Name:	Capitiol Cement Plant			Customer Reference No.:	CN604033142

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA			EMISSION POINT DISCHARGE PARAMETERS										
1. Emission Point						Source							
			4. UTM Coordinates of Emission Point			5. Building	6. Height Above	7. Stack Exit Data			8. Fugitives		
EPN	FIN	Name	Zone	East	North	Height	Ground	Diameter	Velocity	Temperature	Length	Width	Axis
(A)	(B)	(C)		(Meters)	(Meters)	(Ft.)	(Ft.)	(Ft.) (A)	(FPS) (B)	(°F) (C)	(Ft.) (A)	(Ft.) (B)	Degrees (C)
SK-970	DC-970	Clinker Silo 970	14	555,946	3,268,623		170	1.9	30.4	482			
SK-971	DC-971	Cement additives	14	555,956	3,268,678		80	1.5	31.5	95			
SK-974	DC-974	clinker and additives to new FM Feed Bins	14	555,957	3,268,672		22	1.3	29.4	212			
SK-975	DC-975	Clinker transport to existing FM Feed Bins 1	14	556,024	3,268,740		83	1.3	28.2	212			
SK-976	DC-976	Clinker transport to existing FM Feed Bins 2	14	556,060	3,268,713		91	1.3	28.2	212			
SK-977	DC-977	FM Bucket Elevator	14	556,023	3,268,775		114	1.7	30.6	212			
SK-979	DC-979	FM Feed Conveyor	14	556,018	3,268,767		65	1.7	30.4	212			
SK-991	DC-991	Finish Mill # 7 Stack	14	556,054	3,268,760		214	8.0	30.7	197			
SK-994	DC-994	Cement Transport	14	556,063	3,268,768		77	1.0	28.0	212			
F-P-RMS2	F-P-RMS2	RMS Building No. 2 Pile	14	555,774	3,268,634		80				726	125	0
F-P-RMS1	F-P-RMS1	RMS Building No. 1 Pile	14	555,864	3,268,671		80				934	182	0
F-P-ALTF	F-P-ALTF	Alternative Fuel Pile	14	556,116	3,268,480		20				210	210	
F-IC-1	FIC-1 CRSH	Quarry Primary Crusher	14	555,960	3,268,773		3				8	4	36
F-C-1	F-C-1	Primary Crush Conveyor Drop to Conveyor	14	555,991	3,268,751		3						
F-C-2	F-C-2	Conveyor Drop to Transfer	14	556,039	3,268,715		40						
F-C-300	F-C-300	Conveyor Drop to RMS Shuttle Conveyor	14	555,918	3,268,746		80						
F-U-805	F-U-805	Raw Material Truck Unloading Station 1	14	555,945	3,268,325		0				5	5	0
F-U-810	F-U-810	Raw Material Truck Unloading Station 2	14	555,947	3,268,347		0				5	5	0
F-C-ALT1	F-C-ALT1	Alternative fuel Transport Fugitive 1	14	556,113	3,268,476		10						
F-C-ALT2	F-C-ALT2	Alternative fuel Transport Fugitive 2	14	555,984	3,268,554		10						
F-L-CKD	F-L-CKD	Loader Drop to Truck at CKD Pile	14	555,885	3,268,881		10				20	20	
F-PM-898	F-PM-898	Pug Mill drop to loader	14	556,091	3,268,545		10				20	20	
SK-320	KS-1A	Dry Kiln Dust Collector	14	556,228	3,268,751		232.0	12.0	58.2	286.4			
MSSFUG	MSSFUG	Inherently Low Emitting Sitewide MSS Activities (ILE Activities)	14	555,965	3,268,262						2,283	1,333	53.5
NH3 FUG2	NH3 FUG2	Ammonia Piping Fugitives	14	556,073	3,268,494						52	52	-52.0
TANK-5	TANK-5	Engine Fuel Tank Vent	14	556,029	3,268,558		10.0	1.0	0.0				
TANK-6	TANK-6	Alternative Liquid Fuel Tank Vent	14	556,009	3,268,568		20.0	1.0	0.0				

EPN = Emission Point Number
FIN = Facility Identification Number

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ATTACHMENT 6
OFF-PROPERTY SOURCE LOCATIONS

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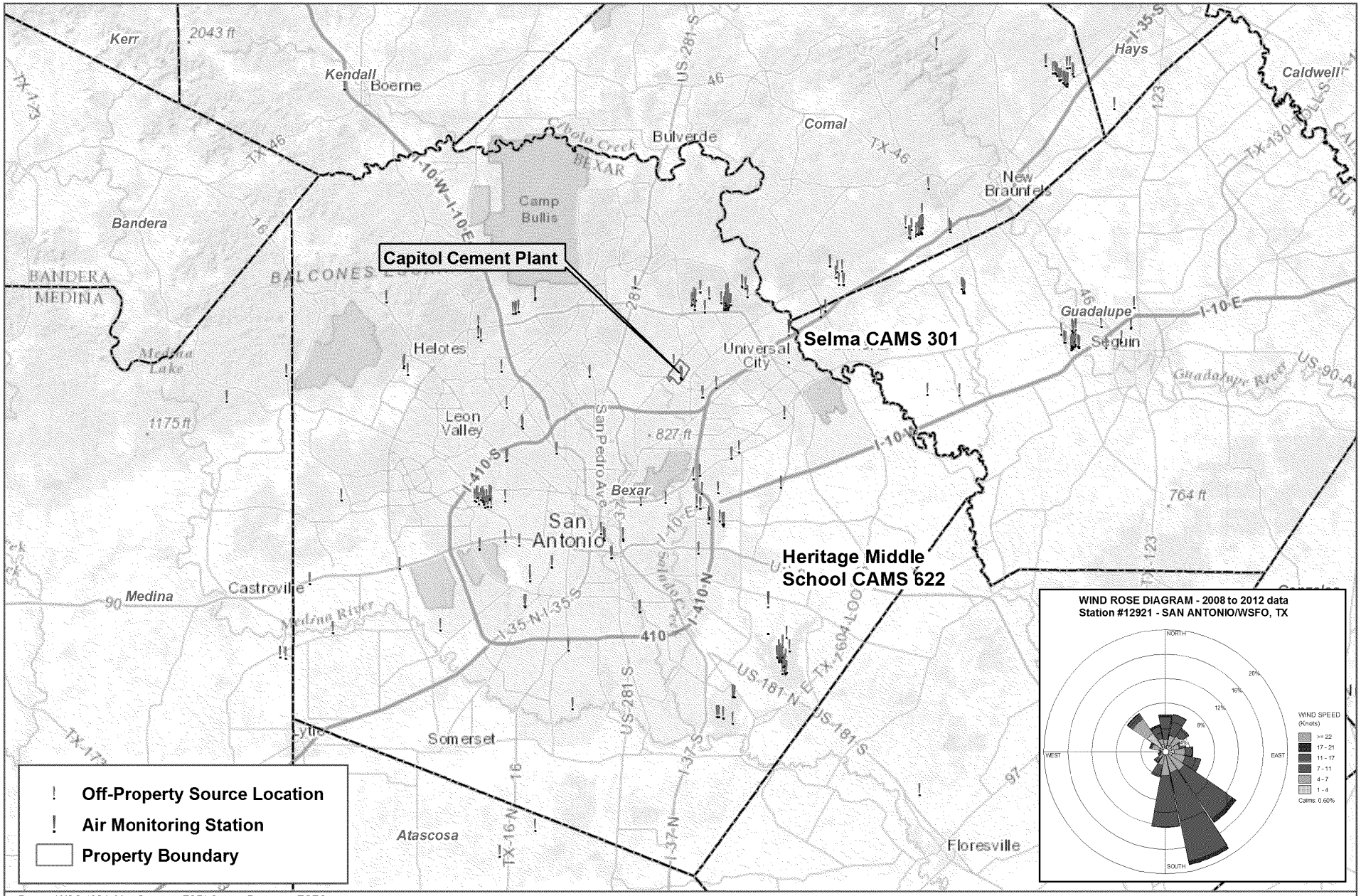

Datum: WGS 1984 Map Sources: ESRI-Streets Basemap; TCEQ

S

0 7 14 Kilometers

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zephyr

Off-Property Source Locations

Capitol Cement Plant - Capitol Aggregates, Inc.
San Antonio, Texas

H:\Capitol Cement\015022 New Kiln 2015\GIS\ArcMap Documents\Modeling Report Fugures\Off_Property_Sources.mxd

Drafted By:	Reviewed by:	Project No.:	Date:
J. Knowles	D. Castro	15022.002	4/7/2016

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ATTACHMENT 7
MAPS OF PROJECT-RELATED CONCENTRATION GRADIENTS

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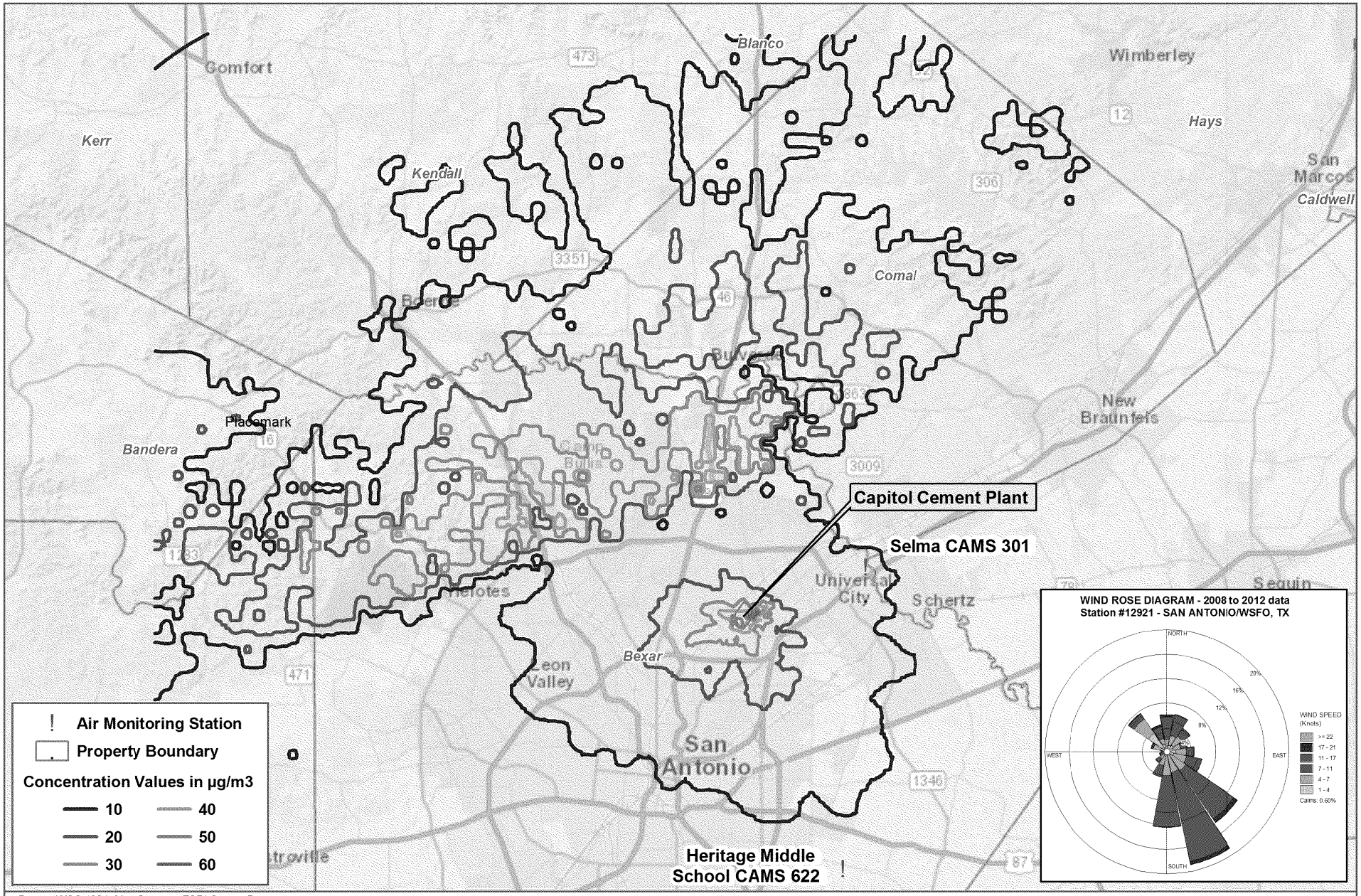

Datum: WGS 1984 Map Sources: ESRI-Streets Basemap

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zephyr

Concentration Gradients

Project Related Impacts, 1-Hour NO2
Capitol Cement Plant - San Antonio, Texas

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Drafted By:	Reviewed by:	Project No.:	Date:
J. Knowles	D. Castro	15022.002	4/7/2016

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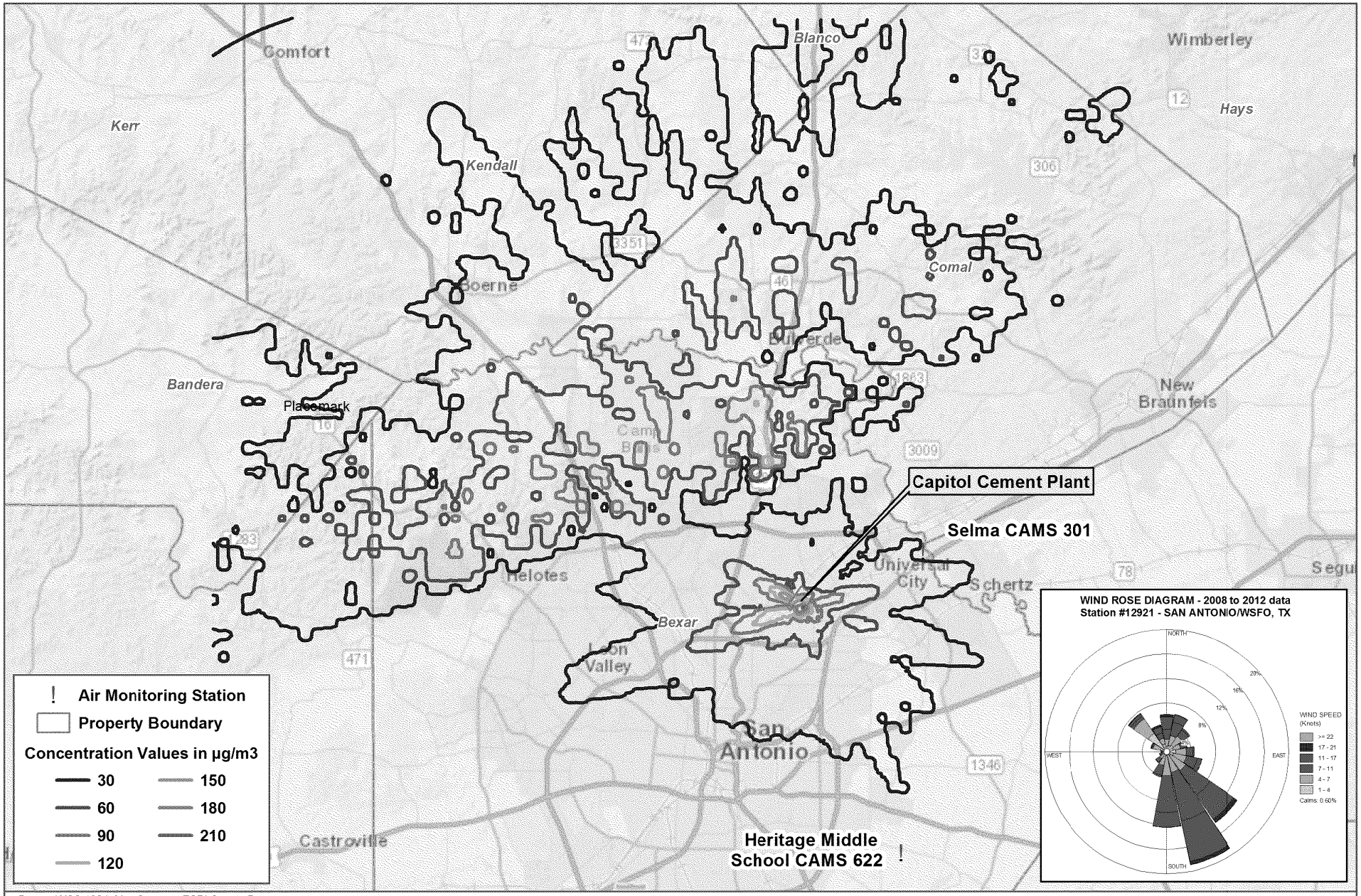

Datum: WGS 1984 Map Sources: ESRI-Streets Basemap

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zephyr

Concentration Gradients

Project Related Impacts, 1-Hour CO
Capitol Cement Plant - San Antonio, Texas

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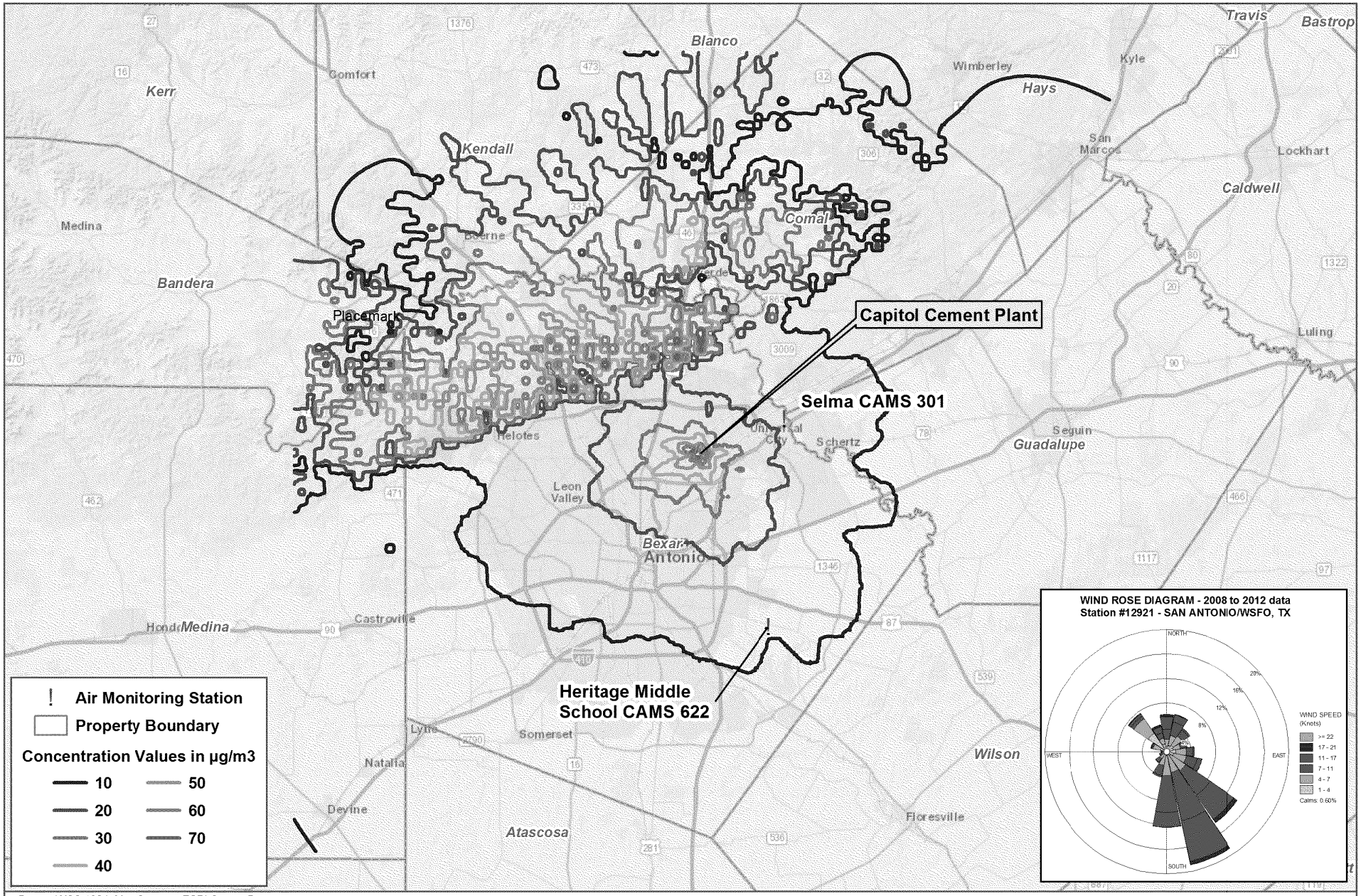
Drafted By:	Reviewed by:	Project No.:	Date:
J. Knowles	D. Castro	15022.002	4/7/2016



Datum: WGS 1984 Map Sources: ESRI-Streets Basemap

S

0 10 20 Kilometers

0 10 20 Miles

zephyr

Concentration Gradients

Project Related Impacts, 1-Hour SO2
Capitol Cement Plant - San Antonio, Texas

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Drafted By:	Reviewed by:	Project No.:	Date:
J. Knowles	D. Castro	15022.002	4/7/2016

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ATTACHMENT 8
SECONDARY PM2.5 ESTIMATE

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SECONDARY PM2.5 ANALYSIS
HOUSTON ALDINE DATA
CAPITOL CEMENT PLANT
SAN ANTONIO, TEXAS

Year	Maximum 24-Hour Concentration (µg/m3) Dallas Hinton			Percent of Total PM2.5	
	PM2.5	Sulfate PM2.5	Nitrate PM2.5	Sulfate PM2.5	Nitrate PM2.5
2012	26.47	5.084	1.047	19.2%	4.0%
2013	31.12	7.890	1.991	25.4%	6.4%
2014	29.38	5.589	0.8928	19.0%	3.0%

Daily Emissions (lb/day)	SO2	NOX
Harris County	87,184	539,556
Proposed Project	2,490	545
Proposed Project / Harris County	2.9%	0.1%

Year	Annual Concentration (µg/m3) Dallas Hinton			Percent of Total PM2.5	
	PM2.5	Sulfate PM2.5	Nitrate PM2.5	Sulfate PM2.5	Nitrate PM2.5
2012	11.254	2.588	0.2619	23.0%	2.3%
2013	10.765	2.184	0.3349	20.3%	3.1%
2014	11.071	2.163	0.2673	19.5%	2.4%

Annual Emissions (TPY)	SO2	NOX
Harris County	15,911	98,469
Proposed Project	454	99
Proposed Project / Harris County	2.9%	0.1%

ATTACHMENT 9
ELECTRONIC FILES

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May 16, 2016

Subject: Capitol Aggregates, Inc. Air Quality Analysis Protocol

I have reviewed the Prevention of Significant Deterioration (PSD) Air Quality Analysis (AQA) Protocol for Capitol Aggregates, Inc. located in San Antonio, Bexar County, Texas, dated April 2016, and my comments are provided below. The comments in sections 5.2.2, 6.2.1.2, 6.2.2.3, 6.4.10, and 6.4.15 should be addressed in a revised protocol.

3.0 Plot Plan – The plot plan should include the locations of any buildings or structures represented in the AQA. Please be sure to clearly label all of these features on the plot plan.

5.1 Available Background Concentrations – Table 5-1 of the protocol lists the 1-hr SO_2 background concentration form as the three-year average of the 99th percentile of the daily maximum 1-hr concentrations for the years 2014 – 2015. The years listed do not correspond to a three-year period. Please ensure that the documentation in all sections of the AQA is consistent.

5.2.1 NO_2, CO, SO_2, PM_{10}, and $PM_{2.5}$ Monitoring Stations – The protocol notes that 2013 TCEQ emission inventory data were used in the justification of the selected background monitors. Tables 5-2 and 5-3 indicate that 2014 TCEQ emission inventory data were used. Please ensure that the 2014 TCEQ emissions inventory data are used in the AQA and that the documentation in all sections of the AQA is consistent.

5.2.2 $PM_{2.5}$ Nitrates and $PM_{2.5}$ Sulfates Monitoring Station – The monitor proposed to be representative of the $PM_{2.5}$ speciation in the vicinity of the project site is not appropriate. The Houston Aldine monitor is located in a coastal area. In contrast, the project site is located much further inland than the monitor. The $PM_{2.5}$ speciation in the vicinity of the Houston Aldine monitor would not be representative of the project location. The applicant should re-evaluate this section in a revised protocol.

6.1.4 Capitol SkyMine, LLC Sources – Please provide a copy of the documentation associated with the Single Property Line Designation petition with the AQA.

In addition, the application of the EPA "Interpretation of Ambient Air" memo to the PSD modeling analysis is acceptable. Please provide a copy of the memo with the AQA as part of the documentation to support the modeled receptor grid.

6.2.1.1 Off-Property NAAQS Source Inventory Development – The protocol notes that a retrieval from the TCEQ Air Permits Allowable Database (APAD) will be obtained for NAAQS pollutants that exceed the applicable de minimis levels. In addition, the protocol notes that a search radius of ten kilometers will be used to focus additional review of APAD data for developing the off-property inventory. Please provide additional justification to support the proposed approach. For example, a map that depicts the location of PM_{10}/$PM_{2.5}$ sources, along with the magnitude of emissions.

6.2.1.2 Use of Ambient Air Quality Data to Account for Background Concentrations – This

section notes that section 6.6.1.1 describes the methods by which the off-property source inventory will be developed. The off-property source inventory development is actually described in section 6.2.1.1. Please ensure that the documentation in all sections of the AQA is consistent.

In addition, the protocol notes how monitor data will be used to account for NO_2, SO_2, and CO sources upwind of the Heritage Middle School monitor. However, the discussion does not include PM sources. If a similar approach will be followed in modeling off-property PM sources, be sure to document the approach in a revised protocol.

6.2.2.3 Increment Modeling Tiers – The protocol notes that actual emissions may be modeled for the Increment analysis. Please provide the calculations of the actual emissions, as well as the basis for the actual emissions that will be used in a revised protocol.

6.4.5 Kiln Startup and Shutdown Scenario – The protocol notes that the modeled NO_2, CO, and SO_2 emission rates for kiln startup/shutdown will be based on March 2015 stack tests of the existing kiln. In addition, the modeled PM_{10} and $PM_{2.5}$ emission rates for kiln startup/shutdown will be based on ten percent of the normal operating emissions. Please coordinate with the permit reviewer on the emission rates that should be evaluated in the modeling analysis.

The protocol notes that the cold startup emissions will be modeled per EPA intermittent guidance for the 1-hr NO_2 and SO_2 analyses. Be aware that the intermittent source guidance does not apply to the SO_2 State Property Line analysis.

6.4.6 Emergency Equipment Emissions – The protocol notes that the fire water pump engine and emergency generator emissions will be modeled per EPA intermittent guidance for the 1-hr NO_2 and SO_2 analyses. Be aware that the intermittent source guidance does not apply to the SO_2 State Property Line analysis.

Be sure to provide the calculations of the modeled emission rates of the intermittent sources in the AQA. In addition, provide the calculations of the modeled emission rates of any sources that will be modeled using emissions that are representative of specific averaging periods.

6.4.10 Maintenance Emissions – The protocol notes that these sources will be modeled at a single, worst-case location, but does not discuss how the worst-case location was determined. Please document how the worst-case location was determined in a revised protocol.

6.4.12.1 CO, SO_2, PM_{10} and $PM_{2.5}$ Analyses – The protocol notes that average 3-hr, 8-hr, and 24-hr emission rates will be modeled for sources with non-continuous operations. Be sure to provide the calculations for these average emission rates with the AQA.

6.4.12.2 NO_2 Analyses – The protocol notes that two modeling scenarios will be included in all 1-hr NO_2 modeling analyses. Please coordinate with the permit reviewer on the emission rates that should be evaluated in the modeling analysis.

6.4.15 $PM_{2.5}$ Emissions – The proposed approach to evaluate secondary $PM_{2.5}$ emissions is

reasonable, with the exception of the proposed monitor data. As noted above in section 5.2.2, the proposed monitor would not be representative of the $PM_{2.5}$ speciation in the vicinity of the project site. The applicant should re-evaluate this section in a revised protocol.

7.2.4 SIL Justification Analysis – Table 7-2 of the protocol indicates that the values in the "Increment Consumed" column represent monitor data from 2010 to 2013. The values actually represent monitor data from 2010 to 2015. Please ensure that documentation in all sections of the AQA is consistent.

In addition, the 24-hr concentrations compared in the $PM_{2.5}$ Increment SIL justification should correspond to the second highest values rather than the highest values to be consistent with the form of the 24-hr $PM_{2.5}$ Increment.

Deliverables – All modeling and downwash input and output files should be sent electronically via email, FTP, or CD/DVD. Electronic copies of the modeling report, plot plan, and maps are also preferred.

If you have any questions, please contact Matthew Kovar at 512-239-0180, by fax at 512-239-1330, or by email at Matthew.Kovar@tceq.texas.gov.

To: Mohr, Ashley[Mohr.Ashley@epa.gov]
Cc: Dianne Anderson[dianne.anderson@tceq.texas.gov]; Snyder, Erik[snyder.erik@epa.gov]; Kordzi, Stephanie[Kordzi.Stephanie@epa.gov]
From: Rachel Melton
Sent: Tue 5/17/2016 3:08:53 PM
Subject: Protocol Response: MOTIVA ENTERPRISES LLC (permit #8404)
Modeling Protocol Response 8404 MOTIVA ENTERPRISES LLC.docx
Motiva PA Model Protocol.pdf

Ashley,

Attached is the TCEQ's response for the MOTIVA ENTERPIRSES LLC Protocol, Permit No.: 8404. Please respond to verify receipt of this information.

Thanks,

Rachel Melton

Texas Commission on Environmental Quality

Air Permits Division

Air Dispersion Modeling Team

T: 512-239-2358

E: Rachel.Melton@tceq.texas.gov

February 19, 2016

Subject: AES Generation Development, LLC Air Quality Analysis Protocol

We have reviewed the Prevention of Significant Deterioration (PSD) Air Quality Analysis (AQA) Protocol for AES Generation Development, LLC located in Pasadena, Harris County, Texas, dated February 2016, and our comments are provided below. The comments in sections 2.3.2, 2.6.1, 2.6.2, and 3.1 should be addressed in a revised protocol before the AQA is submitted.
Per an email from Matthew Kovar, Section 2.3.4 should be addressed instead of Section 2.3.2.

1.3 Applicable Pollutants - Be sure to coordinate with the permit reviewer on the PSD netting calculations documented in Table 1-2 of the protocol prior to conducting the modeling analysis.
The modeling analysis will be based on permit reviewer approved emission calculations.

In addition, confirm with the permit reviewer that it is appropriate to exclude NO_x from the GE 7FA.05 simple cycle turbines analysis and CO from the GE 7HA.01 and GE 7HA.02 combined cycle turbines analyses.
The modeling analysis will be based on permit reviewer approved emission calculations.

Table 1-3 of the protocol notes that the 1-hr SO_2 NAAQS SIL is 7.9 $\mu g/m^3$. Please note that the 1-hr SO_2 NAAQS SIL is 7.8 $\mu g/m^3$. Table 1-3 also notes that the 8-hr CO NAAQS is 5,000 $\mu g/m^3$. Please note that the 8-hr CO NAAQS is 10,000 $\mu g/m^3$.
Updated in the protocol

Footnote F to Table 1-3 notes that, for the $PM_{2.5}$ 24-hour NAAQS analysis, the modeled concentration is the 98th percentile of the 5-year averages of the maximum modeled 24-hour average $PM_{2.5}$ concentrations. Please note that the modeling concentration is the highest of the 5-year averages of the 98th percentile of the maximum modeled 24-hour average $PM_{2.5}$ concentrations.
Updated in the protocol

Table 1-5 of the protocol notes that the SO_2 State Property Line Standard is 730 $\mu g/m^3$. Please note that the SO_2 State Property Line Standard for Harris County is 715 $\mu g/m^3$.
Updated in the protocol

2.2.1 Regulatory Default and Non-Default Options - The protocol notes that a non-default option for the conversion of NO_x to NO_2 may be used depending on initial results using the Tier 2 ARM. If a Tier 3 model option will be used, a revised protocol must be sent to the TCEQ and EPA Region 6 for review prior to submitting the AQA. Furthermore, if a Tier 3 model option is used, the revised protocol must include a discussion and sufficient technical justification for the in-stack NO_2/NO_x ratio that will be used. In addition, full documentation and technical justification for the ozone data selected to be used with the Tier 3 model option and how it is representative of the project site must be provided with the revised protocol.
In the event the Tier 3 model option is used then a revised protocol will be submitted to the TCEQ and EPA Region 6.

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2.2.3 Urban/Rural Dispersion - The protocol does not include a discussion on the population that will be entered for the AERMOD urban option. This discussion should be included in the AQA. The population should be determined following EPA guidance from Section 5 of the AERMOD Implementation Guide.
Updated the protocol to mention Houston's population of 2.2 million and implemented the "URBAN" option and "URBANSRC ALL" keywords within the modeling.

2.3.4 CT Short-Term Stack Parameters - The "Frankenstein" scenario proposed for the combined cycle operations appears to be reasonable. However, according to the provided plot plans, it appears that the source and building locations vary for the different turbine models. Please document in a revised protocol how these variations will be accounted for in the "Frankenstein" scenario.
Both the cooling tower and steam turbine locations vary between the combined cycle plot plans. The GE and Mitsubishi configurations differ on the location of the steam turbine and cooling tower. Sensitivity tests will be performed for the different locations for the 1-hour, 3-hour, 8-hour, 24-hour, and annual averaging periods to determine which configuration results in worst case ground level concentrations. The worst case site configuration for each of the averaging periods will be used in the "Frankenstein" scenario.

The protocol notes that start-up and shutdown operations of the turbines can be classified as intermittent sources. Although information in support of classifying the start-up and shutdown operations as intermittent sources was provided in the protocol, the protocol failed to show that the operations would not contribute significantly to the modeled design value of the annual distribution of daily maximum 1-hr concentrations based on the total number of hours of start-up and shutdown operations. Additional information should be provided in a revised protocol on the start-up and shutdown operations with respect to the frequency and duration of the operations. In addition, the protocol should discuss if the start-up and shutdown operations can occur simultaneously for multiple turbines.
NOx emissions associated with the startup and shutdown of the combustion turbines will be incorporated into the modeling following an EPA recommendation for intermittent sources in the March 1, 2011 memorandum[1]. Specifically, intermittent emissions are annualized to account for potential worst-case meteorological conditions associated with intermittent emissions by assuming continuous operation, while use of the average hourly emission. The EPA presents this approach as a way to account for the probability of the intermittent emissions actually occurring for a given hour. To simulate total emissions from the combustion turbines, the contribution from the intermittent startup and shutdown events will be added to the continuous emissions associated with normal operations.

There are four different types of intermittent events associated with the combined cycle turbine operations: cold startup, warm startup, hot startup, and shutdown. Each of the four events has been analyzed separately in the intermittent source analysis presented below to determine which type of event results in the maximum annualized emission rate.

Table 2-3 summarizes the emission rate calculation methodology for the combined cycle NO_X 1-hour emission rates. The maximum hourly emission rate for the four startup and shutdown

[1] EPA, March 1, 2011 memorandum from Tyler Fox, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard" (Page 11).

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operation events will be modeled for each turbine. Additionally it will be assumed that the other Project sources will be operated continuously. Measured background concentrations of NO_2 and impacts from other background sources will be accounted for as described later in this section.

TABLE 2-3: Combined Cycle 1-hour NO_X Emission Rates

Turbine	Startup/ Shutdown Event	Frequency (events/yr)	Duration (hours)	Annual Emissions (tpy)	Annualized Emissions (lb/hr)	Continuous Emission (lb/hr)	1-hour NO_X Emission (lb/hr)
GE 7F.05	Cold Startup	15	1.00	0.95	0.22	16.80	17.01
	Warm Startup	210	0.75	8.82	2.01	16.80	18.81
	Hot Startup	35	0.50	0.84	0.19	16.80	16.99
	Shutdown	260	0.33	1.56	0.36	16.80	17.15
GE 7HA.01	Cold Startup	15	0.92	1.25	0.29	19.04	19.32
	Warm Startup	210	0.67	8.19	1.87	19.04	20.91
	Hot Startup	35	0.33	0.61	0.14	19.04	19.18
	Shutdown	260	0.20	0.55	0.12	19.04	19.16
GE 7HA.02	Cold Startup	15	0.92	1.98	0.45	23.56	24.01
	Warm Startup	210	0.67	13.23	3.02	23.56	26.58
	Hot Startup	35	0.33	1.17	0.27	23.56	23.83
	Shutdown	260	0.20	0.86	0.20	23.56	23.76
Mitsubishi 501GAC	Cold Startup	15	0.15	0.14	0.3	20.57	20.60
	Warm Startup	210	0.15	1.93	0.44	20.57	21.01
	Hot Startup	35	0.15	0.32	0.07	20.57	20.65
	Shutdown	260	0.21	5.64	1.29	20.57	21.86

The protocol notes the 3-hr and 24-hr SO_2 analyses will use base load emission rates since the SO_2 emissions do not vary due to start-up and shutdown emissions. In addition, base load emission rates will be used for the 24-hr $PM_{10}/PM_{2.5}$ analyses since the base load emissions are larger than start-up and shutdown emissions on a pound per hour basis. Please note that start-up and shutdown scenarios should also be evaluated if the corresponding stack parameters differ from normal operations.

The startup and shutdown SO_2 emission rates do not vary from normal operations. The "Frankenstein" scenario passes below the SIL for all SO_2 averaging periods and represents a highly conservative modeling demonstration. Startup and shutdown scenarios were evaluated for the 24-hour $PM_{10}/PM_{2.5}$ averaging periods as the corresponding stack parameters differed from normal operating conditions. All other averaging periods conservatively modeled the higher of the normal operating emissions or start-up emissions as continuous for the duration of the averaging period.

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The protocol notes that the emergency generator and fire pump will be excluded from the modeling for the 1-hr NO_2 and 1-hr SO_2 NAAQS analyses. These sources should not be excluded from the short-term analyses, but modeled with average hourly emission rates per EPA intermittent guidance.

The emergency generator and fire pump engines will operate for maintenance and testing no more than 100 hours per year each and are prohibited from operating between the hours of 6 am and 12 pm since they are in the Houston-Galveston-Brazoria area This restriction means that instead of 8760 hours per year, annualized emissions will be calculated suing the 6,570 hours per year available for them to operate. Therefore, the emergency engines will be modeled as operating continuously during the hours from 12 am to 6 am and 12 pm to 12 am with average hourly emission rates per EPA intermittent guidance[2] based on 6,570 hours/year.

Please note that the project is located within the Houston-Galveston-Brazoria ozone nonattainment area. Title 30 Texas Administrative Code (30 TAC) Chapter 117 includes operational restrictions for diesel engines in the ozone nonattainment areas. The operation of diesel engines for testing or maintenance purposes cannot occur between the hours of 6 am and 12 pm. The total hours per year available for testing or maintenance would be 6570 hours (18 hours per day multiplied by 365 days per year). The modeled hourly emission rate for the emergency generator and fire pump would be equal to the maximum hourly emission rate multiplied by 100/6570.

See updated text in the protocol from the comment above.

The protocol notes that the emergency generator and fire pump will use average short-term emission rates for the 8-hr CO and 24-hr $PM_{10}/PM_{2.5}$ modeling analyses. Be sure to provide a discussion and corresponding calculations to support the modeled emission rates if this approach is used.

For other short-term modeling (e.g., 1- and 8-hour CO and 24-hour PM_{10} and $PM_{2.5}$), the modeled emission rates will be based on 1 hour of operation within the averaging period. As an example, the 8-hour CO emergency generator emission rate will be calculated as 1 hour of emissions divided by the 8 total hours within the averaging period, as shown in the table below. Although the engines will not be operated for testing or maintenance simultaneously, both engines will be conservatively modeled as if they are operating at the same time for the short-term average cumulative modeling runs.

Larger Auxiliary Boiler (M501GAC, GE HA.01 and GE HA.02)

	Emission Summary		**Averaging Period Model Inputs (lb/hr)**				
Pollutant	1-hr (lb/hr)	Annual (tpy)	1-hr	3-hr	8- hr	24- hr	Annual
NO_X	1.40	0.17	[1]	-	-	-	0.04
CO	5.18	0.64	5.18	-	0.65	-	-
SO_2	0.08	0.01	[1]	0.03	-	3.43E-03	2.33E-03
$PM_{10}/PM_{2.5}$	1.04	0.13	-	-	-	0.04	0.03

[1] Classified as an intermittent source

[2] EPA, March 1, 2011 memorandum from Tyler Fox, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard" (Page 11).

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Smaller Auxiliary Boiler (GE 7FA.05)

	Emission Summary		Averaging Period Model Inputs (lb/hr)				
Pollutant	1-hr (lb/hr)	Annual (tpy)	1-hr	3-hr	8- hr	24- hr	Annual
NO_X	0.60	0.09	[1]	-	-	-	0.02
CO	2.22	0.32	2.22	-	0.28	-	-
SO_2	0.04	0.01	[1]	0.01	-	1.47E-03	1.15E-03
$PM_{10}/PM_{2.5}$	0.45	0.06	-	-	-	0.02	0.01

[1] Classified as an intermittent source

Be sure to coordinate with the permit reviewer on the modeled emission rates documented in Table 2-3 of the protocol prior to conducting the modeling analysis.
The modeling analysis will be based on permit reviewer approved emission calculations.

Please review how the modeled stack diameter, stack temperature, and stack exit velocity were determined for the "Frankenstein" scenario. The values listed in the "Frankenstein Scenario" table do not correspond to the lowest stack parameter values in Table 2-3.
The worst case stack parameters include the lowest release height, lowest exhaust exit temperature, lowest exhaust exit velocity, and the smallest stack diameter.

The protocol notes that the auxiliary boiler can be classified as an intermittent source. Although information in support of classifying the auxiliary boiler as an intermittent source was provided in the protocol, the protocol failed to show that the operations would not contribute significantly to the modeled design value of the annual distribution of daily maximum 1-hr concentrations based on the total number of hours of auxiliary boiler operations. Additional information should be provided in a revised protocol on the auxiliary boiler operations with respect to the frequency and duration of the operations.
The auxiliary boiler will not operate simultaneously with the CTs other than short periods during CT start-ups after extended CT shutdowns. The boiler will typically not operate once the CTs have achieved steady-state operations, but will be conservatively modeled with CT operation and auxiliary boiler operation occurring simultaneously. The large GE turbines (HA.01 and HA.02) and Mitsubishi 501GAC turbines require a larger auxiliary boiler than the smaller GE 7FA.05 CTs. Following the EPA guidance in the March 1, 2011 memorandum[3], intermittent sources will be included in modeling for the 1-hour NO_2 averaging period using annualized emission rates. The large and small auxiliary boilers are to operate a maximum of 260 events each year (similar to the combustion turbine startup and shutdown events). The duration of the events ranges from a maximum of 1 hour to as minimum of 9 minutes for all four turbine scenarios. The total hours of operation per year for the large and small auxiliary boilers are 248 and 285, respectively. AES proposes to model the auxiliary boiler as operating continuously at the annual average hourly emissions rate to ensure that these emissions, when combined with other project emissions, do not cause or contribute to violations of the 1-hour NAAQS for NO_2. This approach is conservative as it accounts for potential worst-case meteorological conditions associated with auxiliary boiler emissions by assuming continuous

[3] EPA, March 1, 2011 memorandum from Tyler Fox, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard" (Page 11).

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operation, while use of the average hourly emission represents a simple approach to account for the probability of the auxiliary boiler operations actually operating for a given hour.

The protocol notes that the size of the auxiliary boiler and cooling tower can vary depending on the turbine model. Be sure that this variation is accounted for in the "Frankenstein" scenario.
To conservatively model the small and large auxiliary boilers in the "Frankenstein" scenario, the modeling will be setup to use the large auxiliary boiler's higher emission rate with the smaller auxiliary boiler's stack parameters (lower stack height and lower exit velocity). This worst case auxiliary boiler scenario will be used in the "Frankenstein" scenario. The GE and Mitsubishi configurations differ on the location of the cooling tower. Sensitivity tests will be performed for the different locations for the 1-hour, 3-hour, 8-hour, 24-hour, and annual averaging periods to determine which configuration results in worst case ground level concentrations. The worst case site configuration for each of the averaging periods will be used in the "Frankenstein" scenario.

2.6.1 Justification of Use of $PM_{2.5}$ SILs - The protocol includes justification for the use of the $PM_{2.5}$ SILs in the NAAQS analysis, but does not include justification for the use of the SILs in the Increment analysis. Please provide this justification in a revised protocol.
To provide justification with respect to use of $PM_{2.5}$ SILs in the PSD Increment analysis, the differences between the PSD Increment and the change in ambient monitored concentrations determined to be representative of the Project impact area (see Section 3.1) for the time period between the most recent complete year (2014) of available ambient monitoring data and the major source baseline date (October 20, 2010) were quantified and compared to the SIL. The comparison, summarized in Table 2-10, shows that the differences between the PSD Increment and the difference in measured concentrations are larger than the corresponding SILs. Therefore, these differences are sufficient to conclude that a modeled impact less than the $PM_{2.5}$ SILs indicate that emissions from the proposed project will not cause or contribute to a violation of the PSD Increment.

TABLE 2-10: Comparison of $PM_{2.5}$ PSD Increment, Monitored Concentrations and SILs ($\mu g/m^3$)

Pollutant	Averaging Period	PSD Increment	Monitored Design Values		Difference in Design Values[1]	Difference Between PSD Increment and Change in Design Value	SIL
			2010	2014			
$PM_{2.5}$	24-Hour	9	29.20	20.60	0.00	9	1.2
	Annual	4	12.28	11.74	0.00	4	0.3

[1] A zero value for the difference in design values means the ambient background concentration has stayed the same or decreased since the major baseline date.

2.6.2 Significance Analysis Modeling Procedures - The protocol notes that an additional 100 percent load/maximum emissions scenario may be evaluated in addition to the "Frankenstein" scenario. It is not clear why this additional evaluation is proposed, since the "Frankenstein" scenario should result in the maximum predicted concentrations. Please elaborate on the reason for this approach in a revised protocol.
Updated in the protocol to reflect the start-up or shutdown emissions will be considered for cases in which the 100% load/maximum emissions do not result in maximum predicted impacts.

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As stated in section 2.3.4, the emergency generator and fire water pump should be included in the 1-hr NO_2 and 1-hr SO_2 NAAQS analyses.
Please refer to Section 2.3.4 for additional clarification on the emergency engines and the 1-hour NO_2 and 1-hour SO_2 NAAQS analyses.

For the Increment analysis, note that the area of impact (AOI) will be the same one used in the PSD NAAQS analysis, except for those criteria pollutants with NAAQS that are statistically-based (i.e. multi-year average). While the SILs for both NAAQS and Increment are identical, the procedures to determine significance (that is, predicted concentrations to compare to the SIL) are different. This difference occurs because for those NAAQS that are statistically-based, the corresponding Increments are exceedance-based. For criteria pollutants with NAAQS that are statistically-based, determine the AOI following the convention of exceedance-based NAAQS (i.e., maximum predicted concentration).
It is understood that the method for comparing the predicted modeled concentrations for PSD Increment differs from PSD NAAQS. Table 1-3 in the modeling protocol identifies "Class II Increment" values and the corresponding footnotes discuss the procedures to determine significance have been clarified for PSD Increment modeling.

For example, when modeling $PM_{2.5}$, use the maximum predicted concentrations from all receptors to determine the AOI for the 24-hour and annual averaging times instead of the five-year average of the maximum predicted concentrations from the NAAQS analysis.
In the event the predicted modeled concentrations are above the NAAQS and PSD Increment SILs, the appropriate methods will be implemented in determining the AOI. Additional details will be provided, if necessary, in the modeling report.

2.6.5.1 NO_x to NO_2 Conversion Options - As stated in 2.2.1, a revised protocol will need to be submitted to the TCEQ and EPA Region 6 if one of the Tier 3 model options will be used.
In the event the Tier 3 model option is used then a revised protocol will be submitted to the TCEQ and EPA Region 6.

3.1 Background Data - The proposed background monitor is reasonable. Be sure to provide the background concentrations and supporting calculations in a revised protocol. In addition, the three most recent years of complete data should be used.
The ambient background concentrations are summarized in the table below and will be included in the updated protocol. The calculations are provided in a separate document.

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TABLE 3-1: Ambient Background Concentrations

Pollutant	Averaging Period	Concentration (μg/m³)			Design Value (μg/m³)	Monitor ID/Location
		2012	2013	2014		
CO	1-hour	N/A	N/A	1,873.4	1,873.4	48-201-1035 Houston
	8-hour	N/A	N/A	1,610.0	1,610.0	
NO_2	1-hour	102.3	108.3	94.6	101.7	
	Annual	N/A	N/A	24.6	24.6	
PM_{10}	24-hour	104.0	79.0	107.0	96.7	
$PM_{2.5}$	24-hour	23.4	22.8	20.6	22.3	
	Annual	11.8	11.3	11.7	11.6	
SO_2	1-hour	76.5	56.1	48.7	60.4	
	3-hour	N/A	N/A	38.8	38.8	
	24-hour	N/A	N/A	10.5	10.5	
	Annual	N/A	N/A	2.0	2.0	

5.0 Class I Area Impact Analysis - Please note that the areas listed in Table 5-1 are not defined as Class I areas by the EPA.
Updated in the protocol

5.1 PSD Class I Area Increment Analysis - Please note that the nearest Class I area, Caney Creek Wilderness, is located approximately 530 kilometers from the project site.

The TCEQ follows 40 Code of Federal Regulations § 52.21(p) which requires the TCEQ to provide written notice of any permit application for a proposed major stationary source which may affect a Class I area to the Federal Land Manager and the Federal official charged with direct responsibility for management of any lands within any such area. The EPA, through applicable guidance, has interpreted the meaning of the term "may affect" to include all major source or major modifications which propose to locate within 100 kilometers of a Class I area. The applicant may contact the applicable Federal Land Manager to discuss any potential Class I analyses for air quality related values.
Updated the protocol text to indicate AES is not within 100 km of any Class I area.

7.1 Visibility Impairment Analysis - Please note that the requirement for the Class II visibility analysis can be met by acknowledging compliance with the visibility and opacity requirements in 30 TAC Chapter 111.
Updated the protocol text

Deliverables - All modeling and downwash input and output files should be sent electronically via email, FTP, or CD/DVD. Electronic copies of the modeling report, plot plan, and maps are also preferred.

If you have any questions, please contact Rhys Davies at 512-239-1134 or Matthew Kovar at 512-239-0180, by fax at 512-239-1400, or by email at Rhys.Davies@tceq.texas.gov or Matthew.Kovar@tceq.texas.gov.

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May 4, 2016

Subject: AES Generation Development LLC Air Quality Analysis Protocol

On February 19, 2016, the Air Dispersion Modeling Team (ADMT) sent comments to the permit reviewer regarding the Air Quality Analysis (AQA) Protocol for AES Generation Development LLC located near Pasadena, Harris County, Texas, dated February 2016. The applicant submitted a revised protocol with responses to the ADMT comments on April 6, 2016. Our comments related to the responses are provided below.

1.3 Applicable Pollutants

Original ADMT Comment: Footnote F to Table 1-3 notes that, for the $PM_{2.5}$ 24-hour NAAQS analysis, the modeled concentration is the 98th percentile of the 5-year averages of the maximum modeled 24-hour average $PM_{2.5}$ concentrations. Please note that the modeling concentration is the highest of the 5-year averages of the 98th percentile of the maximum modeled 24-hour average $PM_{2.5}$ concentrations.

Applicant Response: Updated in the protocol

ADMT Response: The footnote F to Table 1-3 is not correct. For the $PM_{2.5}$ 24-hr SIL analysis, the modeled concentration is the highest of the five-year averages of the maximum modeled 24-hr $PM_{2.5}$ concentrations predicted each year at each receptor. For the $PM_{2.5}$ 24-hr NAAQS analysis, the modeled concentration is the highest of the five year averages of the 98th percentile of the modeled 24-hr $PM_{2.5}$ concentrations predicted each year at each receptor.

2.2.3 Urban/Rural Dispersion

Original ADMT Comment: The protocol does not include a discussion on the population that will be entered for the AERMOD urban option. This discussion should be included in the AQA. The population should be determined following EPA guidance from Section 5 of the AERMOD Implementation Guide.

Applicant Response: Updated the protocol to mention Houston's population of 2.2 million and implemented the "URBAN" option and "URBANSRC ALL" keywords within the modeling.

ADMT Response: The revised protocol has been updated with a reasonable population size for the Houston area.

2.3.4 CT Short-Term Stack Parameters

Original ADMT Comment: The "Frankenstein" scenario proposed for the combined cycle operations appears to be reasonable. However, according to the provided plot plans, it appears that the source and building locations vary for the different turbine models. Please document in a revised protocol how these variations will be accounted for in the "Frankenstein" scenario.

Applicant Response: Both the cooling tower and steam turbine locations vary between the combined cycle plot plans. The GE and Mitsubishi configurations differ on the location of the steam turbine and cooling tower. Sensitivity tests will be performed for the different locations for the 1-hour, 3-hour, 8-hour, 24-hour, and annual averaging periods to determine which configuration results in worst case ground level concentrations. The worst case site configuration for each of the averaging periods will be used in the "Frankenstein" scenario.

ADMT Response: The updated protocol acceptably documented how the variations were accounted for in the "Frankenstein" scenario. Be sure to fully document the approach in the AQA.

Original ADMT Comment: The protocol notes that start-up and shutdown operations of the turbines can be classified as intermittent sources. Although information in support of classifying the start-up and shutdown operations as intermittent sources was provided in the protocol, the protocol failed to show that the operations would not contribute significantly to the modeled design value of the annual distribution of daily maximum 1-hr concentrations based on the total number of hours of startup and shutdown operations. Additional information should be provided in a revised protocol on the start-up and shutdown operations with respect to the frequency and duration of the operations. In addition, the protocol should discuss if the start-up and shutdown operations can occur simultaneously for multiple turbines.

Applicant Response: NO_x emissions associated with the startup and shutdown of the combustion turbines will be incorporated into the modeling following an EPA recommendation for intermittent sources in the March 1, 2011 memorandum1. Specifically, intermittent emissions are annualized to account for potential worst-case meteorological conditions associated with intermittent emissions by assuming continuous operation, while use of the average hourly emission. The EPA presents this approach as a way to account for the probability of the intermittent emissions actually occurring for a given hour. To simulate total emissions from the combustion turbines, the contribution from the intermittent startup and shutdown events will be added to the continuous emissions associated with normal operations. There are four different types of intermittent events associated with the combined cycle turbine operations: cold startup, warm startup, hot startup, and shutdown. Each of the four events has been analyzed separately in the intermittent source analysis presented below to determine which type of event results in the maximum annualized emission rate. Table 2-3 summarizes the emission rate calculation methodology for the combined cycle NO_X 1-hour emission rates. The maximum hourly emission rate for the four startup and shutdown operation events will be modeled for each turbine. Additionally it will be assumed that the other Project sources will be operated continuously. Measured background concentrations of NO_2 and impacts from other background sources will be accounted for as described later in this section.

ADMT Response: The updated protocol documentation, including Table 2-3: Combined Cycle 1-hour NO_x Emission Rates, was acceptable for all of the original ADMT comments except it failed to discuss if the start-up and shutdown operations can occur simultaneously for multiple

turbines; this will still need to be addressed.

In addition, the protocol notes that warm start-ups and shutdowns can be classified as intermittent sources. Based on the information provided in the protocol, the warm start-up and shutdown operations could contribute significantly to the modeled design value of the annual distribution of daily maximum 1-hr concentrations. The EPA intermittent guidance does not apply to these operations.

Original ADMT Comment: The protocol notes the 3-hr and 24-hr SO_2 analyses will use base load emission rates since the SO_2 emissions do not vary due to start-up and shutdown emissions. In addition, base load emission rates will be used for the 24-hr $PM_{10}/PM_{2.5}$ analyses since the base load emissions are larger than start-up and shutdown emissions on a pound per hour basis. Please note that startup and shutdown scenarios should also be evaluated if the corresponding stack parameters differ from normal operations.

Applicant Response: The startup and shutdown SO_2 emission rates do not vary from normal operations. The "Frankenstein" scenario passes below the SIL for all SO_2 averaging periods and represents a highly conservative modeling demonstration. Startup and shutdown scenarios were evaluated for the 24-hour $PM_{10}/PM_{2.5}$ averaging periods as the corresponding stack parameters differed from normal operating conditions. All other averaging periods conservatively modeled the higher of the normal operating emissions or start-up emissions as continuous for the duration of the averaging period.

ADMT Response: The applicant's response is an acceptable. Be sure to fully document the approach in the AQA.

Original ADMT Comment: The protocol notes that the emergency generator and fire pump will be excluded from the modeling for the 1-hr NO_2 and 1-hr SO_2 NAAQS analyses. These sources should not be excluded from the short-term analyses, but modeled with average hourly emission rates per EPA intermittent guidance.

Applicant Response: The emergency generator and fire pump engines will operate for maintenance and testing no more than 100 hours per year each and are prohibited from operating between the hours of 6 am and 12 pm since they are in the Houston-Galveston-Brazoria area This restriction means that instead of 8760 hours per year, annualized emissions will be calculated suing the 6,570 hours per year available for them to operate. Therefore, the emergency engines will be modeled as operating continuously during the hours from 12 am to 6 am and 12 pm to 12 am with average hourly emission rates per EPA intermittent guidance based on 6,570 hours/year.

ADMT Response: It appears that footnote 1 to Table 2-5: Summary of Stack Parameters and Emission Rates for Emergency Engines was inadvertently left in the protocol. The footnotes for 1-hour NO_2 and SO_2 of the Emergency Generator and Fire Water Pump tables state: "Classified as an exempt emergency source therefore exempt from the 1-hour NO_2 and SO_2 analyses." As stated in the original ADMT comment, these sources should not be excluded from the short-term analyses, but modeled with average hourly emission rates per EPA intermittent guidance.

Original ADMT Comment: The protocol notes that the emergency generator and fire pump will use average short-term emission rates for the 8-hr CO and 24-hr $PM_{10}/PM_{2.5}$ modeling analyses. Be sure to provide a discussion and corresponding calculations to support the modeled emission rates if this approach is used.

Applicant Response: For other short-term modeling (e.g., 1- and 8-hour CO and 24-hour PM_{10} and $PM_{2.5}$), the modeled emission rates will be based on 1 hour of operation within the averaging period. As an example, the 8-hour CO emergency generator emission rate will be calculated as 1 hour of emissions divided by the 8 total hours within the averaging period, as shown in the table below. Although the engines will not be operated for testing or maintenance simultaneously, both engines will be conservatively modeled as if they are operating at the same time for the short-term average cumulative modeling runs.

ADMT Response: The revised protocol has satisfied the original ADMT comment. Be sure to fully document the approach in the AQA.

Original ADMT Comment: Please review how the modeled stack diameter, stack temperature, and stack exit velocity were determined for the "Frankenstein" scenario. The values listed in the "Frankenstein Scenario" table do not correspond to the lowest stack parameter values in Table 2-3.

Applicant Response: The worst case stack parameters include the lowest release height, lowest exhaust exit temperature, lowest exhaust exit velocity, and the smallest stack diameter.

ADMT Response: The updated stack parameters do correctly correspond to the worst case scenario.

Original ADMT Comment: The protocol notes that the auxiliary boiler can be classified as an intermittent source. Although information in support of classifying the auxiliary boiler as an intermittent source was provided in the protocol, the protocol failed to show that the operations would not contribute significantly to the modeled design value of the annual distribution of daily maximum 1-hr concentrations based on the total number of hours of auxiliary boiler operations. Additional information should be provided in a revised protocol on the auxiliary boiler operations with respect to the frequency and duration of the operations.

Applicant Response: The auxiliary boiler will not operate simultaneously with the CTs other than short periods during CT start-ups after extended CT shutdowns. The boiler will typically not operate once the CTs have achieved steady-state operations, but will be conservatively modeled with CT operation and auxiliary boiler operation occurring simultaneously. The large GE turbines (HA.01 and HA.02) and Mitsubishi 501GAC turbines require a larger auxiliary boiler than the smaller GE 7FA.05 CTs. Following the EPA guidance in the March 1, 2011 memorandum, intermittent sources will be included in modeling for the 1-hour NO_2 averaging period using annualized emission rates. The large and small auxiliary boilers are to operate a maximum of 260 events each year (similar to

the combustion turbine startup and shutdown events). The duration of the events ranges from a maximum of 1 hour to as minimum of 9 minutes for all four turbine scenarios. The total hours of operation per year for the large and small auxiliary boilers are 248 and 285, respectively. AES proposes to model the auxiliary boiler as operating continuously at the annual average hourly emissions rate to ensure that these emissions, when combined with other project emissions, do not cause or contribute to violations of the 1-hour NAAQS for NO_2. This approach is conservative as it accounts for potential worst-case meteorological conditions associated with auxiliary boiler emissions by assuming continuous operation, while use of the average hourly emission represents a simple approach to account for the probability of the auxiliary boiler operations actually operating for a given hour.

ADMT Response: The protocol notes that the auxiliary boiler can be classified as an intermittent source. Based on the information provided in the protocol, the auxiliary boiler could contribute significantly to the modeled design value of the annual distribution of daily maximum 1-hr concentrations. The EPA intermittent guidance does not apply to this source.

Original ADMT Comment: The protocol notes that the size of the auxiliary boiler and cooling tower can vary depending on the turbine model. Be sure that this variation is accounted for in the "Frankenstein" scenario.

Applicant Response: To conservatively model the small and large auxiliary boilers in the "Frankenstein" scenario, the modeling will be setup to use the large auxiliary boiler's higher emission rate with the smaller auxiliary boiler's stack parameters (lower stack height and lower exit velocity). This worst case auxiliary boiler scenario will be used in the "Frankenstein" scenario. The GE and Mitsubishi configurations differ on the location of the cooling tower. Sensitivity tests will be performed for the different locations for the 1-hour, 3-hour, 8-hour, 24-hour, and annual averaging periods to determine which configuration results in worst case ground level concentrations. The worst case site configuration for each of the averaging periods will be used in the "Frankenstein" scenario.

ADMT Response: The proposed worst case scenario has accounted for the varying size of the auxiliary boiler and cooling tower and is reasonable to satisfy the original ADMT comment. Be sure to fully document the approach in the AQA.

2.6.1 Justification of Use of $PM_{2.5}$ SILs

Original ADMT Comment: The protocol includes justification for the use of the $PM_{2.5}$ SILs in the NAAQS analysis, but does not include justification for the use of the SILs in the Increment analysis. Please provide this justification in a revised protocol.

Applicant Response: To provide justification with respect to use of $PM_{2.5}$ SILs in the PSD Increment analysis, the differences between the PSD Increment and the change in ambient monitored concentrations determined to be representative of the Project impact area (see Section 3.1) for the time period between the most recent complete year (2014) of available ambient monitoring data and the major source baseline date (October 20, 2010) were quantified and compared to the SIL. The comparison, summarized in Table 2-10, shows

that the differences between the PSD Increment and the difference in measured concentrations are larger than the corresponding SILs. Therefore, these differences are sufficient to conclude that a modeled impact less than the $PM_{2.5}$ SILs indicate that emissions from the proposed project will not cause or contribute to a violation of the PSD Increment.

ADMT Response: The revised protocol has sufficiently justified the use of the de minimis levels in the Increment analysis.

2.6.2 Significance Analysis Modeling Procedures

Original ADMT Comment: The protocol notes that an additional 100 percent load/maximum emissions scenario may be evaluated in addition to the "Frankenstein" scenario. It is not clear why this additional evaluation is proposed, since the "Frankenstein" scenario should result in the maximum predicted concentrations. Please elaborate on the reason for this approach in a revised protocol.

Applicant Response: Updated in the protocol to reflect the start-up or shutdown emissions will be considered for cases in which the 100% load/maximum emissions do not result in maximum predicted impacts.

ADMT Response: The applicant's response is reasonable. Be sure to fully document the approach in the AQA.

Original ADMT Comment: As stated in section 2.3.4, the emergency generator and fire water pump should be included in the 1-hr NO_2 and 1-hr SO_2 NAAQS analyses.

Applicant Response: Please refer to Section 2.3.4 for additional clarification on the emergency engines and the 1-hour NO_2 and 1-hour SO_2 NAAQS analyses.

ADMT Response: As stated earlier, it appears that footnote 1 to Table 2-5: Summary of Stack Parameters and Emission Rates for Emergency Engines was inadvertently left in the protocol. The footnotes for 1-hour NO_2 and SO_2 of the Emergency Generator and Fire Water Pump tables state: "Classified as an exempt emergency source therefore exempt from the 1-hour NO_2 and SO_2 analyses." As stated in the original ADMT comment, these sources should not be excluded from the short-term analyses, but modeled with average hourly emission rates per EPA intermittent guidance.

3.1 Background Data

Original ADMT Comment: The proposed background monitor is reasonable. Be sure to provide the background concentrations and supporting calculations in a revised protocol. In addition, the three most recent years of complete data should be used.

Applicant Response: The ambient background concentrations are summarized in the table below and will be included in the updated protocol. The calculations are provided in a

separate document.

ADMT Response: The proposed monitors and the corresponding background concentrations are reasonable. Be sure to fully document and support the selection of the monitors in the AQA.

Deliverables - All modeling and downwash input and output files should be sent electronically via email, FTP, or CD/DVD. Electronic copies of the modeling report, plot plan, and maps are also preferred.

If you have any questions, please contact Rhys Davies at 512-239-1134 or Matthew Kovar at 512-239-0180, by fax at 512-239-1400, or by email at Rhys.Davies@tceq.texas.gov or Matthew.Kovar@tceq.texas.gov.

Air Dispersion Modeling Protocol
Supporting the NSR Permit Application for
New Propylene Production Unit (Permit 132611, PSDTX1462)
BASF Corporation
Freeport, Texas

Prepared for:

BASF Corporation
Freeport Site
602 Copper Road,
Freeport, Texas 77541

Prepared by:

AECOM
9400 Amberglen Boulevard
Austin, Texas 78729

April 2015

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APPENDIX

Appendix A A-1

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EXECUTIVE SUMMARY

BASF Corporation (BASF) owns and operates a chemical manufacturing facility at the Freeport, Texas (Brazoria County) site. BASF operates under multiple Texas Commission on Environmental Quality (TCEQ) – New Source Review (NSR) Air Permit authorizations. BASF has submitted an application for an air permit to authorize a new propylene production unit (Project OPUS) at the Freeport, Texas site. It is anticipated that during technical review of the permit application, TCEQ would request an air dispersion modeling evaluation of all new emissions of nitrogen dioxide (NO_2), Sulfur Dioxide (SO_2), carbon monoxide (CO), particulate matter under 10 microns (PM_{10}), and particulate matter under 2.5 microns ($PM_{2.5}$) to demonstrate compliance with National Ambient Air Quality Standards (NAAQS), and pollutants as required by the Modeling and Effects Review Applicability (MERA) analysis associated with the NSR permit application.

All modeling procedures conducted for this Air Quality Analysis (AQA) will conform to the latest state guidance as represented in the TCEQ documents, *Air Quality Modeling Guidelines,* (APDG 6232v2, Revised 4/2015), *Modeling and Effects Review Applicability* (MERA) [APDG 5874v3, Revised 7/2009], Code of Federal Regulations (CFR) *Title 40 Part 51 Appendix W*, U.S. Environmental Protection Agency (EPA) *Guidelines on Air Quality Models,* (EPA-450/2-78-027 and EPA-450/2/78/027R).

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1.0 Project Identification Information

Applicant:	BASF Corporation
Site Location:	Freeport Site
SIC Number:	2869, Chemical Manufacturing Plant
TCEQ Customer Number (CN):	CN600124895
TCEQ Reference Number (RN):	RN100218049
Air Quality Account Number:	BL-0021-O
Applicant's Primary Contact:	Doug Reeves
Applicant's Primary Contact No.:	713-752-4952
Applicant's Primary E-mail:	doug.reeves @basf.com
Nearest City and County:	Freeport, Texas
Applicant's Modeler:	AECOM

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2.0 Project Overview

BASF owns and operates a chemical manufacturing facility in Brazoria County, Freeport, Texas ("Freeport site"). BASF operates the Freeport site under multiple TCEQ NSR Air Permit authorizations. The current application represents an initial permit application for a NSR Permit for a new Gas-to-Propylene Production Unit, also described as "Project OPUS", which will be located at the BASF Freeport, Texas site. The permit application proposes to authorize increase in emissions of NO_2, SO_2, CO, PM_{10}, $PM_{2.5}$ and volatile organic compounds (VOCs).

BASF has proposed to install emission units including a Reformer, methanol to propylene (MTP) Heater, Regeneration Gas Heater, Steam Superheater, two Boilers, two elevated Flares, an enclosed combustor "enclosed ground flare" a Thermal Oxidizer and MTP Regeneration Gas Oxidizer, two Emergency Diesel Generators, and a Cooling Tower.

The proposed site is located in Brazoria County which is a part of the Houston-Galveston-Brazoria ozone non-attainment area designated as "Severe" non-attainment under the 1997 ozone standard.[1]Emissions from the proposed project alone exceed significance levels for certain criteria pollutants and will require a Nonattainment New Source Review (NNSR) for NO_2 and VOCs (as precursors for ozone), a Prevention of Significant Deterioration (PSD) review for NO_2, CO, PM_{10}, and $PM_{2.5}$, and a minor New Source Review (NSR) for SO_2. As a part of the permit application to authorize emissions, an air quality dispersion modeling analysis will be required to demonstrate that the predicted impacts of criteria pollutants (NO_2, SO_2, CO, PM_{10}, and $PM_{2.5}$) and non-criteria pollutants from the proposed operations will not exceed any of the applicable NAAQS, applicable PSD increment, State Property Line Standard, or cause adverse effects to human health or welfare for pollutants regulated by TCEQ.

2.1 Preliminary Impact Determination

The predicted impacts of the proposed emissions increases of NO_2, SO_2, CO, PM_{10}, and $PM_{2.5}$ from project only sources will be compared to the appropriate significant impact levels (SILs), and Significant Monitoring Concentrations (SMCs) included in the Table 2-1 below determining the necessity of refined modeling.

[1] The Federal Register notice 81466/ Vol. 80, No. 250 published on December 30, 2015, effective January 29, 2016, states "*EPA finds that the HGB ozone nonattainment area has attained the 1997 ozone standard and meets the requirements in 40 CFR 51.1118.for determination of attainment status for Houston-Galveston-Brazoria 1997 Ozone Nonattainment Area*"; however, EPA has not completed the re-designation of this area and the current designation for Brazoria County, "Severe" under the 1997 1-hour Ozone standard, is still applicable as stated in 40 Code of Federal Regulations 81.344.

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The U.S. Court of Appeals vacated and remanded 40 Code of Federal Regulations (CFR) 51.166(k)(2) and 52.21(k)(2) based on Environmental Protection Agency's (EPA's) lack of authority to exempt sources from the requirements of the Federal Clean Air Act (FCAA) when it established SILs for $PM_{2.5}$. Based on recent U.S. Court decision regarding $PM_{2.5}$ SILs and based on Guidance for $PM_{2.5}$ Permit Modeling (EPA, May 20 2014), the permit application should not rely on SILs alone to avoid a cumulative impacts analysis for the proposed project. Rather, they should take into account background pollution values to ensure that a planned facility's emissions do not cause or contribute to a NAAQS violation. Therefore, according to the EPA's guidance, "If the preconstruction monitoring data shows that the difference between the $PM_{2.5}$ NAAQS and the monitored $PM_{2.5}$ background concentrations in the area is greater than the EPA's $PM_{2.5}$ SIL value, then the EPA believes it would be sufficient in most cases for permitting authorities to conclude that a proposed source with a $PM_{2.5}$ impact below the $PM_{2.5}$ SIL will not cause or contribute to a violation of the $PM_{2.5}$ NAAQS and to forgo a more comprehensive cumulative modeling analysis". EPA "believes that sources with final PSD permits are not likely to be affected by the Court's decision, since they were issued in accordance with the rule in effect at that time". Using this methodology, justification of the continued use of the $PM_{2.5}$ SILs will be provided in the air quality analysis.

TABLE 2-1. CRITERIA POLLUTANT THRESHOLDS

Pollutant	Averaging Period	Significant Impact Level ($\mu g/m^3$)	Significant Monitoring Concentrations ($\mu g/m^3$)
CO	8-hour	500	--
	1-hour	2,000	575
NO_2	Annual	1	14
	1-hour	7.5	--
PM_{10}	24-hour	5	10
$PM_{2.5}$	Annual	0.3	--
	24-hour	1.2	--
SO_2	Annual	1	N/A[2]
	24-hour	5	
	3-hour	25	
	1-hour	7.8	

[2] Proposed SO_2 emissions increases do not exceed the major source thresholds; therefore, a PSD NAAQS review is not required for this pollutant. A minor NSR NAAQS review will be performed for SO_2.

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2.2 PSD Review

The emissions of NO_2, CO, PM_{10}, and $PM_{2.5}$ from project only sources are greater than the major source thresholds; therefore, a PSD review will be conducted for these pollutants.

2.2.1 PSD Air Quality Analysis

A PSD NAAQS analysis will be performed to evaluate impacts from the following compounds as the proposed emissions for these pollutants are greater than the major source thresholds: NO_2, CO, PM_{10}, and $PM_{2.5}$. Predicted preliminary impact concentrations of these pollutants will be compared to their respective SILs. For any pollutant with a predicted impact greater than the SIL, a Cumulative PSD NAAQS evaluation will be required. Procedures outlined in TCEQ's *Air Quality Modeling Guidelines,* (APDG 6232v2, Revised 4/2015) will be used as a guide.

2.2.2 PSD Increment Analysis

A PSD increment analysis will be performed to evaluate the following compounds: NO_2, PM_{10}, and $PM_{2.5}$. Maximum predicted impacts from the cumulative PSD NAAQS analysis (excluding the background concentration) will be compared to the applicable increment calculated using the methodology in TCEQ's *Air Quality Modeling Guidelines,* (APDG 6232v2, Revised 4/2015) and EPA's Appendix W to Part 51 - *Guideline on Air Quality Models*.

2.2.3 Pre-application Analysis

A pre-application analysis will be performed on the existing ambient air quality for the following criteria pollutants requiring PSD review: NO_2, CO, and PM_{10}. Maximum predicted impacts from the preliminary impact determination will be compared to the applicable SMCs included to determine if an analysis of the ambient air quality will be required per methodology in TCEQ's *Air Quality Modeling Guidelines,* (APDG 6232v2, Revised 4/2015).

2.2.4 Additional Impacts Analysis

An Additional Impacts Analysis will be performed to show that additional impacts from a new major source or major modification of an existing source will not impair visibility, soils, and vegetation as a result of the emissions associated with the source or modification.

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2.2.5 Class I area Analysis

Any new major source or major modification located within 100 kilometer (km) of a Class I area is required to perform an impacts analysis for the affected Class I areas; however, an analysis may also be required for sources located more than 100 km from a Class I area if there is concern that the project emissions could cause an adverse impact on a Class area (see TCEQ APDG 6232v2, Revised 04/15 Air Quality Modeling Guidelines, Page 28). The nearest Class I areas and their distance from the facilities are – Caney Creek Wilderness, 600 km; Breton National Wildlife Preserve, 630 km; Big Bend National Park, 760 km; and Guadalupe Mountains National Park, 950 km. None of the Class I areas are within 600 km of the facility, which is significantly greater than the 100 km threshold and the emissions from the proposed project are not expected to cause any adverse impacts on this Class I area. Therefore, a Class I area analysis is not proposed to be included in the modeling analysis.

2.2.6 Ozone Impacts Analysis

The proposed net emissions increase of VOCs from the OPUS project are less than 100 tpy; however, the site is located in Brazoria County which is designated "nonattainment" under the 1997 ozone standard and classified as "Severe."[3] The project VOC emissions are greater than 5 tpy; therefore, the project is subject to Nonattainment New Source Review (NNSR), and an ozone impact analysis is not required as a part of this permitting action.

2.3 Minor NSR NAAQS Analysis

The proposed emissions from the project do not trigger PSD review for SO_2. The predicted SO_2 impacts from the project sources will be compared to the applicable SILs to determine if a cumulative NAAQS analysis is required. If the predicted SO_2 impacts are greater than the SILs then a cumulative NAAQS analysis will be required.

2.4 State Property Line Analysis

A State Property Line Analysis will be performed for SO_2 (1-hour) to demonstrate compliance with the State standards for net ground-level concentrations of this pollutant. The maximum

[3]The Federal Register notice 81466/ Vol. 80, No. 250 published on December 30, 2015, effective January 29, 2016, states "*EPA finds that the HGB ozone nonattainment area has attained the 1997 ozone standard and meets the requirements in 40 CFR 51.1118.for determination of attainment status for Houston-Galveston-Brazoria 1997 Ozone Nonattainment Area*"; however, EPA has not completed the re-designation of this area and the current designation for Brazoria County, "Severe" under the 1997 1-hour Ozone standard, is still applicable as stated in 40 Code of Federal Regulations 81.344.

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ground-level concentration from project-level emissions will be compared to the De Minimis level of 2% of the State Property Line standards. If the predicted SO2 impact is greater than 2% of the standard, a sitewide analysis will be required.

2.5 Secondary $PM_{2.5}$ Formation Analysis

Per TCEQ's Air Quality Modeling Guidance (APDG 6232v2), the complex chemistry of secondary formation of $PM_{2.5}$ is well documented and entities proposing new or increased emissions of $PM_{2.5}$ should provide an evaluate impacts of secondary formation $PM_{2.5}$ to demonstrate that the proposed emissions are not expected to cause an exceedance of the NAAQS. NO_2 and SO_2 are considered as $PM_{2.5}$ precursors; therefore, the Significant Emission Rate (SER) for NO_2 and SO_2, which is defined as 40 tpy for both under 40 Code of Federal Regulations (CFR) §52.21 (b)(23)(i) is used to determine the need for a review of the secondary $PM_{2.5}$ formation.

The total proposed increases in emissions of $PM_{2.5}$, NO_2, and of SO_2 are consistent with the requirements of assessment case 3 in Table III-1 of the United States Environmental Protection Agency's (EPA's) "Guidance for $PM_{2.5}$ Modeling" dated May 20, 2014; therefore, BASF is proposing to conduct a qualitative analysis of the secondary $PM_{2.5}$ formation which is consistent with EPA's guidance.

2.6 Health Effects Review Analysis

The Modeling and Effects Review Applicability (MERA) [APDG 5874v3, Revised 7/2009] guidance will be used to evaluate impact concentrations of proposed pollutants.

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3.0 Plot Plan

A plot plan that illustrates both (1) the property boundary for the BASF Freeport site and (2) the locations of the modeled sources which emit the evaluated contaminants from the project will be included in the modeling report. A copy of the building parameters for on-site structures which have the potential to contribute to downwash will also be included in the modeling report. For informational purposes, a rough draft plot plan has been included for reference.

The exact location of point sources and buildings are subject to change during the detailed plant engineering phase. However, we have made estimates using the current plot plan and design information available. Locations of the emission points are not expected to vary significantly from these estimates.

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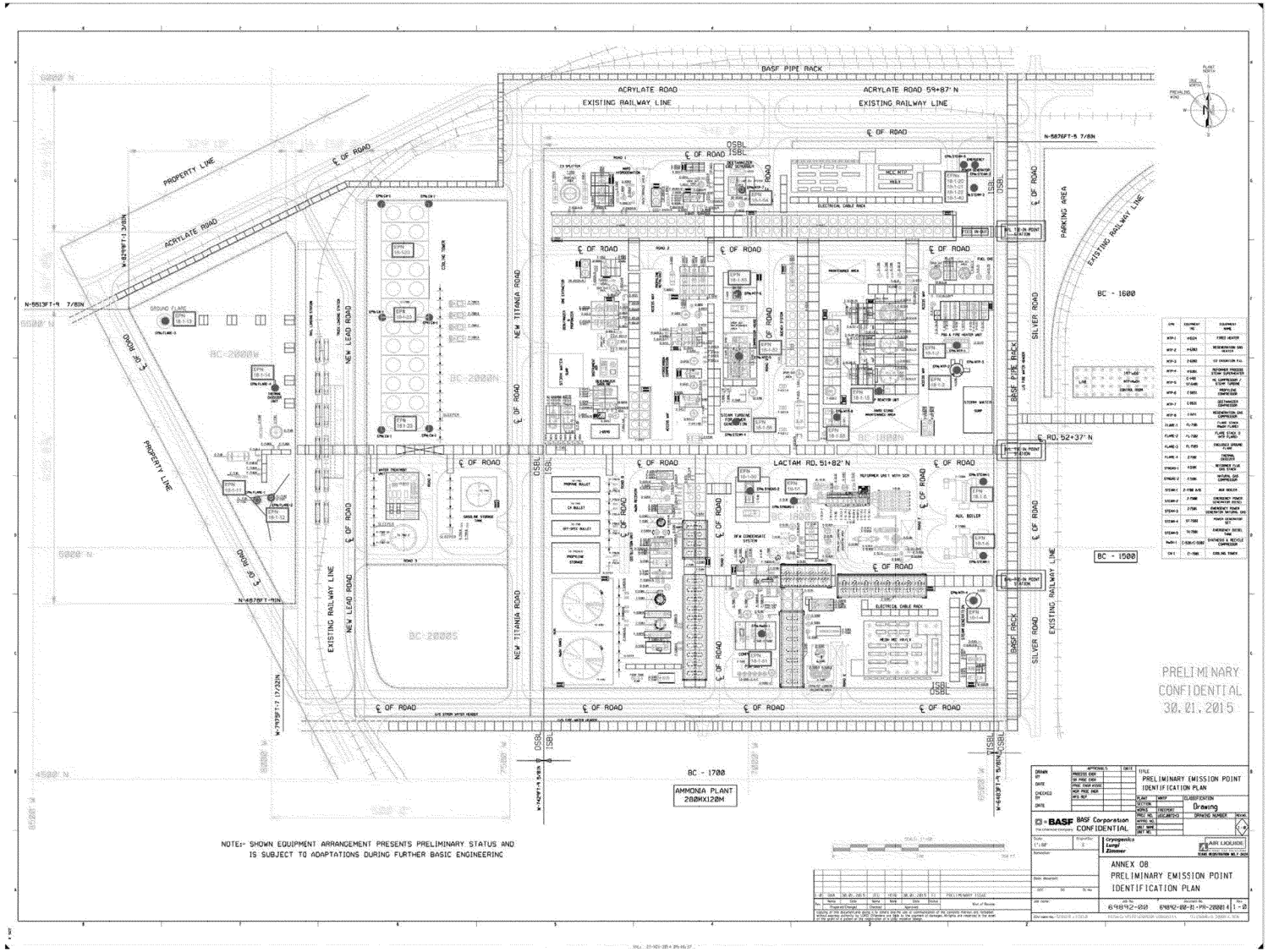

FIGURE 3-1. REFERENCE PLOT PLAN

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4.0 Area Maps

The area map (Figure 4-1. Area Map) depicts an aerial view of the BASF Freeport site.

4.1 Area Map Description

The existing BASF Freeport site is classified under the Standard Industrial Classification (SIC) number 2869, as a Chemical Manufacturing facility. The site is located in Freeport, TX, which is approximately 80 km south of Houston. Within the BASF property fence line, there are no interior public roads or public access points. An area map has been rendered to depict a regional aerial view of surrounding areas within 3,000 feet and 3 kilometer (km) of plant.

4.2 Topography

The BASF Freeport facility is located in Brazoria County. The analysis used terrain heights obtained from Multi-Resolution Land Characteristics Consortium (MRLC) National Land Cover Database (NLCD) National Elevation Datasets (NED) files. For the BASF Freeport facility, NED files were obtained from the query generated by BEEST based on terrain limits at the following website: http://www.mrlc.gov/viewerjs. AERMAP (AMS/EPA Regulatory Model Terrain Pre-processor) was used to process terrain data from the NED files.

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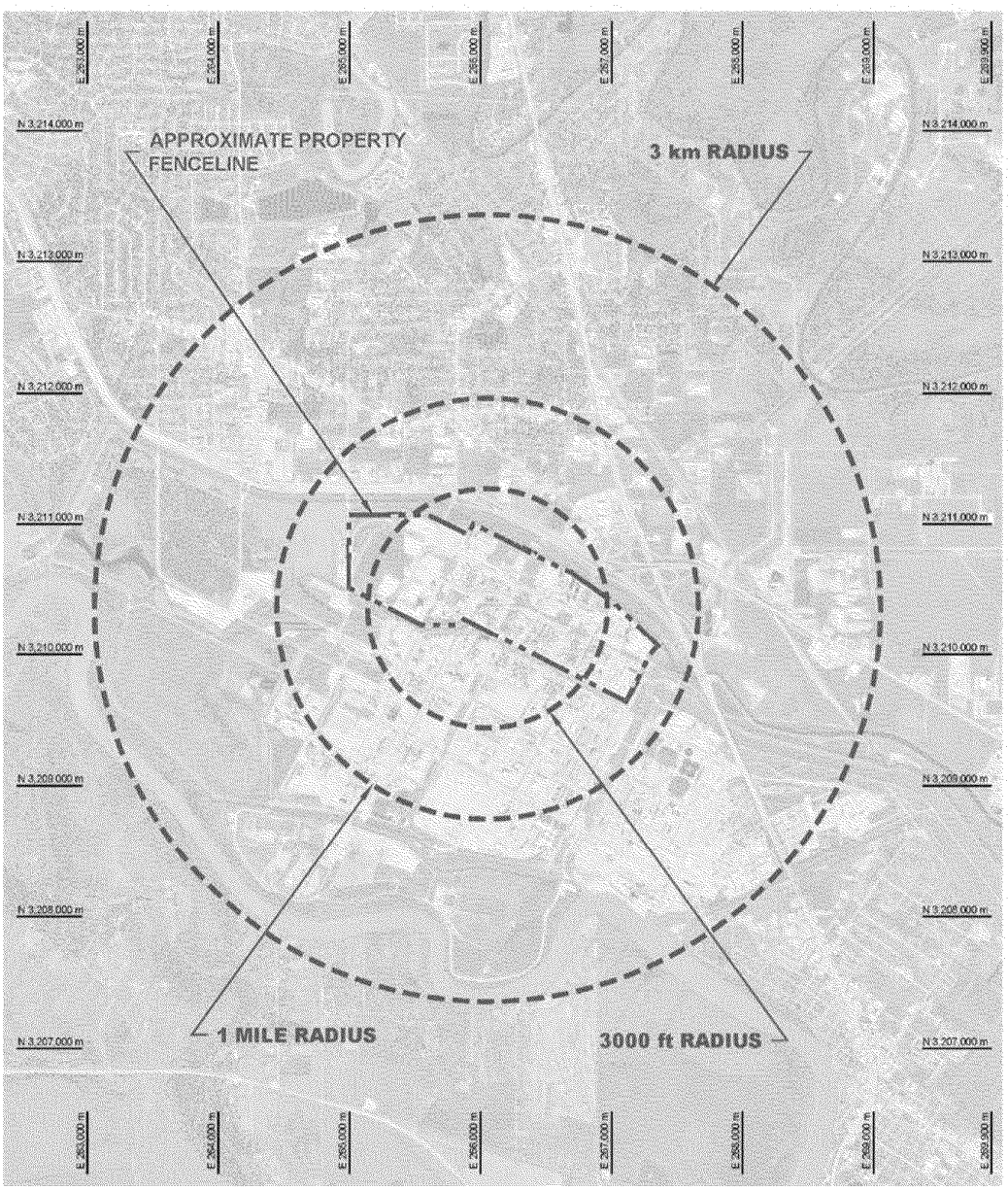

FIGURE 4-1. AREA MAP

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5.0 Air Quality Monitoring Data

5.1 Pre-construction Monitoring

A pre-application analysis will be performed to evaluate the need for pre-construction monitoring. Emissions from the proposed project trigger PSD review for CO, NO_2, PM_{10} and $PM_{2.5}$. The predicted impacts for these pollutants from the project sources are compared to the EPA De Minimis concentrations listed in the Table 5-1 below to evaluate whether pre-construction monitoring is required.

TABLE 5-1. SIGNIFICANT MONITORING CONCENTRATIONS THRESHOLDS

Pollutant	Averaging Period	SMC (µg/m3)
CO	8-hour	575
NO_2	Annual	14
PM_{10}	24-hour	10
$PM_{2.5}$	24-hour	[4]

Based on preliminary impact determinations, the predicted concentrations of CO, NO_2 and PM_{10} are less than the SMCs; therefore, pre-construction monitoring will not be required for these pollutants. Since the U.S. Court of Appeals has vacated the SMC for $PM_{2.5}$, an analysis of the existing ambient $PM_{2.5}$ concentration in the area surrounding the plant will be required. BASF is proposing to use the data from the Houston Deer Park #2 CAMS 235 [EPA ID 48-201-1039] monitor to satisfy the pre-construction monitoring requirements. Refer to section 5.2 for justification for using the Houston Deer Park #2 monitor.

5.2 NAAQS Analysis Background Concentration

Emissions from the proposed project trigger PSD review for CO, NO_2, PM_{10} and $PM_{2.5}$. A representative monitoring station will be selected to obtain background air concentration data for NO_2, PM_{10} and $PM_{2.5}$for which predicted preliminary impacts are expected to be greater than the SILs. The justification for the monitor selection will include an analysis of the area surrounding the project site relative to the monitor site with respect to nearby sources of emission

[4] On January 22, 2013, the U.S. Court of Appeals for the District of Columbia vacated 40 CFR 51.166(i)(5)(i)(c)and 52.21(i)(5)(i)(c) based on EPA's lack of authority to exempt the preconstruction monitoring requirements through the Significant Monitoring Concentration (SMC) established for PM2.5 (Sierra Club v. EPA)

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(comparison between emission rates within certain radius (i.e. 10 km) from the monitoring station and emission rates within the same radius from the project), monitoring objectives, and type of location.

PM_{10} Background Monitoring Data: BASF Freeport site is located in Freeport, Brazoria County, Texas. Since there is no valid PM_{10} monitor available in Brazoria County, a representative monitoring station was evaluated in a nearby county, which has similar emission rates within certain radius of distance, similar county-wide population, and similar types of land use to project area. The closest PM_{10} monitor from the BASF Freeport site is located in Galveston County, but it is surrounded by ocean and no industrial facilities are located nearby. This monitor might be useful in the context of a site-wide cumulative NAAQS analysis (because it is unaffected by nearby stationary sources).

The closest county with emissions and industry similar to the Brazoria County is Harris County. The only PM_{10} monitor in Houston-Galveston-Brazoria area is Deer Park #2 CAMS 235 [EPA ID 48-201-1039] located at 4514 1/2 Durant St, Deer Park, Texas. Per TCEQs' Air Quality Modeling Guidelines (APDG 6232v2, revised 04/15), emissions for sources that fall within 10 km radius of the monitor site and within 10 km radius of the BASF Freeport Facility were compared to justify the representative background monitor.

40 CFR Appendix K to Part 50, Interpretation of the National Ambient Air Quality Standards for Particulate Matter, specifies that, for 24-hour PM_{10} standard "a minimum of 75 percent of the scheduled PM_{10} samples per quarter are required" and, "In all cases, 3 years of representative monitoring data that meet the 75 percent criterion of the previous paragraph should be utilized, if available, and would suffice."

TABLE 5-2. COMPLETENESS OF DAILY PM_{10} AVERAGED MONITORING VALUES (≥75%)

Monitor [1]	Monitor Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual
Deer Park #2	2013	97%	88%	97%	97%	95%
	2014	96%	91%	100%	96%	96%
	2015	99%	95%	86%	95%	93%

The Deer Park #2 monitor meets the 75% completeness criteria for most recent 3 years of data per 40 CFR Appendix K to Part 50. The emission inventory data was obtained from the "2013statesum.xlsx" in the section of "Detailed Data from the Point Source Emissions

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Inventory" located at the following TCEQ website: http://www.tceq.texas.gov/airquality/point-source-ei/psei.html.

The "2013statesum Monitor Data - SAP.xlsx" (included with the email accompanying this protocol) shows the calculations and supporting documentations for the total $PM_{2.5}$ emissions reported in Table 5-3. This file shows how the "2013statesum.xlsx" was used to evaluate the total emission rates within 10 km radius of the monitor site and within 10 km radius of the BASF Freeport facility. The Tab "STATE SUM" represents original information of "2013statesum.xlsx" obtained from TCEQ website. Then, this information was sorted by Harris County in "Harris" tab and sorted by Brazoria County in "Brazoria" tab. The coordinate information for each RN was obtained from TCEQ. Using this spreadsheet, the distance was generated for BASF Freeport Facility and the Deer Park 2 monitoring station. The emissions for sources that fall within 10 km radius of the BASF Freeport Facility are shown in the tab "BASF Freeport", and the emissions for sources that fall within 10 km radius of Deer Park #2 monitor are shown in the tab "Deer Park #2" and are summarized in Table 5-3 below.
The emissions within the 10 km radius from the Deer Park #2 monitor are higher (more conservative) than the emissions within the 10 km radius from the BASF Freeport facility.

The Deer Park #2 monitor was selected as a representative monitor for the following reasons:

- The emissions from the area surrounding the monitor are significantly higher than the site;
- The area surrounding the monitor has similar land; and
- The population and county-wide emissions for the county where the monitor is located are significantly higher than the county where the site is located; and

Additionally, the monitor background values are conservative since they will be used in addition to off-property sources from the emissions inventory.

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TABLE 5-3. DESCRIPTION OF AMBIENT MONITOR OF PM_{10}

Monitor[5]	County	PM_{10} Monitoring Site ID	Distance from Project (km)	Land Type	Total PM_{10} Emissions within 10km Radius[6] (tpy)	County-wide PM_{10} Emissions[7] (tpy)	County-wide Population[8]
BASF Freeport Plant	Brazoria	-	-	Industrial/ Residential	956	42,920	346,312
Deer Park 2	Harris	CAMS 235 [EPA ID 48-201-1039]	79.80	Industrial/ Residential	1,509	108,627	4,538,028

[5] Monitors were selected based on the percent of completeness data.
[6] PM_{10} emission data by facility was obtained from "2013statesum.xlsx (281K)"file located at the following TCEQ website: http://www.tceq.texas.gov/airquality/point-source-ei/psei.html. The 10 km of radius was selected to define the area of influence to each monitoring station based on average distance of monitors in Harris County.
[7] County-wide emission data for Brazoria County (NEI 2011 v2 GPR) and for Harris County (NEI 2011 v2 GPR) was obtained from the EPA's website.
[8] County-wide population data for 2015 was obtained from U.S. Census Bureau: http://quickfacts.census.gov/qfd/states/48000.html

Ambient hourly PM_{10} monitoring data at Deer Park #2 CAMS 235 [EPA ID 48-201-1039] for 2012-2014 was obtained from the TCEQ's website: http://www.tceq.state.tx.us/cgi-bin/compliance/monops/yearly_summary.pl. A 24-hour PM_{10} background concentration was estimated based on the 3-year H2H daily average concentration from the representative monitor. Table 5-5 shows the H2H monitored concentration for 24-hour averaging time encompassing 2013, 2014, and 2015 data for Deer Park #2 monitoring site.

TABLE 5-4. PM_{10} MONITORED CONCENTRATION

Monitoring Site	3-year H2H 24-hour Average Monitored PM_{10} Concentration ($\mu g/m^3$)
Deer Park #2 [9]	88.71

$PM_{2.5}$ Background Monitoring Data: As discussed in the analysis above, the Deer Park #2 CAMS 235 [EPA ID 48-201-1039] was selected as a representative PM_{10} monitor for BASF based on total emissions within 10km radius from the monitor and from the project location. Similarly, $PM_{2.5}$ emissions for Seabrook Friendship monitor, Deer Park #2 monitor and the Houston Aldine monitor were compared; the results are included in Table 5-4. As seen in Table 5-4, the $PM_{2.5}$ emissions within the 10 km radius from the Deer Park #2 monitor are higher (more conservative) than the emissions within the 10 km radius from the BASF Freeport facility; therefore, the Deer Park #2 monitor was selected as a representative monitor. Additionally, the monitor background values are conservative since they will be used in addition to off-property sources from the emissions inventory.

40 CFR Appendix N to Part 50, Interpretation of the National Ambient Air Quality Standards for $PM_{2.5}$, specifies that, for 24-hour $PM_{2.5}$ standard "Three years of valid annual $PM_{2.5}$ 98th percentile mass concentrations are required to produce a valid 24-hour $PM_{2.5}$ NAAQS DV. A year meets data completeness requirements when quarterly data capture rates for all four quarters are at least 75 percent" and for annual $PM_{2.5}$ standard "Three years of valid annual means are required to produce a valid annual $PM_{2.5}$ NAAQS DV. A year meets data completeness requirements when quarterly data capture rates for all four quarters are at least 75 percent."

[9] Monitoring Site selected when using a 10 km area of influence.

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TABLE 5-5 DESCRIPTION OF AMBIENT MONITOR OF $PM_{2.5}$

Monitor[10]	County	$PM_{2.5}$ Monitoring Site ID	Distance from Project (km)	Land Type	Total $PM_{2.5}$ Emissions within 10km[611] Radius (tpy)	County-wide $PM_{2.5}$ Emissions[12] (tpy)	County-wide Population[13]
BASF Freeport Plant	Brazoria	-	-	Industrial/ Residential	614	10,157	346,312
Seabrook Friendship Park	Harris	CAMS 45 [EPA ID 48-201-1050]	75	Industrial/ Suburban	344	21,987	4,538,028
Deer Park 2	Harris	CAMS 235 [EPA ID 48-201-1039]	79.80	Industrial/ Residential	1,295	21,987	4,538,028
Houston Aldine	Harris	CAMS 8 [EPA ID 48-201-0024]	101.33	Residential	48	21,987	4,538,028

[10] Monitors were selected based on the percent of completeness data.
[11] $PM_{2.5}$ emission data by facility was obtained from "2013statesum.xlsx(281K)"file located at the following TCEQ website: http://www.tceq.texas.gov/airquality/point-source-ei/psei.html. The 10 km of radius was selected to define the area of influence to each monitoring station based on average distance of monitors in Harris County.
[12] County-wide emission data for Brazoria County (NEI 2011 v2 GPR) and for Harris County (NEI 2011 v2 GPR) was obtained from the EPA's website.
[13] County-wide population data for 2015 was obtained from U.S. Census Bureau: http://quickfacts.census.gov/qfd/states/48000.html

TABLE 5-6. COMPLETENESS OF DAILY $PM_{2.5}$ AVERAGED MONITORING VALUES (≥75%)

Monitor [1]	Monitor Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual
Deer Park #2	2013	100%	90%	95%	96%	95%
	2014	91%	100%	100%	98%	97%
	2015	100%	89%	91%	98%	95%

The Deer Park #2 monitor meets the 75% completeness criteria for most recent 3 years of data per 40 CFR Appendix N to Part 50.

Ambient hourly $PM_{2.5}$ monitoring data at Deer Park #2 CAMS 235 [EPA ID 48-201-1039] for 2013-2015 was obtained from the TCEQ's website: http://www.tceq.state.tx.us/cgi-bin/compliance/monops/yearly_summary.pl. 24-hour and annual $PM_{2.5}$ background concentrations were estimated based on the 3-year average of the 98th percentile daily average concentration from the representative monitor. Table 5-7 shows the 3-year average of 98th percentile of daily average background concentration for Deer Park #2 monitoring site as well as the 3-year average of annual mean background concentration.

TABLE 5-7. $PM_{2.5}$ MONITORED CONCENTRATION

Monitoring Site	Monitored Year	98th Percentile of 24-hour Average $PM_{2.5}$ Monitored Concentration (µg/m³) [14]	3-year Average 98th Percentile 24-hour Average Monitored $PM_{2.5}$ Concentration (µg/m³)	Annual Mean $PM_{2.5}$ Monitored Concentration (µg/m³) [15]	3-year Average Annual Mean $PM_{2.5}$ Monitored Concentration (µg/m³)
Deer Park #2 [16]	2013	19.87	18.43	9.45	8.77
	2014	18.21		8.99	
	2015	18.65		8.55	

<u>NO_2 Background Monitoring Data:</u> The BASF Freeport site is located in Brazoria County. Brazoria County has 3 NO_2 monitor stations: Danciger CAMS 756 [EPA ID 480390618], Lake Jackson CAMS 1016 [EPA ID 480391016], and Mustang Bayou CAMS 757 [EPA ID 480390619]. Both Danciger and Mustang Bayou stations are located at a distance of 25 miles from the BASF site and are located in an area primarily classified rural. The CAMS 1016 [EPA ID 480391016] monitor is located less than 10 km from the BASF Freeport site and is the nearest monitoring station for NO_2 and is located downwind of the major contributing source in the area.

[14] For 24-hour PM2.5, the background represents the 98th percentile of daily average ambient concentration per year.
[15] For annual PM2.5, the background concentration represents the average value of annual mean concentration per year.
[16] Monitoring Site selected when using a 10 km area of influence.

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Due to the proximity of the Lake Jackson monitor in comparison to the other monitors and the area surrounding the monitors, BASF is proposing to evaluate the Lake Jackson monitor for NO_2 background monitor data. Data from stations further away are not likely to be more representative than the CAMS 1016 site for NO_2.

40 CFR Appendix S to Part 50, Interpretation of the National Ambient Air Quality Standards for Oxides of Nitrogen (Nitrogen Dioxide), specifies that, "An annual primary standard design value is valid when at least 75 percent of the hours in the year are reported." and for 1-hour NO_2 standard, "An NO_2 1-hour primary standard design value is valid if it encompasses three consecutive calendar years of complete data. A year meets data completeness requirements when all 4 quarters are complete. A quarter is complete when at least 75 percent of the sampling days for each quarter have complete data. A sampling day has complete data if 75 percent of the hourly concentration values, including State-flagged data affected by exceptional events which have been approved for exclusion by the Administrator, are reported."

TABLE 5-8. COMPLETENESS OF DAILY NO_2 AVERAGED MONITORING VALUES (≥75%)

Monitor [1]	Monitor Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual
Lake Jackson	2013	98%	100%	99%	93%	98%
	2014	98%	99%	96%	100%	98%
	2015	99%	97%	88%	71%	88%

The Lake Jackson monitor meets the 75% completeness criteria for most recent 3 years of data per 40 CFR Appendix S to Part 50 for both 1-hour and annual periods except for the fourth quarter of 2015. A substitution test was performed for the fourth quarter of 2015 per 40 CFR Part 50 Appendix S 3.2(c)(ii)(B). The total number of number of days with reported concentrations in the fourth quarter of 2013, 2014 and 2015 is 270 days, which is greater than the threshold of at least 200 days across the three matching quarter of the three years; therefore, substitution is permitted per 40 CFR Part 50 Appendix S 3.2(c)(ii)(A). After substituting the highest non-excluded reported daily maximum 1-hour value for the fourth quarter of 2015 for as much of the missing daily data in this "deficient" quarter as is needed to make them 100 percent complete, the recalculated 3-year 1-hour standard "test design value" is equal to 24 parts per billion (ppb). This value is below the NAAQS standard (100 ppb). Also, the recalculated annual standard is 3 ppb, which is below the NAAQS standard (53 ppb) therefore, per 40 CFR Part 50 Appendix S 3.2(c)(ii)(B), the 1-hour and annual primary standard design value passes the diagnostic test and is valid. BASF proposes CAMS 1016 monitor for NO_2 background concentration determination.

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Ambient hourly and annual NO_2 monitoring data at Lake Jackson CAMS 1016 [EPA ID 480391016] for 2013-2015 was obtained from the TCEQ's website: http://www.tceq.state.tx.us/cgi-bin/compliance/monops/yearly_summary.pl. 1-hour NO_2 background concentration was estimated based on the 98th percentile daily maximum concentration averaged over 3 years (2013-2015) from the representative monitor. The annual NO_2 background concentration was estimated based on annual mean of 2014 1-hour average concentration values at the representative monitor. Table 5-8 shows the monitored concentrations at the Lake Jackson monitoring site.

TABLE 5-9. NO_2 MONITORED CONCENTRATION

Monitoring Site	3-year Average 98th Percentile 1-hour Daily Maximum Concentration (ppb)	Annual Mean 1-hour Concentration (ppb)	3-year Average 98th Percentile 1-hour Daily Maximum Concentration (µg/m³)	Annual Mean 1-hour Concentration (µg/m³)
Lake Jackson	20	2	37.4	4.23

The monitor background values are conservative since they will be used in addition to off-property sources from the emissions inventory.

CO Background Monitoring Data: CO is anticipated to be below its representative SIL and not require additional review under NAAQS analysis. A background monitoring station for CO is not being proposed at this time. BASF will propose a CO monitor if it is determined later that a cumulative NAAQS analysis is required.

SO_2 Background Monitoring Data: SO_2 is anticipated to be below its representative SIL and not require additional review under NAAQS analysis. A background monitoring station for SO_2 is not being proposed at this time. BASF will propose a SO_2 monitor if it is determined later that a cumulative NAAQS analysis is required.

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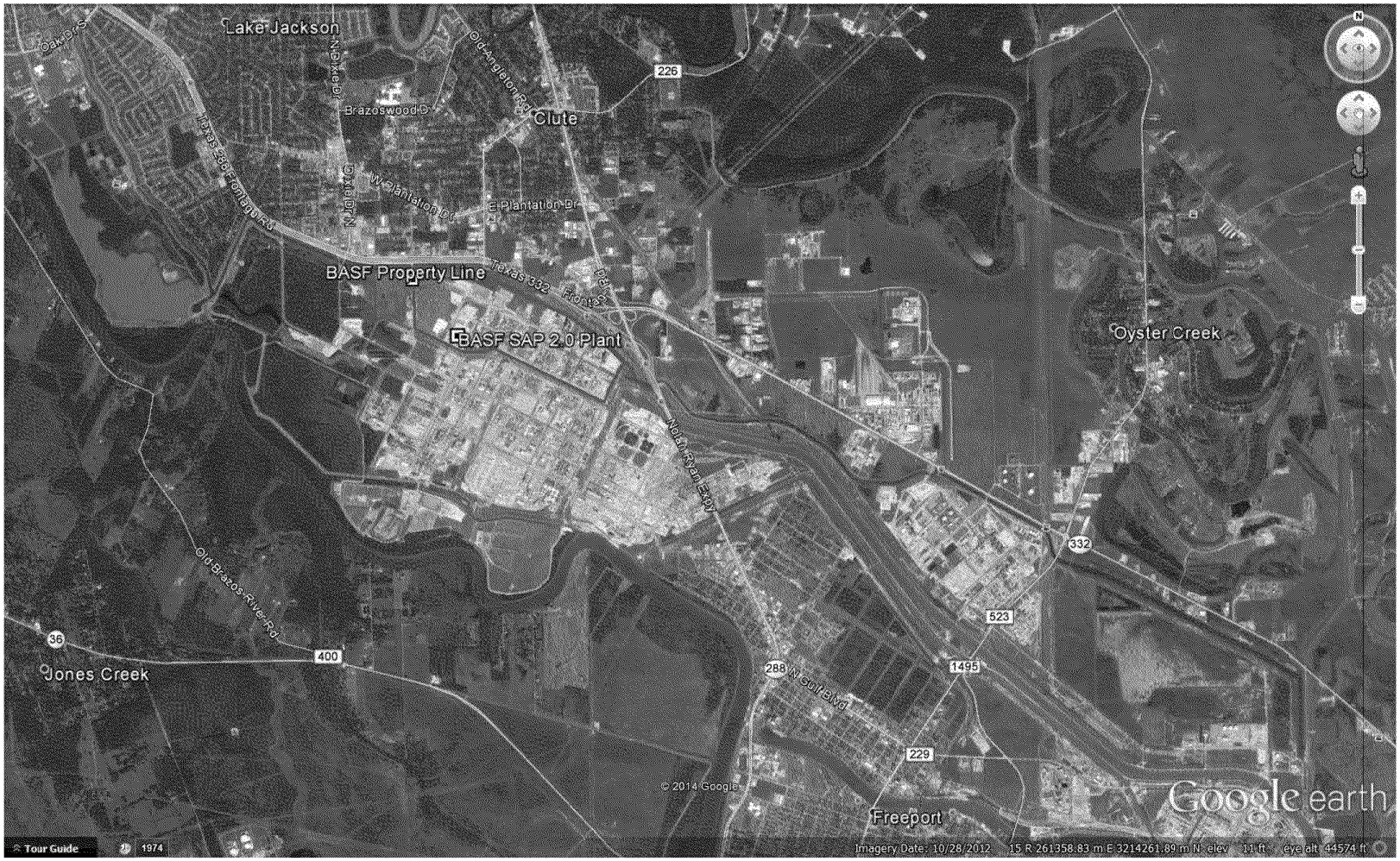

FIGURE 5-1. AERIAL MAP OF BASF FREEPORT IN BRAZORIA COUNTY

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FIGURE 5-2. AERIAL MAP OF $PM_{2.5}$ BACKGROUND MONITORING STATION (CAMS 45 [EPA ID 48-201-1050]) AT SEABROOK FRIENDSHIP PARK IN HARRIS COUNTY (INDUSTRIAL/RESIDENTIAL)

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FIGURE 5-3. AERIAL MAP OF PM_{10} AND $PM_{2.5}$ BACKGROUND MONITORING STATION (CAMS 235 [EPA ID 48-201-1039]) AT DEER PARK 2 IN HARRIS COUNTY (INDUSTRIAL/RESIDENTIAL)

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FIGURE 5-4. AERIAL MAP OF $PM_{2.5}$ BACKGROUND MONITORING STATION (CAMS 8 [EPA ID 48-201-0024]) AT HOUSTON ALDINE IN HARRIS COUNTY (RESIDENTIAL)

FIGURE 5-5. AERIAL MAP OF NO_2 BACKGROUND MONITORING STATION IN LAKE JACKSON (CAMS 1016 [EPA ID 480391016] AND BASF FREEPORT SITE IN BRAZORIA COUNTY

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5.3 $PM_{2.5}$ SIL Justification for NAAQS Analysis

Per January 22, 2013 court decision, any permitting authority wishing to use a particular SIL value as a screening tool in a significant impact analysis should determine whether a substantial portion of the NAAQS has already been consumed. Per EPA's Guidance for $PM_{2.5}$ Permit Modeling (EPA, May 20, 2014), if the difference between the NAAQS and the measured $PM_{2.5}$ background in the area is greater than the applicable SIL value, then the EPA believes it would be sufficient in most cases for permitting authorities to conclude that a source with an impact below that SIL value will not cause a new NAAQS violation. As seen in Table 5-10, because the difference between the NAAQS and the measured background $PM_{2.5}$ concentration for the selected monitoring site is greater than the applicable SIL, BASF believes there is sufficient justification for using the SIL value.

TABLE 5-10. $PM_{2.5}$ BACKGROUND CONCENTRATION FROM DEER PARK #2 MONITOR

Compound	Avg. Period[17]	Background ($\mu g/m^3$)[18]	NAAQS ($\mu g/m^3$)[19]	Difference Between Background and NAAQS ($\mu g/m^3$)	SIL ($\mu g/m^3$)[20]	Difference Greater than SIL?
$PM_{2.5}$	24-hour	20.71	35	14.29	1.2	YES
	Annual	9.61	12	3.39	0.3	YES

5.4 $PM_{2.5}$ SIL Justification for Increment Analysis

Per January 22, 2013 court decision, any permitting authority wishing to use a particular SIL value as a screening tool in a significant impact analysis should determine whether a substantial portion of the NAAQS has already been consumed. The procedure specified in TCEQ's Modeling Guidance (APDG 6232v2, Appendix A, pg. 35 and 36) to justify the use of significant impact levels was used to justify the use of $PM_{2.5}$ SIL. The major source baseline date for $PM_{2.5}$ is October 20, 2010.

[17] For 24-hour PM2.5, the background represents the 3-year average value of 98th percentile ambient concentration. For Annual PM2.5, the background represents the 3-year average value of annual mean concentration.
[18] Background concentration of most recent and complete year of data (2013-2015).
[19] National Ambient Air Quality Standard (NAAQS) were obtained from EPA's website: http://www.epa.gov/air/criteria.html.
[20] Significant Impact Level (SIL) thresholds for $PM_{2.5}$ were obtained from the Interim $PM_{2.5}$ NAAQS Implementation Guidance.

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TABLE 5-11. 5-YEAR $PM_{2.5}$ BACKGROUND CONCENTRATION FROM DEER PARK #2 MONITOR

Compound	Avg. Period[21]	2011 (µg/m³)	2012 (µg/m³)	2013 (µg/m³)	2014 (µg/m³)	2015 (µg/m³)
$PM_{2.5}$	24-hour	23.70	23.44	27.43	28.40	24.38
	Annual	9.96	9.55	9.45	8.99	8.55

TABLE 5-12. $PM_{2.5}$ BACKGROUND CONCENTRATION JUSTIFICATION

Compound	Avg. Period	Difference in background (2015 – 2011)[22] (A) (µg/m³)	PSD Class II Increment (B) (µg/m³)	Difference (B-A=C) (µg/m³)	SIL (µg/m³)	Difference is greater than or equal to SIL?
$PM_{2.5}$	24-hour	0.68	9	8.32	1.2	YES
	Annual	-1.40	4	5.40	0.3	YES

Per TCEQ's Modeling Guidance (APDG 6232v2, Appendix A, page 36), "If the difference between the PSD increment and the difference in measured background concentrations is greater than or equal to the SIL, then it would be sufficient to conclude that a source with an impact less than the SIL would not cause or contribute to a violation of the PSD increment and forego a cumulative modeling analysis." As seen in Tables 5-11 and 5-12, the difference between the PSD increment and the ambient background concentrations for the time period between the most recent complete year and the major source baseline date is greater than the applicable SIL; BASF believes there is sufficient justification for using the SIL value.

[21] For 24-hour $PM_{2.5}$, the background represents the high, second high value of ambient concentration. For Annual PM2.5, the background represents annual average concentration.

[22] The monitor does not meet the completeness criteria for 2010. Since the major source baseline date was set in October 2010, the background value for 2011 is used for comparison.

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6.0 Modeling Emissions Inventory

6.1 On-property Sources

A detailed description of the project on-property sources of NO_2, CO, PM_{10}, $PM_{2.5}$ and SO_2 to be included in the air dispersion analysis is included in Section 7. The on-site non-project sources will also be included in the PSD NAAQS and increment analysis.

6.2 Off-property Sources

The current inventories of maximum allowable emission rates for industrial sources within the Radius of Impacts (ROI) plus 50 km will be obtained from the TCEQ Air Permits Allowable Data Base (APAD) for use in the NAAQS analyses. If the predicted impacts from the full NAAQS analysis are greater than the increment thresholds and a full PSD Increment Analysis is required, only increment consuming sources will be included in the modeling. The primary search option was selected for the inventory sources in both analyses. APAD retrievals were requested from the Information Resources Division of the TCEQ to obtain a current list of off-property inventory sources.

The determination of whether an emissions change at a given source consumes or expands Increment is based on the source definition (major or minor for PSD) and the time the change occurs in relation to baseline dates. The major source baseline date for NO_2 is February 8, 1988, for PM_{10} is January 6, 1975, and for $PM_{2.5}$ is October 20, 2010. Increases or decreases in actual emissions at major sources after the major source baseline date as a result of construction of a new source, a physical or operational change (i.e., modification) to an existing source, or shutdown of an existing source affect the available increment, and therefore, must be included in an increment analysis. Actual emission changes at minor sources only affect increment after the minor source baseline date, which is set at the time when the first complete PSD application is submitted in a county.

As a first step in the PSD increment analysis, the predicted high concentration obtained from the PSD full NAAQS analysis for each averaging period will be compared to the applicable increment. If this analysis results in predicted impacts greater than the increment then all off-property PSD Increment consuming emission sources within the ROI plus at least 50 km will be modeled with BASF sources to demonstrate compliance with Class II PSD Increment Standards. In order to obtain an off property inventory for $PM_{2.5}$ PSD Increment analysis, BASF will review the TCEQ IMS for all PSD major projects in the Area of Impact (AOI) that have been submitted

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between the dates of October 20, 2010 (major source baseline date) and December 20, 2011 (minor source baseline date). Additionally, new modified major and minor projects submitted between the minor source baseline date and the submission of the BASF Freeport permit application will also be reviewed. Per TCEQ's modeling guidance (APDG 6232), the minor source baseline dates have been established for NO_2, PM_{10}, and SO_2 for all areas of the state. For NO_2, the minor source baseline date was established as a single date for the entire state. For PM_{10} and SO_2, the minor source baseline dates were established by air quality control regions (AQCRs). The minor source baseline dates for $PM_{2.5}$ are established by county. The following minor source baseline dates were obtained from TCEQ: NO_2 – February 8, 1988, PM_{10} – August 3, 1978, and $PM_{2.5}$ (Brazoria County) – December 20, 2011. Sources and emissions of qualifying projects as noted above will be requested from TCEQ and included as Increment consuming sources in the PSD Increment analysis. The results of the $PM_{2.5}$ PSD Increment analyses will be reported as the highest modeled concentration, per EPA guidance.

As per TCEQ guidance, the APAD retrieval should be supplemented, as necessary, with recently-permitted sources. Thus, in an effort to ensure a more complete inventory is included in the Full Impacts Analysis, BASF will obtain from TCEQ a list of regulated entities within each pollutant's respective AOI and identify regulated entities that are absent from the APAD retrieval. BASF will then make a reasonable attempt to obtain and incorporate source parameter and emissions information into the off-property inventory. Proposed efforts include obtaining modeled parameters from air quality analyses recently submitted to TCEQ, reviewing the most-recent emissions inventory (EI) stack locations and parameters, and reviewing permit application files.

6.2.1 Supplementing Data from APAD

The data obtained from the APAD search contains information for sources permitted prior to 2000 (the last update to the database). BASF will supplement the data obtained from the APAD search with a permit search using TCEQ's Remote Document Server, the permit files from TCEQ's Central Records for permits issued within a 3-year period prior to the date of TCEQ's approval of this modeling protocol. Source parameters, emission rates and coordinates will be obtained from permit information and the TCEQ's State of Texas Air Reporting Systems (STARS) 2014 EI database.

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Per EPA guidance[23], considering all sources within a 50 km radius of the facility is likely to produce overly conservative results; therefore, EPA suggests that "the emphasis on determining which nearby sources to include in the modeling analysis should focus on the area within about 10 kilometers of the project location in most cases." The maximum ROI for the project is expected to be less than 10 km; therefore, predicted impacts of project sources are not expected to contribute significantly to the ground level concentrations at receptors beyond 10 km from the facility. BASF is proposing to refine the data obtained from the permit search and 2014 EI to include sources from all regulated entities within a radius of 10 km of the facility or ROI, whichever is greater. The facilities fitting this criterion will be considered in addition to all the sources obtained from the APAD retrieval

6.2.2 Data Corrections

In order to rectify inconsistencies and data gaps in the APAD retrieval, BASF will make a reasonable effort to verify the data from the APAD retrieval with the data obtained from searching TCEQ's permit database and most recent available EI. Additionally, per TCEQ's Air Quality Modeling Guidance, missing or invalid data will be handled as follows:

- Missing emission rates: Allowable emission rate represented as 0 lb/hr or 0 tpy in the APAD retrieval will be replaced with actual reported actual emission rate from 2013 EI;
- Missing or invalid source parameters:
    - For missing or invalid parameters for type "STACK" and "FLARE": Height = 1.0 meter, Temperature = 0 Kelvin, Velocity = 0.001 meters/second, Diameter = 0.001 meters; and
    - For missing or invalid parameters for type "FUGITIVE": Height = 1.0 meter, Length = 1.0 meter, Width = 1.0 meter, Degree = 0.
- Missing source coordinates: For sources with invalid or missing coordinates, the sources will be modeled approximately at the center of the facility.

[23] EPA, Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard, pg. 16, March 1, 2011.

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7.0 Modeling Emissions Sources

In this section, the types of emission sources used within this modeling project are described.

7.1 Source Parameters

Point, pseudo-point, flare and area sources will be used to evaluate health impacts for this modeling analysis. Following is a description of the proposed source characterization:

- Sources with vertical releases and exit velocities will be modeled as point sources;
- Tank emissions and sources with little or no vertical velocity (e.g. stacks with rain caps or horizontal releases) will be modeled as pseudo point sources as follows[24]:
    - Stack diameter: actual;
    - Exit temperature: ambient/actual; and
    - Exit Velocity: 0.001 m/s;
- Flares will be modeled per TCEQ guidance with the following parameters:
    - Exit gas velocity: 20 meters per second;
    - Exit gas temperature: 1273 Kelvin;
    - Height of release: use the actual height of the flare tip
    - Effective Diameter: Calculated using the equations specified in TCEQ's modeling guidance document (APDG 6232).
- Process area fugitives and other sources with ground-level emissions spread over an area will be modeled as area sources.

Non-default stack parameters will be derived from vendor information, and/or process knowledge.

7.1.1 Stack Parameter Justification

In general, process area fugitives will be represented with the dimensions specific to the process area and are representative of the emissions that will be released concurrently in a 1-hour period. Two process areas have been represented as FUGAREA1 and FUGAREA2 modeling Source IDs. FUGAREA1 and FUGAREA2 each correspond to fugitive emissions areas for the "methanol section" and "MTP section" of the plant, respectively. The emissions associated with these areas are from piping equipment and other fugitive equipment sources with little or no

[24] Per TCEQ's Air Quality Modeling Guidelines (APDG 6232) dated April 2015 and EPA's AERMOD Implementation Guide dated March 19, 2009.

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plume rise and hence can be characterized as area sources. Similarly, emissions from maintenance, startup and shutdown (MSS) activities carried out in the process areas are also located in the same extents of FUGAREA1 and FUGAREA2, which correspond to equipment opening activities in the methanol and MTP sections. These emissions also disperse in two dimensions with little or no plume rise and hence can be characterized as area sources. Area source release heights will be placed at the average midpoint height of the released emissions.

Point source parameters will be based on current design estimates. Flares will use default parameters and calculated effective diameters. The effective diameter calculations will be provided in the report.

7.1.2 Scenario Justification

When flaring, EPN 18-1-13 (Enclosed Ground Flare, EGF) will be used as the primary control device. If the flow of process gases exceeds the maximum capacity of the Enclosed Ground Flare (not expected), the excess throughput would then be automatically diverted to the elevated flares [EPNs 18-1-11 for Methanol (MeOH) and 18-1-12 for Methanol to Propylene (MTP)] for destruction. We propose to model the pilot emissions from the EGF and elevated flares as continuous sources. Emissions from the MSS activities routed to the flare system would be normally routed to the EGF and therefore would be modeled as such. Additionally, a comparison analysis will be conducted to determine the worst-case impacts from EGF versus flares. MSS emissions will be modeled from the worst-case scenario.

Per guidance included in EPA's memorandum titled *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard* dated March 1, 2011, specifically pertaining to treatment of intermittent sources, the emergency generators (EPNs 18-1-20 through 22) at the site will be modeled as intermitted sources. Emergency generators proposed at the site are operated only for the purpose of testing and are not operated on a continuous basis. Consequently, the operation of these sources is not expected to contribute significantly to the annual distribution of daily maximum 1-hour contributions.

BASF also proposes to model the MSS emissions from the EGF as intermittent (i.e., annualized) for the purposes of the 1-hr NO_2 and 1-hr SO_2 NAAQS. BASF feels this is appropriate because of the low number of MSS activities with high NOx emission rates per year that are proposed for inclusion into the permit (1 cold startup and shutdown, 3 warm startup and shutdown per year).

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We further note that cold startups and shutdowns, which have higher emissions than warm startups and shutdowns, are likely to occur only once every 3-4 years (although we cannot permit for a frequency of less than once per year), further justifying the annualization of these emissions.

If specific operating scenarios require evaluation, additional detail regarding these specific modeling scenarios will be provided in the air modeling report.

The modeled emission rates, source parameters and coordinate information will be included with the modeling report.

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8.0 Model Descriptions and Techniques

This section outlines the dispersion modeling techniques utilized in the modeling analysis.

8.1 Dispersion Model Selection

EPA's preferred model, the American Meteorological Society/Environmental Protection Agency Regulatory (AERMOD) model (Version 15181), will be utilized for all modeling evaluations. AERMAP (AMS/EPA Regulatory Model Terrain Pre-processor) (version 11103) was used to process terrain data from the NED files.

8.2 PSD Air Quality Analysis Methodology

The NAAQS are maximum concentration limits measured in terms of the total concentration of a pollutant in the atmosphere. In a typical PSD NAAQS analysis, off-property inventory emissions sources located within the ROI plus 50 km will be modeled along with all the onsite sources to demonstrate compliance with the NAAQS. Per NAAQS review, BASF will perform an air quality analysis for NO_2, CO, PM_{10} and $PM_{2.5}$ as described in the procedures outlined in TCEQ's Air Quality Modeling Guidelines, (APDG 6232v2, Revised 4/2015).

The Tier 2 NO_2 evaluation method explained in the EPA's memorandum *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard* dated March 1, 2011, Ambient Ratio Method (ARM), will be used as a first-pass for cumulative NAAQS compliance demonstration. BASF proposes to use the ARM ratio of 0.8 for the 1-hour NO_2 standard and 0.75 for the annual NO_2 standard. If it is determined that a more detailed analysis is required then BASF is proposing to use in-stack ratios obtained from the EPA's NO2/NOx In-Stack Ratio (ISR) Database[25] to perform Tier 3 NO_2 evaluation.

8.3 PSD Increment Analysis Methodology

A PSD Increment is the maximum increase in ambient concentrations allowed to occur above a baseline date for a pollutant. As a first step in the PSD increment analysis, the predicted high concentration obtained from the PSD full NAAQS analysis for each averaging period will be

[25]The EPA's ISR database can be accessed here: https://www3.epa.gov/scram001/no2_isr_database.html

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compared to the applicable increment. If this analysis results in predicted impacts greater than the increment then all off-property PSD Increment consuming emission sources within the ROI plus at least 50 km will be modeled with BASF sources to demonstrate compliance with Class II PSD Increment Standards. A PSD Increment consumer is defined as (1) any new *major* stationary source that has been constructed since, or any existing *major* stationary source that has been modified after the *major* source baseline date, and (2) any new stationary source that has been constructed, or any existing stationary source that has been modified after the *minor* source baseline date.[26] For a given pollutant, the major source baseline date is the date after which actual emissions associated with construction at *major* stationary sources consume the available PSD Increment. The minor source baseline date is the date of submittal of the first complete PSD permit application in the area after the trigger date.

A current list of off-property inventory PSD Increment consuming sources will be obtained from TCEQ based on the procedures described in Section 6 of this protocol for the PSD Increment Analyses for applicable averaging periods involving NO_2, $PM_{2.5}$, and PM_{10}, if necessary.

Per EPA guidance, NO_2, $PM_{2.5}$, and PM_{10} annual average impacts will be reported as the maximum annual average concentration over the one year on-site meteorological data modeled. PM_{10} (24-hour) average impacts will be reported as the highest yearly second high (H2H) modeled concentration for one year on-site meteorological data modeled. The $PM_{2.5}$ average 24 hour impacts will be reported as the maximum high, second high (H2H) 24-hour average modeled concentration one year on-site meteorological data modeled. There are no PSD Increments for CO.

In order to determine which major source modifications to include in the PSD Increment analysis for applicable pollutants and averaging periods, NSR projects at all major sources within a radius from the Freeport facility equal to the applicable ROI plus 50 km will be analyzed.

Project numbers of modeling projects completed since the minor source baseline date with potential impacts for significant receptors for the proposed BASF project will be requested. The applicable modeling projects between the minor source baseline date and the date of application will be utilized to determine increment consuming emissions of applicable pollutants.

[26] U.S. EPA, Office of Air Quality Planning and Standards, New Source Review Workshop Manual: Prevention of Significant Deterioration and Nonattainment Area Permitting, DRAFT, October 1990; pg. C.35 – C.36.

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8.4 Health Effects Evaluation Methodology

Per anticipated TCEQ request, BASF will perform an air quality analysis for all pollutants as required by MERA guidance.

8.5 Minor NSR NAAQS

The predicted high concentration for all averaging period from the preliminary impact determination will be compared to the applicable SILs to determine compliance with Minor NSR NAAQS for SO_2. BASF anticipates the SO_2 impacts for all averaging periods to be less than SILs; therefore, additional modeling is not proposed for SO_2. If the impacts exceed the SILs a cumulative NAAQS analysis will be conducted to predict impacts from off-property sources in addition to the on-site source.

8.6 State Property Line Analysis

TCEQ Air Quality Modeling Guidelines summarizes the general procedure for a State Property Line analysis. Modeling for the State Property Line evaluation began with modeling the net emissions increase of SO_2 (1-hour). Predicted ground-level concentrations from the proposed sources will be compared to De Minimis concentrations equal to two percent[27] of the State Property Line standard. If maximum predicted impacts are below these levels, the project does not cause a significant air quality impact, and no further modeling is required.

8.7 Additional Impacts Analysis

An additional impacts analysis will be performed for the project per TCEQ and EPA guidance to show that the impacts from the proposed project will not impair visibility, soils and vegetation as result of the emissions. The additional impact analysis will address the following elements:

Growth Analysis – Construction for the proposed expansion project will begin upon issuance of authorizations by TCEQ (expected in the fourth quarter of 2016). The project is expected to create additional 128 permanent jobs in the area. The project is expected to employ as many as 1,000-1,500 additional temporary workers for the construction and commissioning of the project starting first quarter of 2017 and will continue into third quarter of 2018. The total increase due

[27] Per TCEQ's document Air Quality Modeling Guidelines, April 2015 (APDG 6232v2)

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to permanent jobs is less than 0.25% of the population of Brazos Port Area.[28] The project is not expected to cause a significant shift in the population and activity in the area; therefore, the associated air emissions are not expected to have significant impacts.

Class II Visibility Impairment Analysis - Brazoria County is classified as a Class II area, which allows normal well-managed industrial growth. The TCEQ has no specific modeling requirements for visibility impairment. The TCEQ specifies that compliance with TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, meets visibility requirements. BASF complies with Class II visibility analysis by acknowledging compliance with the visibility and opacity requirements in 30 TAC Chapter 111. Therefore, no additional analysis is required.

Class I Visibility Impairment Analysis – The project is proposed to be located in Freeport Texas. The nearest Class I area, Caney Creek Wilderness is 600km away from the facility's proposed location. Therefore, the proposed emissions are not expected to contribute to visibility impairment in any Class I areas.

Soils and Vegetation Analysis – EPA has developed NAAQS Secondary standards to provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. The predicted impacts of emissions from the proposed sources are expected to be less than the primary NAAQS, which are more conservative than the secondary NAAQS. TCEQ has determined that the ambient concentrations of criteria pollutants below secondary NAAQS will not result in harmful effects; therefore, further analysis of soil and vegetation impacts is not required.

[28] Based on a 2014 estimate of combined population of Brazos Port Area, which includes City of Freeport (12,191), City of Clute (11,392), and City of Lake Jackson (27,604) obtained from United States Census Bureau accessed on April 5, 2016: http://www.census.gov/quickfacts/map/PST045214/4827420,48

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9.0 Land Use

Several parameters are used to describe the character of the modeled domain, including surface roughness length, albedo, and Bowen ratio. All of these factors have been considered while developing site specific meteorological data. A 1 year (2012) on-site preprocessed meteorological data set prepared and submitted to TCEQ for an amendment to BASF NSR permit 1733A at the same location will be utilized for this modeling exercise. Additional information and justification for utilization of the on-site meteorological data is included in the modeling exercise previously submitted to and approved by TCEQ.

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10.0 Terrain

BASF Freeport site is located in the Brazoria County. The analysis used terrain heights obtained from Multi-Resolution Land Characteristics Consortium (MRLC) National Land Cover Database (NLCD) National Elevation Datasets (NED) files. For the BASF Freeport facility, NED files were obtained from the query generated by BEEST based on terrain limits at the following website: http://www.mrlc.gov/viewerjs. AERMAP (AMS/EPA Regulatory Model Terrain Pre-processor) was used to process terrain data from the NED files.

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11.0 Building Wake Effects

Direction-specific building data will be generated for stack heights below good engineering practice (GEP) using the EPA Building Parameter Input Program PRIME (BPIPPRM; version 04274). A plot plan illustrating both emission points and building downwash structures for the BASF Freeport site will be provided in the modeling report. UTM coordinates for building corners were determined to identify building shapes and locations (UTM Zone 15 NAD 27). This information, along with the building heights will be used by BPIPPRM to obtain downwash inputs to AERMOD. This information will be included with the modeling report.

AERMOD considers direction-specific downwash using the PRIME algorithm which is evaluated in the BPIPPRM program. All BPIPPRM input and output modeling files will be listed in Section 15.0 of the final modeling report.

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12.0 Receptor Grid

The receptor grid used for this modeling analysis is as follows:

- 25-meter spacing extending from the property line out to 300 meters;
- 100-meter spacing within 1 km of the facility for any locations not covered by the 50-meter grid;
- 500-meter spacing within 5 km of the facility for any locations not covered by the 100-meter grid; and
- 1000-meter spacing within 10 km of the facility for any locations not covered by the 500-meter grid.

Figures of the receptor grid design will be included with the modeling report. If necessary, industrial and non-industrial areas will be evaluated with separate receptor grids.

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13.0 Meteorological Data

Per guidance received from TCEQ during the pre-modeling meeting on June 16, 2015, a 1 year (2012) on-site preprocessed meteorological data set prepared and submitted to TCEQ for an amendment to BASF NSR permit 1733A at the same location will be utilized for this modeling exercise. Additional information and justification for utilization of the on-site meteorological data is included in the modeling exercise previously submitted to and approved by TCEQ.[29]

During preparation of the AQA, BASF determined that substituting data from the Brazoria County Airport in place of missing onsite data (i.e., using the "SUBNWS" AERMET method) leads to a misrepresentation of the conditions at the Freeport site during the few hours of missing onsite data. BASF is proposing to use onsite data alone with no substitutions from the unrepresentative Brazoria County Airport data. Technical justification for this approach was prepared in support of the AQA for Permit 1733A by TRC on behalf of BASF and submitted to TCEQ in March 2015 (included in Appendix A).

[29] This data is included in the report submitted by TRC on June 9, 2014 to TCEQ in support for the data used in the Air Quality Analysis (AQA) for BASF's NSR Permit 1733A amendment application.

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14.0 Modeling Results

Modeling results will be included in the forthcoming final modeling report.

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15.0 Modeling Runs and Hard Copy Output

The AERMOD model input and output files will be provided on a CD or DVD which will be submitted concurrently with the final modeling report.

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16.0 CD

The modeling report will include a CD or DVD with all associated electronic files.

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17.0 References

TCEQ, 2015 — *Air Quality Modeling Guidelines (Revised)*, APDG 6232v2, Revised 4/2015. Texas Natural Resource Conservation Commission, P.O. Box 13087, Austin, Texas 78711-3087.

TCEQ, 2009 — *Modeling and Effects Review Applicability: How to Determine the scope of Modeling and Effects Review for air Permits*, APDG 5874, July 2009, Air Permits Division, Texas Commission on Environmental Quality.

EPA, 2014 — *Guidance for PM2.5 Modeling*, May 2014, United States Environmental Protection Agency, Research Triangle Park, NC 27711

EPA, 2011 — *Addendum User's Guide for the AMS/EPA Regulatory Model – AERMOD*

EPA, 2011 — *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard*

EPA, 2011 — *Additional Clarification Regarding Application of Appendix W Modeling Guidance for 1-hour NO2 National Ambient Air Quality Standard,* March 1, 2011, Air Quality Modeling Group, C439-01, Environmental Protection Agency, Research Triangle Park, NC 27711

EPA, 2006 — *40 CFR Appendix N to Part 50 (Interpretation of the National Ambient Air Quality Standards for PM2.5*

EPA, 2005 — *Revision to the Guidance on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions; Final Rule*, November 2005, EPA Code of Federal Regulations Title 40 Part 51 Appendix W., 1301 Constitution Ave., NW., Washington, DC 20004.

EPA, 2004 — User's Guide For the AMS/EPA Regulatory Model – AERMOD, U.S. Environmental Protection Agency, Research Triangle Park, NC.

EPA, 1990 — *New Source Review Workshop Manual Prevention of Significant Deterioration and Nonattainment Area Permitting (Draft)*, October 1990, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711.

EPA, 1978 — *Guideline on Air Quality Models*, April 1978, Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711.

APPENDIX A
TECHNICAL JUSTIFICATION OF METEOROLOGICAL DATA

TRC Environmental Corporation
10011 Meadowglen Lane, Suite 100
Houston, Texas 77042
Main 713.244.1000 ● Fax 713.244.1099

To:	Mr. Dan Jamieson, TCEQ ADMT
From:	BASF Corporation
Subject:	Air Quality Analysis (AQA) for TCEQ Permit No. 1733A
Date:	April 20, 2015

Onsite Meteorological Data Processing Protocol Supplement

1.0 Project Information and Introduction

Applicant:	BASF Corporation
Facility:	Freeport Complex
Permit Application No.:	1733A
Nearest City:	Freeport
County:	Brazoria County
Customer Reference No.:	CN 600124895
Regulated Entity No.:	RN 100218049
Applicant's Modeler:	Elizabeth Stanko, TRC

Onsite meteorological data from the BASF Corporation (BASF) Freeport plant were used to calculate AERMOD impacts for use in the Air Quality Analysis (AQA) for permit 1733A. BASF received approval for the use of onsite meteorological data in May 2014 after several protocol iterations and receiving comments from TCEQ ADMT. Following the protocol review by TCEQ, a revision was made to the onsite meteorological data processing protocol to omit substitution of airport wind data from Brazoria County Airport (LBX) in place of missing onsite data. This protocol supplement provides technical data in support of the revision to the final onsite meteorological data processing protocol that was prepared in support of the AQA for permit 1733A submitted in March 2015.

2.0 Onsite Meteorological Data Processing Technical Supplement

During preparation of the AQA, BASF determined that substituting data from the Brazoria County Airport in place of missing onsite data (i.e., using the "SUBNWS" AERMET method) leads to a misrepresentation of the conditions at the Freeport site during the few hours of missing onsite data. This determination is based on several important factors:

1. **Onsite Data Capture Rate**

   The onsite data has an exceptional data capture rate. At a 98.75% capture rate, the onsite data followed the TCEQ-accepted BASF's Air Quality Monitoring Quality Assurance

Project Plan (QAPP). This data capture exceeds even the Brazoria County Airport capture rate for the same period (97.4%) and together with the approved QAPP procedures leads to a robust and representative meteorological data set for the BASF Freeport site.

2. **Dominant Wind Conditions**

   The Brazoria County Airport dominant wind conditions are different than that which is observed at the Freeport site. The Brazoria County Airport wind rose Figure 1 in Attachment A shows a dominant stronger southerly flow versus the onsite data wind rose Figure 2 in Attachment A, which records a dominant weaker southeasterly flow. In addition, the airport reports a significant northerly flow that is not observed to a high degree (occurs less than 7 percent of the time) at the Freeport site.

3. **Surface Roughness Characteristics**

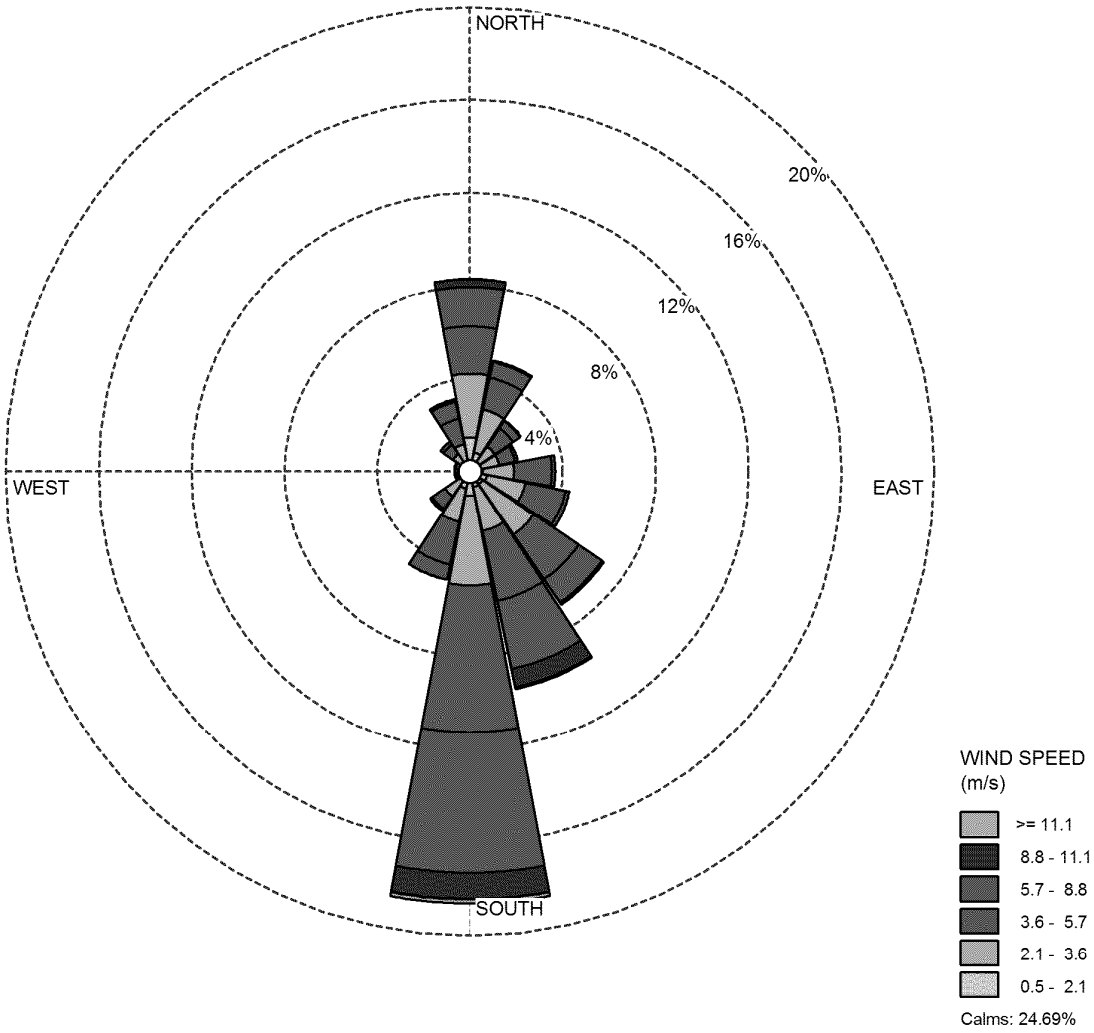
   The Freeport site has substantially higher surface roughness characteristics as calculated by AERSURFACE. Figure 3 in Attachment A and Table 1 in Attachment A show an analysis of the Freeport site surface roughness compared directly to the Brazoria County Airport surface roughness. The values are paired according to identical AERSURFACE seasons and sectors and show quite clearly that the Freeport site is characterized by higher surface roughness for nearly all seasons and sectors. Substituting a lower and unrepresentative surface roughness from the airport during AERMET processing will directly lead to a lower and unrepresentative mechanical mixing depth at the Freeport site.

For the above reasons, we have used the onsite data alone with no substitutions from the un-representative Brazoria County Airport data. Attachment A provides Figures 1 through 3, and Table 1.

Attachment A

Figure 1

WIND ROSE PLOT:
Brazoria County Airport Meteorological Observations

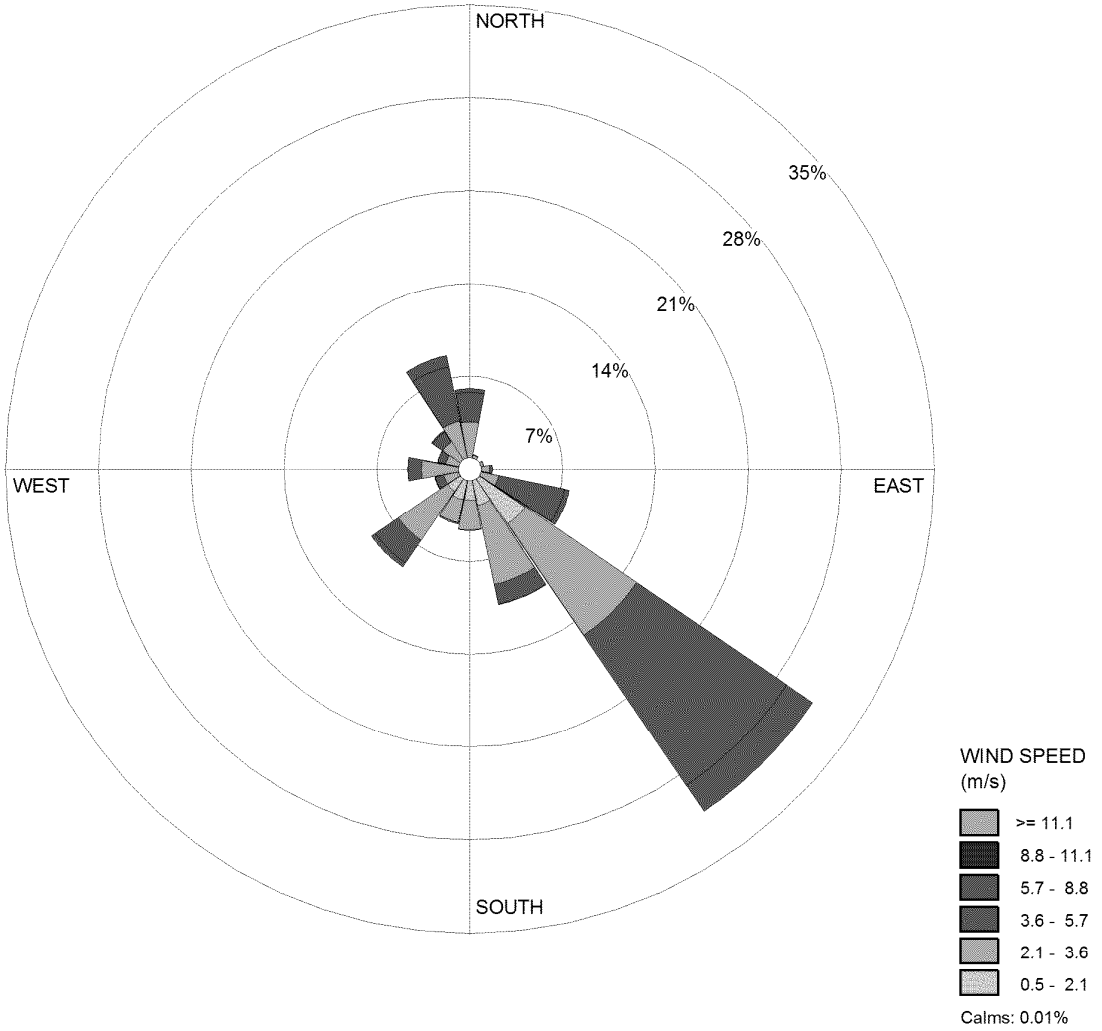


COMMENTS:		COMPANY NAME:	
Location: 95.462W, 29.11N Data Time: 1/1/2012 00:00 through 12/31/2012 23:00 221 missing / incomplete records (97.4% capture)		**TRC Environmental Corporation**	
		MODELER: **Matthew S Jones**	TRC Results you can rely on
	CALM WINDS: **24.69%**	TOTAL COUNT: **8563 hrs.**	
	AVG. WIND SPEED: **3.26 m/s**	DATE: **4/16/2015**	PROJECT NO.: **194889**

WRPLOT View - Lakes Environmental Software

Figure 2

WIND ROSE PLOT:
Freeport Site Onsite Meteorological Observations



COMMENTS: Location: 95.399W, 29.001N Data Time: 1/1/2012 00:00 through 12/31/2012 23:00 110 missing / incomplete records (98.7% capture)		COMPANY NAME: **TRC Environmental Corporation**	
		MODELER: **Matthew S Jones**	TRC Results you can rely on
	CALM WINDS: **0.01%**	TOTAL COUNT: **8674 hrs.**	
	AVG. WIND SPEED: **3.27 m/s**	DATE: **4/16/2015**	PROJECT NO.: **194889**

WRPLOT View - Lakes Environmental Software

Figure 3

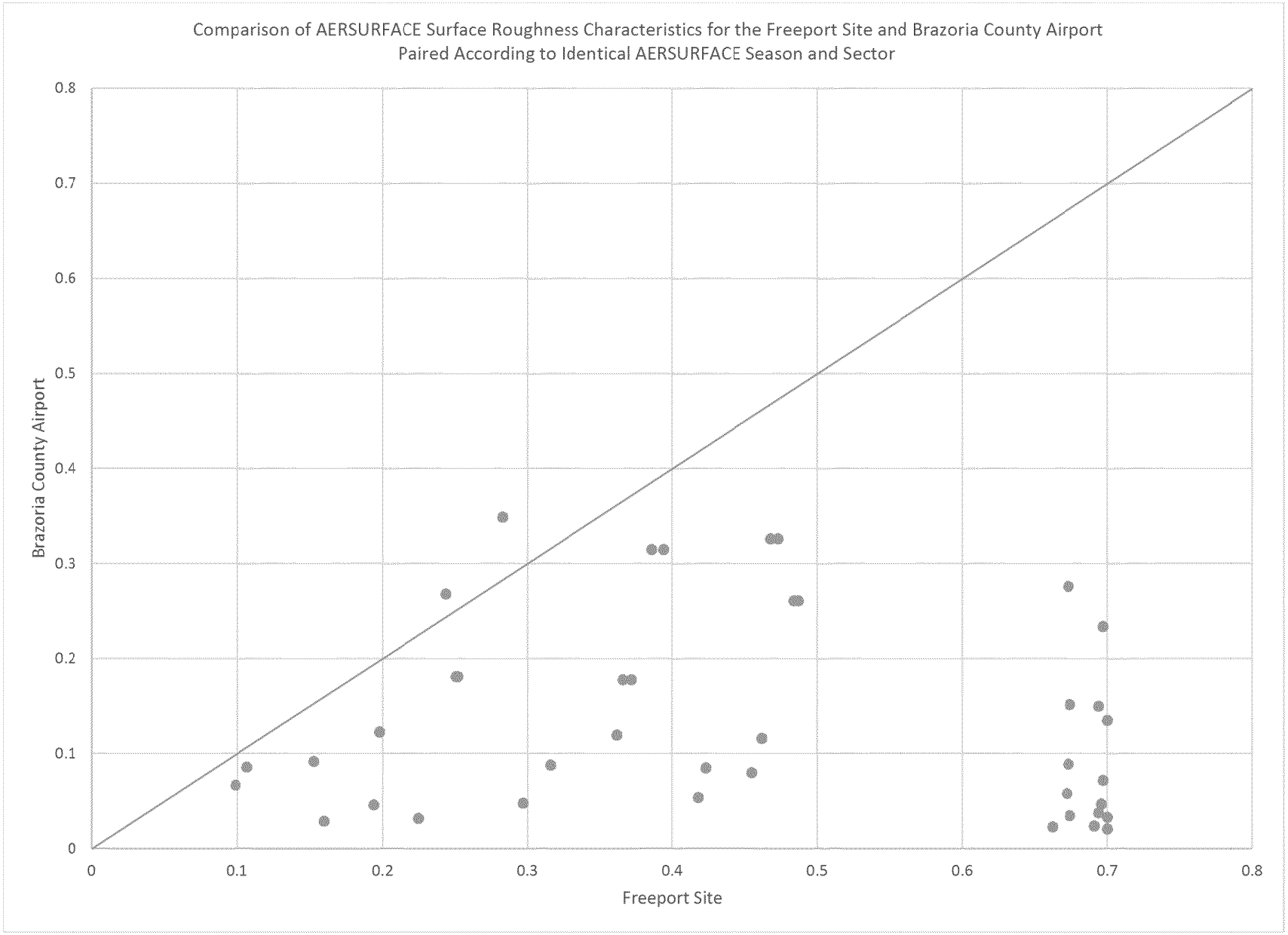


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Table 1 - AERSURFACE Output Comparison

Freeport Site 29.000536N, 95.402256W					Brazoria County Airport 29.115503N, 95.463190W				
Season	Sect	Alb	Bo	Zo	Season	Sect	Alb	Bo	Zo
1	1	0.16	1.12	0.225	1	1	0.16	1.41	0.032
1	2	0.16	1.12	0.316	1	2	0.16	1.41	0.088
1	3	0.16	1.12	0.423	1	3	0.16	1.41	0.085
1	4	0.16	1.12	0.662	1	4	0.16	1.41	0.023
1	5	0.16	1.12	0.691	1	5	0.16	1.41	0.024
1	6	0.16	1.12	0.7	1	6	0.16	1.41	0.021
1	7	0.16	1.12	0.696	1	7	0.16	1.41	0.047
1	8	0.16	1.12	0.672	1	8	0.16	1.41	0.058
1	9	0.16	1.12	0.418	1	9	0.16	1.41	0.054
1	10	0.16	1.12	0.099	1	10	0.16	1.41	0.067
1	11	0.16	1.12	0.107	1	11	0.16	1.41	0.086
1	12	0.16	1.12	0.16	1	12	0.16	1.41	0.029
2	1	0.15	0.95	0.297	2	1	0.14	0.97	0.048
2	2	0.15	0.95	0.362	2	2	0.14	0.97	0.12
2	3	0.15	0.95	0.462	2	3	0.14	0.97	0.116
2	4	0.15	0.95	0.674	2	4	0.14	0.97	0.035
2	5	0.15	0.95	0.694	2	5	0.14	0.97	0.038
2	6	0.15	0.95	0.7	2	6	0.14	0.97	0.033
2	7	0.15	0.95	0.697	2	7	0.14	0.97	0.072
2	8	0.15	0.95	0.673	2	8	0.14	0.97	0.089
2	9	0.15	0.95	0.455	2	9	0.14	0.97	0.08
2	10	0.15	0.95	0.153	2	10	0.14	0.97	0.092
2	11	0.15	0.95	0.198	2	11	0.14	0.97	0.123
2	12	0.15	0.95	0.194	2	12	0.14	0.97	0.046
3	1	0.16	0.82	0.372	3	1	0.17	0.88	0.178
3	2	0.16	0.82	0.394	3	2	0.17	0.88	0.315
3	3	0.16	0.82	0.473	3	3	0.17	0.88	0.326
3	4	0.16	0.82	0.674	3	4	0.17	0.88	0.152
3	5	0.16	0.82	0.694	3	5	0.17	0.88	0.15
3	6	0.16	0.82	0.7	3	6	0.17	0.88	0.135
3	7	0.16	0.82	0.697	3	7	0.17	0.88	0.234
3	8	0.16	0.82	0.673	3	8	0.17	0.88	0.276
3	9	0.16	0.82	0.487	3	9	0.17	0.88	0.261
3	10	0.16	0.82	0.244	3	10	0.17	0.88	0.268
3	11	0.16	0.82	0.283	3	11	0.17	0.88	0.349
3	12	0.16	0.82	0.252	3	12	0.17	0.88	0.181
4	1	0.16	1.12	0.366	4	1	0.17	1.41	0.178
4	2	0.16	1.12	0.386	4	2	0.17	1.41	0.315
4	3	0.16	1.12	0.468	4	3	0.17	1.41	0.326
4	4	0.16	1.12	0.674	4	4	0.17	1.41	0.152
4	5	0.16	1.12	0.694	4	5	0.17	1.41	0.15
4	6	0.16	1.12	0.7	4	6	0.17	1.41	0.135
4	7	0.16	1.12	0.697	4	7	0.17	1.41	0.234
4	8	0.16	1.12	0.673	4	8	0.17	1.41	0.276
4	9	0.16	1.12	0.484	4	9	0.17	1.41	0.261
4	10	0.16	1.12	0.244	4	10	0.17	1.41	0.268
4	11	0.16	1.12	0.283	4	11	0.17	1.41	0.349
4	12	0.16	1.12	0.251	4	12	0.17	1.41	0.181

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April 19, 2016

Subject: BASF Corporation Air Quality Analysis Protocol

I have reviewed the Prevention of Significant Deterioration (PSD) Air Quality Analysis (AQA) Protocol for BASF Corporation located in Freeport, Brazoria County, Texas, dated April 2015, and my comments are provided below. The comments in sections **2.5, 5.1, 5.3, 7.1.2,** and **9.0** will need to be addressed before the AQA is submitted. The remaining comments are reminders and recommendations for information to be included with the AQA.

2.0 Project Overview – The purpose of any AQA for permitting is for the applicant to make a demonstration that their operation, as represented, would not cause or contribute to a National Ambient Air Quality Standard (NAAQS) or PSD Increment violation or adversely affect public health and welfare. The representation made in the demonstration is typically a worst-case representation of the operation. All representations must be supported with technical justifications. Though assumptions and selections can be made using general guidance, these assumptions and selections must be justified why the particular guidance is appropriate to a specific case. A statement that the guidance has been followed or referencing discussions with TCEQ staff is not sufficient justification.

2.1 Preliminary Impact Determination – Table 2-1 of the protocol lists the criteria pollutant thresholds. For PM_{10}, only the 24-hr averaging time was addressed. Although the PM_{10} annual NAAQS has been revoked, annual PM_{10} will still need to be addressed for the increment analysis. Please note that the de minimis level for annual PM_{10} is 1 $\mu g/m^3$.

2.2 PSD Review – When conducting the PSD Significance analyses, consider all new and increased emissions from the site related to the project, including emissions associated with all planned maintenance, start-up, and shut down (MSS) activities. For pollutants that exceed the associated de minimis levels, conduct a NAAQS analysis that considers all allowable emissions at the site, including emissions associated with all planned MSS activities, permit-by-rules (PBRs), and emissions from off-property sources and activities. For applicable pollutants, conduct a PSD increment analysis that considers all increment consuming sources.

Note that 24-hr and annual $PM_{2.5}$ will need to be evaluated modeling the individual years to determine if a PSD full increment analysis will be required.

2.2.2 PSD Increment Analysis – The protocol notes that the maximum predicted impacts from the cumulative PSD NAAQS analysis (excluding background concentrations) will be used in the increment analysis. Please note that utilizing the results from the NAAQS demonstration may not be appropriate for PM_{10} and $PM_{2.5}$, depending on the output metric used.

2.2.3 Pre-application Analysis – The purpose of the pre-application analysis is to provide an analysis of the existing ambient air quality in the area that the major source or major modification would affect. The pre-application analysis can be addressed by providing representative monitoring data to establish the existing air quality in the area. An applicant may be exempt from this requirement by demonstrating that the model predictions associated with the

project emissions are less than the significant monitoring concentrations (SMCs). Although noted in other sections of the protocol, $PM_{2.5}$ was not identified in this section as a pollutant requiring a pre-application analysis. The SMC for $PM_{2.5}$ has been vacated and is no longer applicable; therefore, the pre-application analysis for $PM_{2.5}$ must be addressed. See comments in section 5.1 below for additional information.

2.2.4 Additional Impacts Analysis – The AQA should explain in detail how the project will affect the area in terms of a growth analysis, soil and vegetation analysis, and a Class II visibility impairment analysis. Be aware that the applicant can meet the visibility analysis by acknowledging compliance with the visibility and opacity requirements in 30 TAC Chapter 111.

2.3 Minor NSR NAAQS Analysis – When conducting the Minor New Source Review (NSR) analyses, consider all new and increased emissions from the site related to the project, including emissions associated with all planned MSS activities. For pollutants and averaging periods that exceed the associated de minimis levels, conduct a full Minor NSR NAAQS analysis that considers all allowable emissions at the site, including emissions associated with all planned MSS activities, PBRs, and emissions from off-property sources and activities.

2.4 State Property Line Analysis – When conducting the State Property Line analysis, consider all emissions at the site. The AQA must include justification why some emissions have not been modeled and how site-wide emissions have been considered in the demonstration of compliance with the standards.

2.5 Secondary $PM_{2.5}$ Formation Analysis – The protocol states that a qualitative assessment of the secondary formation of $PM_{2.5}$ will be provided. The applicant should provide a detailed analysis of how secondary formation of $PM_{2.5}$ will be addressed prior to submitting the AQA. For more information, see the following web link from EPA:

http://www.epa.gov/ttn/scram/guidance/guide/Guidance_for_PM25_Permit_Modeling.pdf

2.6 Health Effects Review Analysis – When conducting the Health Effects analysis, consider all new and increased emissions from the site related to the project. For all health effects pollutants evaluated, provide the corresponding Chemical Abstract Service (CAS) numbers, as applicable, with the AQA.

3.0 Plot Plan – Provide a plot plan with the AQA (electronic format preferred) that depicts the entire site. The plot plan should include the site property line, fence line, locations of production activities, locations of emission sources represented in the AQA, and the locations of any buildings or structures represented in the AQA. Please be sure to clearly label all of these features on the plot plan.

The protocol notes that the exact location of point sources and buildings are subject to change. Please note that changes in point sources and buildings locations may require a revised AQA if these changes take place after the initial AQA submittal.

The plot plan that was provided with the protocol is marked as confidential. Be sure to provide a

non-confidential version of the plot plan with the AQA.

5.1 Pre-construction Monitoring – The protocol notes that preliminary modeling indicates that the predicted concentrations for CO, NO_2, and PM_{10} are less than the applicable SMCs. If the preliminary results change and the model predictions of any of these pollutants are greater than or equal to an applicable SMC, then a revised protocol will need to be submitted that provides representative monitoring to address the pre-application analysis requirement. Existing ambient monitoring data that are used to address the PSD pre-application analysis requirement should be located in an area with similar types of sources and emissions as the project site.

For $PM_{2.5}$, the Houston Deer Park #2 monitor (EPA AIRS monitor 482011039) is being proposed to satisfy the pre-application analysis requirement. Since this monitor is located in a residential area, the ADMT recommends that the applicant select a different monitor that is located along the heavily industrialized Houston Ship Channel to better represent emissions near the project site. Please provide the monitor selection and monitoring data for this analysis prior to submitting the AQA.

5.2 NAAQS Analysis Background Concentration – The quantitative assessment of nearby sources of emissions near the project site relative to the monitor site is a reasonable approach for justifying a representative monitor. Although included as a footnote to Table 5-3 of the protocol, full documentation for information such as county emissions comparisons and county population comparisons should be provided with the AQA when justifying the use of a monitor that is located in a different county than the project site.

<u>PM_{10} Background Monitoring Data</u> – The protocol notes that the Deer Park #2 monitor is the only PM_{10} monitor in the Houston-Galveston-Brazoria area. Please note that there are other PM_{10} monitors within this area. However, the selection and justification of the Deer Park #2 monitor to represent PM_{10} background concentrations is reasonable. Be sure to include this information in the AQA.

The protocol notes that the 2013 emissions inventory data from the TCEQ website is used to account for the emissions near the project site and monitor. Please note that 2014 emissions inventory data are available from the TCEQ website and should be used instead of the 2013 data when the AQA is submitted.

Table 5-4 of the protocol lists the background concentration as the three-year high, second high (H2H) 24-hr averaged monitored concentration. It is not clear if the reported concentration is the three-year average of the H2H 24-hr monitored concentration or the H2H 24-hr monitored concentration out of the three years. Please note that PM_{10} monitored concentration should be reported as the H2H monitored concentration out of the most recent three years and not the three-year average. In addition, the monitored concentration was reported as 88.71 $\mu g/m^3$. Be sure to verify that the H2H is being used. Based on the ADMT's review of the H2H monitored concentrations, none of the years had 24-hr concentrations greater than 80 $\mu g/m^3$.

Make sure when referencing tables in the AQA, the information accurately reflects the discussion. For example, the protocol notes that total $PM_{2.5}$ emissions are reported in Table 5-3,

but it should have noted that total PM_{10} emissions are reported in Table 5-3. Also, this section notes that monitoring data from 2012-2014 were obtained from the TCEQ website and reported in Table 5-5; however, the monitoring data actually reflects 2013-2015 data and is reported in Table 5-4. Similar references to the incorrect table numbers occur in other sections as well.

$PM_{2.5}$ Background Monitoring Data – The selected monitor and justification are reasonable for the $PM_{2.5}$ NAAQS demonstration. However, as stated above, the ADMT recommends that the applicant select a different monitor that is located along the heavily industrialized Houston Ship Channel to better represent emissions near the project site for the pre-application analysis.

NO_2 Background Monitoring Data – The selected monitor and justification are reasonable for the NO_2 NAAQS demonstration. Be sure to provide all information in the AQA, including the calculations for the substitution test and conversions to appropriate units.

The protocol notes that the annual mean concentration for NO_2 is based on 2014 data. Please note that the 2013 data has the highest annual mean concentration out of the three years and should be used instead of the 2014 data. Also, the ADMT was unable to verify the 1-hr monitored concentration reported in Table 5-9 of the protocol. Make sure that the 98th percentile was correctly calculated for each year.

CO Background Monitoring Data – The protocol notes that the CO maximum predicted concentrations are anticipated to be less than the applicable de minimis levels. If the preliminary results change and the model predictions of are greater than or equal to an applicable de minimis level, then follow the same methodologies used for selecting ambient background concentrations for the pollutants discussed in the protocol.

SO_2 Background Monitoring Data – The protocol notes that the SO_2 maximum predicted concentrations are anticipated to be less than the applicable de minimis levels. If the preliminary results change and the model predictions of are greater than or equal to an applicable de minimis level, then follow the same methodologies used for selecting ambient background concentrations for the pollutants discussed in the protocol.

5.3 $PM_{2.5}$ SIL Justification for NAAQS Analysis – The methodology to justify the $PM_{2.5}$ de minimis levels for the NAAQS demonstration is appropriate; however, as mentioned above, the applicant should select a different monitor that is located along the heavily industrialized Houston Ship Channel to better represent emissions near the project site for justification of the de minimis levels. This information should be provided prior to submitting the AQA.

5.4 $PM_{2.5}$ Justification for Increment Analysis – Since the monitor is not located nearby the project site, the procedure to justify the $PM_{2.5}$ de minimis levels for the increment analysis is not sufficient to be exempt from conducting a full increment analysis; however, the full increment analysis could be limited to significant receptors with some additional justification. In support of this approach, the ADMT recommends that the applicant demonstrate that predicted impacts are driven by the applicant's sources, are located close in to the project site, and fall off quickly with distance from the project site.

6.1 On-property Sources – Be sure to include full documentation for each source characterization and complete technical justification for the associated source parameters in the AQA.

6.2 Off-property Sources – The approach to develop the off-property inventory is generally reasonable. The protocol notes that the retrieval will be supplemented by identifying regulated entities within each pollutant's respective area of impact (AOI) that are not included in the retrieval. Be sure to provide justification as to why the supplemental review will be limited to within each pollutant's respective AOI; why the criteria used for the supplemental review is appropriate; and documentation associated with the supplemental review. In addition, the ADMT recommends that the applicant review the retrievals for completeness and accuracy prior to conducting any modeling. Any changes to data or exclusion of sources must be clearly documented and justified. Be sure to provide any retrieval files that were obtained from the TCEQ and all supporting materials with the AQA.

The protocol notes that primary inventory retrievals will be obtained based on the radius of impact (ROI) plus 50 kilometers (km). It should be noted that retrievals from the TCEQ's Air Permits Allowable Database (APAD) no longer provides primary and secondary options and the search is limited to 50 km.

The protocol notes that for the $PM_{2.5}$ increment analysis, the applicant will review all PSD major projects in the AOI that have been submitted between the major source baseline date and the minor source baseline date. The applicant should review all PSD major projects out to 50 km since the major source baseline date. In addition, the applicant should use the date of this protocol response as the cutoff date for searching for increment sources instead of the application submittal date.

Please note that the results for the increment analysis are the maximum H2H predicted concentrations over a one-year period for the 24-hr averaging time and the maximum annual predicted concentration over a one-year period for the annual averaging time since on-site data are being used.

6.2.1 Supplementing Data from APAD – The approach for limiting the search for off-property sources related to the permit search and 2014 emissions inventory data is generally acceptable. In addition to including sources from all regulated entities within 10 km or the ROI, whichever is greater, the ADMT recommends that all major sources out to 50 km be included. Furthermore, the ADMT recommends that the applicant provide a map that depicts the location of the sources to help support the case for limiting the search.

The protocol notes that data obtained from APAD was last updated in 2000. For clarification, APAD did not exist in 2000. Retrievals were obtained from the TCEQ's Point Source Database (PSDB) during that time. However, many of the sources in APAD were populated with PSDB source data.

6.2.2 Data Corrections – Please note that the most recent emissions inventory data is 2014 and not 2013. In addition, the ADMT recommends that the applicant review permit files to obtain

allowable emission rates rather than relying on annual emissions data from the 2014 emissions inventory when APAD sources are represented as 0 lb/hr or 0 tpy.

7.1 Source Parameters – Be sure to provide the flare calculations in the AQA.

7.1.2 Scenario Justification – The protocol notes that the hourly emissions from the emergency engines (EPNs 18-1-20 through 22) will be treated as intermittent (i.e. following EPA's intermittent guidance). It is not clear from the information provided that the emergency engines qualify as intermittent sources. Information such as the frequency of operation, the number of times per year, the duration for each event, and whether there are simultaneous operations with other sources should be provided prior to submitting the AQA. In addition, please note that the project area is located in the Houston-Galveston-Brazoria non-attainment area for ozone and testing for these types of engines are not allowed between 6 am to 12 pm. The reduced hours of operation will affect how the annual average emission rate is determined for modeling purposes.

The protocol notes that the hourly emissions from the MSS activities (1 cold startup and shutdown, 3 warm startup and shutdown per year) will be treated as intermittent (i.e. following EPA's intermittent guidance). It is not clear from the information provided that the MSS activities qualify as intermittent sources, nor is it clear which sources these MSS activities apply. Information such as the number of times per year, the duration for each event, and whether there are simultaneous operations with other sources should be provided prior to submitting the AQA. In addition, be sure to clearly identify which activities this approach is being used.

Be sure to document any operational limitations and/or scenarios used in the modeling demonstrations. Also note that the intermittent guidance only applies to the 1-hr NO_2 and 1-hr SO_2 NAAQS demonstrations. It should not be used for any other pollutant or averaging time, including the SO_2 State Property Line analysis.

8.1 Dispersion Model Selection – The protocol notes that AERMOD version 15181 will be used in the modeling demonstration. This is appropriate.

8.2 PSD Air quality Analysis Methodology – The protocol notes that a Tier 2 approach will be used to evaluate the NO_2 emissions but may consider a Tier 3 approach if needed for refinements. If a Tier 3 approach is used to evaluate the NO_x emissions, then a revised protocol will need to be submitted to the TCEQ and EPA Region 6 that discusses the details of the Tier 3 approach.

8.3 PSD Increment Analysis Methodology – The protocol notes as a first step that the predicted high concentration from the PSD full NAAQS analysis will be compared to the increment. Please note that the H2H predicted concentration from the PSD full NAAQS modeling may also be used to compare to the applicable increment. In addition, and as noted above, utilizing the results from the NAAQS demonstration may not be appropriate for PM_{10} and $PM_{2.5}$, depending on the output metric used.

8.5 Minor NSR NAAQS – The protocol notes that all project modeled impacts will be less than the de minimis levels for SO_2. If the model predictions are greater than or equal to the applicable

de minimis levels, a revised protocol that discusses a full NAAQS impacts analysis will need to be submitted prior to submitting the AQA.

8.6 State Property Line – The protocol notes that the maximum ground-level concentration from project-level emissions will be compared to the de minimis level of 2% of the applicable state property line standards. Be aware that if the predicted high concentration is less than 2% of the applicable standard, then technical justification for demonstrating compliance may require additional information such as project emissions increases, total site emissions, results from previous site-wide demonstrations, or ambient monitoring data. Refer to Appendix F of the TCEQ's Air Quality Modeling Guidelines (APDG 6232) to determine if site-wide modeling is needed. The link below is provided for convenience:

http://www.tceq.texas.gov/permitting/air/guidance/newsourcereview/nsr_mod_guidance.html

9.0 Land Use – The protocol notes that one year (2012) of on-site preprocessed meteorological data set will be used. Please note that if more than one year of on-site data is available, then the additional years should be included per EPA guidance. The protocol refers to a previously submitted modeling demonstration as justification for the use of the on-site meteorological data. Referring to previously submitted analyses is not sufficient justification. Please provide documentation detailing the justification for its use. If applicable, the same justification used in the previous modeling may be sufficient. Be sure to provide the justification prior to submitting the AQA. In addition, please provide the meteorological and AERSURFACE files for review prior to submitting the AQA.

11.0 Building Wake Effects – Provide all structure heights used in the downwash analysis and any computer assisted drawing files with the AQA.

Ensure that all GEP heights used in BPIP PRIME are justified according to Guideline for Determination of Good Engineering Practice Stack Height:

http://www.epa.gov/scram001/guidance/guide/gep.pdf

For structures not included in the downwash analysis or for air quality analyses conducted without consideration of downwash, please provide technical justification for supporting this approach. Please note that piping fugitives should not be included as a downwash structure unless sufficient justification can be provided.

12.0 Receptor Grid-Design – Be aware that ambient air for Minor NSR analyses starts at the property line; however, for PSD modeling, ambient air starts at the fence line or other physical barrier to public access. Be sure to make clear in the AQA whether the property line and fence line are the same.

13.0 Meteorological Data – Refer to the comments above in Section 9.0 as it pertains to the meteorological data.

Deliverables – All modeling and downwash input and output files should be sent electronically

via email, FTP, or CD/DVD. Electronic copies of the modeling report, plot plan, and maps are also preferred.

If you have any questions, please contact Justin Cherry at (512) 239-0955 or by fax at (512) 239-1400, or by email at justin.cherry@tceq.texas.gov.

To: Ahmed Omar (Ahmed.Omar@tceq.texas.gov)[Ahmed.Omar@tceq.texas.gov]; Sean.OBrien@tceq.texas.gov[Sean.OBrien@tceq.texas.gov]; Thomasson, Lance E[Lance.E.Thomasson@invista.com]
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From: Periapattanam, Gopal
Sent: Fri 4/15/2016 8:06:30 PM
Subject: INVISTA Victoria ADN Modeling Report - Permit #7186
INVISTA Victoria ADN Modeling Report - Permit 7186 - 041516.pdf

Ahmed,

Please find attached the air dispersion modeling report for the INVISTA Victoria ADN unit (Permit # 7186) located at Victoria, Texas.

The report addresses your comments from the modeling protocol. This modeling report summarizes the methodologies used for the PSD review, TCEQ State NAAQS, State Property Line Analysis, and Health Effects Evaluations, the data used to conduct the analyses, and the results of these analyses. Electronic modeling files supporting the analysis will be sent separately.

Please contact Lance Thomasson or myself if you have any questions.

Thanks

Gopal Periapattanam

Global Air Capability Manager

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AIR QUALITY PSD MODELING REPORT

INVISTA S.à r.l.

INVISTA™

Victoria Plant
Victoria County, Texas
NSR Permit No. 7186

Adiponitrile Unit

Prepared By:

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April 2016

Project 144402.0045

Trinity Consultants

Environmental solutions delivered uncommonly well

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1. EXECUTIVE SUMMARY

INVISTA S.à r.l. (INVISTA) owns and operates a synthetic organic chemical manufacturing plant in Victoria, Victoria County, Texas (Victoria Plant). INVISTA has been assigned Texas Commission on Environmental Quality (TCEQ) Costumer Number (CN) 602582231. Additionally, the Victoria Plant has been assigned TCEQ Air Quality Account No. VC-0008-Q and Regulated Entity Number (RN) 102663671. The Adiponitrile (ADN) Unit at the Victoria Plant is authorized under TCEQ New Source Review (NSR) Permit No. 7186.

The Victoria Plant is located in Victoria County, which is currently classified as "attainment/ unclassifiable" or "attainment (maintenance)" for all criteria pollutants with respect to compliance with the National Ambient Air Quality Standards (NAAQS).[1] The plant is a major source with respect to the Prevention of Significant Deterioration (PSD) and the Title V Operating Permit programs.

INVISTA submitted an amendment application to the NSR Permit 7186 in March 2015 and a subsequent addendum to the amendment application in January 2016. The amendment and addendum were to authorize the following at the ADN Unit:

- Improvement of the distributed control system (DCS) and implementation of advanced process controls (APC) for the ADN Unit;
- Upgrades to the Natural Gas Plant (NGP);
- Addition of a raw Natural Gas Bypass/Blending System;
- Equipment replacement, reliability, availability, and efficiency improvements;
- Removal of shut down facilities and facilities authorized but not constructed;
- Updates to the Maintenance, Startup, and Shutdown (MSS) representations;
- Updates to loading representations for some loading operations;
- Incorporation of Permit by Rule (PBR) Registrations into TCEQ Permit No. 7186;
- Changes to TCEQ Permit No. 7186 Special Conditions; and
- Revisions and corrections to the Maximum Allowable Emission Rate Table

The emissions increase of nitrogen oxides (NO_X), carbon monoxide (CO), and volatile organic compounds (VOC) from the proposed project are greater than the PSD Significant Emission Rate (SER) threshold, and therefore trigger PSD review. Emissions increases of sulfur dioxide (SO_2) from the project are less than the PSD Significant Emission Rate (SER) threshold, and therefore do not trigger PSD review. For particulate matter (PM) including particulate matter less than 10 microns (PM_{10}) and particulate matter less than 2.5 microns ($PM_{2.5}$), the only emission increases are at upstream/downstream sources; there are no changes to any $PM/PM_{10}/PM_{2.5}$ emission rates within the Permit No. 7186. The upstream/downstream increases are less than the PSD SER threshold, and therefore PSD review is not triggered for $PM/PM_{10}/PM_{2.5}$.

As part of the application, a Class II air quality analysis is required to demonstrate that proposed emissions of NO_X and CO from the ADN permit amendment do not cause or contribute to a violation of any applicable National Ambient Air Quality Standards (NAAQS), applicable PSD Increment, or adversely affect public health and welfare. An air quality analysis is required to demonstrate compliance with the TCEQ State NAAQS for SO_2. As the NO_X and VOC project emissions increase is greater than 100 tpy, a qualitative ozone analysis is performed in accordance with TCEQ guidelines.

[1] Based on TCEQ's internet site http://www.tceq.texas.gov/airquality/sip/victoria-sip/vic-status as of January, 2016.

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A State Health Effects evaluation is required for emissions increases of speciated volatile organic compounds (VOC) from the proposed project at the Victoria Plant to demonstrate compliance with TCEQ toxicology division's Effects Screening Levels (ESL) guidelines.

This document summarizes the methodologies used for the PSD review, TCEQ State NAAQS, State Property Line Analysis, and Health Effects Evaluations, the data used to conduct the analyses, and the results of these analyses. The methodologies used to perform these analyses are consistent with Modeling and Effects Review Applicability (MERA) guidance package, the TCEQ's *Air Quality Modeling Guidelines, and the EPA's Guideline on Air Quality Models (Revised)*.[2,3,4] In consideration of the single property designation among INVISTA, DuPont, and Equistar, a combined single fence line will be used in the PSD modeling. This fenceline represents the extents of the INVISTA Victoria Site property that have a physical barrier restricting public access. Access to the DuPont and Equistar properties is controlled by INVISTA via the fenceline and gates. Therefore, INVISTA has concluded that the DuPont and Equistar properties do not constitute ambient air.

[2] Code of Federal Regulations, Title 40–Protection of Environment, Part 51, Appendix W, November 9, 2005.

[3] TCEQ, *Air Quality Modeling Guidelines*, APDG 6232 (Revised), Air Permits Division, Austin, TX, April 2015.

[4] TCEQ, *Modeling and Effects Review Applicability: How to Determine the Scope of Modeling and Effects Review for Air Permits*, APDG 5874, July 2009.

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2. BACKGROUND

This section of the report provides a brief summary of the proposed project and location.

2.1. PROJECT DESCRIPTION

INVISTA submitted the permit application to authorize the following changes:

2.1.1. DCS and APC Implementation

The distributed control system (DCS) will be replaced with modern controls which improve safety, reliability, and efficiency. INVISTA will also implement advanced process controls (APC) to optimize production via improvements in process safety, reliability, and efficiency.

2.1.2. Install a Raw Natural Gas Bypass/Blend System

INVISTA proposes to install a new natural gas (NG) bypass/blend system. The proposed system will allow a controlled flow of raw natural gas to bypass the NGP and then be blended with the methane product gas stream from the NGP. This bypass or slip stream will enable using the NGP to full capacity regardless of the C2+ concentration in the raw gas. The bypass/blend system will add additional fugitive emission components (e.g., valves and connectors).

2.1.3. Replacement, Reliability, Availability, and Efficiency Improvement Projects

As part of this project, INVISTA will replace and improve equipment located in the ADN Unit. These projects include end-of-life replacements, projects to reduce downtime, and projects that improve the overall reliability of the unit. Additional information is provided in the confidential volume of the application.

2.1.4. Removal of Shut Down Facilities and Facilities Not Constructed

With this amendment application, INVISTA proposes to remove from the permit facilities that have been permanently shut down and facilities that were authorized by a previous permit amendment but were never constructed. A detailed list of these facilities to be removed can be found in the March 2015 Amendment application and subsequent January 2016 Addendum.

2.1.5. Maintenance, Startup, and Shutdown (MSS) Activities

MSS activities performed at the ADN Unit have previously been represented in applications for TCEQ Permit No. 7186; a detailed list of changes to MSS activities can be found in the permit application and addendum.

2.1.6. Update Loading Representations

Loading representations are being updated to reflect different tanks that some materials are loaded from and different loading points for some materials.

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2.1.7. Incorporate Permit by Rule (PBR) and Standard Permit Registrations into NSR Permit 7186.

INVISTA is proposing to roll PBRs and Standard Permits claimed at the ADN Unit into TCEQ Permit No. 7186. These PBRs will be voided after inclusion in TCEQ Permit No. 7186.

2.1.8. Changes to Special Conditions

INVISTA is requesting several changes to special conditions for Permit No. 7186.

2.1.9. Revisions and Corrections to the Maximum Allowable Emission Rate Table

INVISTA is requesting several revisions and corrections to the Maximum Allowable Emission Rate Table (MAERT).

Detailed information on the project description can be found the in the March 2015 Amendment application and the subsequently submitted January 2016 Addendum.

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This section presents a summary of the pollutants evaluated and outlines the general dispersion modeling approach and screening technique used for this analysis.

3.1. POLLUTANTS TO BE EVALUATED

3.1.1. Prevention of Significant Deterioration

Per the PSD definitions in Title 30, Texas Administrative Code, Chapter 116, Subchapter A (30 T.A.C. § 116.12), the Victoria site is considered a major source under the PSD program (i.e., chemical process plant, one of the 28 major source categories, and has emissions of any single criteria pollutant that exceeds 100 tons per year [tpy]). Based on the ADN Unit permit amendment application submitted in March 2015 and amendment addendum submitted in January 2016, the project is considered a major modification for NO_X, CO, and VOC since the project emissions of NO_X, CO, and VOC exceed their respective significant emission rates.

The impacts from NO_X (evaluated as nitrogen dioxide [NO_2]) and CO will be evaluated in accordance with applicable federal and state air quality dispersion modeling and screening procedures, as discussed in Section 3.2 of this protocol. Modeled concentrations will be compared to the EPA-established Significant Impact Levels (SIL), NAAQS, and PSD Increments shown in Table 3-1.

Table 3-1. Scope of PSD Modeling Review

Pollutant	Averaging Period	Modeling Significance Level (SIL/MSL) (µg/m³)	Monitoring *de minimis* concentration SMC (µg/m³)	NAAQS (µg/m³)	PSD Class II Increment (µg/m³)
NO_2	1-hour	7.5	N/A	188	--
	Annual	1	14	100	25
CO	1-hour	2000	N/A	40000	--
	8-hour	500	575	10000	--

3.1.2. State NAAQS Analysis

The project net annual emissions increases of SO_2 are less than the Significant Emission Rate (SER) for PSD, and hence they do not trigger PSD modeling, but must be modeled in State NAAQS. For the State NAAQS analysis, a preliminary impacts determination, which considers project emissions increases associated with the affected sources at the facility, was performed to determine whether the proposed emissions of SO_2 will have a significant impact upon the area surrounding the facility. The maximum modeled ground-level concentrations (H1H) for SO_2 for each averaging period evaluated were compared to the corresponding SILs to determine whether the maximum modeled ground-level concentration (GLC_{max}) at any receptor exceeds the applicable SIL. The SILs are presented in Table 3-2. For SO_2, if the GLC_{max} resulting from project emissions increases exceeds the corresponding SIL, a State NAAQS Analysis may be required.

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Table 3-2. Scope of Modeling Review for State NAAQS Analysis

Pollutant	Averaging Period	Modeling Significance Level (SIL/MSL) (µg/m³)	NAAQS (µg/m³)
SO_2 [A]	1-hour	7.8	196
	3-hour [B]	25	1,300
	24-hour	5	365
	Annual	1	80

[A] The existing annual and 24-hour SO_2 NAAQS standards will be revoked one year after the effective date in areas with a designated status for the revised SO_2 NAAQS, per 40 CFR §50.4(e).

[B] The SO_2 3-hr standard is a secondary NAAQS standard.

3.1.3. State Property Line Analysis

A property line analysis is required for SO_2 in accordance with Title 30 Texas Administrative Code (TAC) Chapter 112. The maximum modeled ground level concentration at the fenceline of SO_2 should not exceed the thresholds listed below in Table 3-3. The H1H SO_2 concentration for the 1-hour averaging period is determined using AERMOD; this GLC_{max} is then compared to the standard presented below.

Table 3-3. Scope of Modeling Review for Property Line Analysis

Pollutant	Regulation/ Guidance	Averaging Period	Standard (µg/m³)
SO_2	30 TAC 112.3(a)	30-min	1,021[A]

[A] The 30-minute standard of 0.4 ppm (1021 µg/m³) for Victoria County is evaluated using the model's 1-hr averaging period.

3.1.4. State Health Effects Evaluation (ESL Evaluation)

As mentioned in Section 1 of this protocol, the State Health Effects Evaluation is based on the July 2009 TCEQ MERA guidance package. The TCEQ MERA guidance document provides a flowchart to be used to determine the required scope of the modeling and effects review for each compound required to be included in the analysis. The flowchart provides a process to determine if refined air dispersion modeling or effects review is required for a permitting project and, if required, the minimum requirements for the scope of the modeling and effects review. The MERA guidance document requires comparison to the Effects Screening Level (ESL) for each compound under consideration. The flow chart is followed and, for air toxics which require modeling, AERMOD is used to determine a GLC_{max} on both a 1-hour averaging period and an annual averaging period in order to compare with the respective short-term and long-term ESL. A list of the compounds to be evaluated in this analysis, along with the corresponding hourly and annual ESLs, is provided in Table 3-4.

Table 3-4. Pollutants to be Evaluated and Associated Effects Screening Levels

Compound	CAS No.	Short-term ESL (µg/m³)[A]	Long-term ESL (µg/m³)[A]
Butadiene (BD as 1,3-C4H6)	106-99-0	510	9.9
trans 2-Butene (T-C4H8, t-2-C4H8)	107-01-7	10,000	480
Hydrogen Cyanide (HCN)	74-90-8	20	2
Benzene (C6H6)	71-43-2	170	4.5

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Compound	CAS No.	Short-term ESL (µg/m³)[A]	Long-term ESL (µg/m³)[A]
Cyclohexane (CYAN, C6H12)	110-82-7	3,400	340
trans-2-Methyl-2-Butenenitrile (T2M2BN)	30574-97-1	70	7
2-Methyl-3-Butenenitrile (2M3BN)	16529-56-9	800	80
cis-2-Pentenenitrile (C2PN)	25899-50-7	700	70
Vinylcyclohexene (VCH, C8H12)	695-12-5	2,000	200
cis-2-Methyl-2-Butenenitrile (C2M2BN)	20068-02-4	70	7
Valeronitrile (VN)	110-59-8	220	22
Pentenenitriles (PNs as 3,4 Pentenenitrile)	4635-87-4	120	12
trans-2-Pentenenitrile (T2PN)	26294-98-4	700	70
Phenol (PHENOL, C6H6O)	108-95-2	150	3.3
Benzonitrile (BZNIT, C7H5N)	100-47-0	500	50
IB	-	2	0.2
Ethylene Glycol (E-GLYCOL, C2H6O2)	107-21-1	260	26
m-Cresol (MCRESOL, C7H8O)	108-39-4	4.4	10
Phenyl Ethylene Glycol Borane (PEGB)	-	2	0.2
Ethyl Succinonitrile (ESN)	110-61-2	200	20
Methylglutaronitrile (MGN, C6H8N2)	4553-62-2	80	8
Adiponitrile (ADN, C6H8N2)	111-69-3	90	9
Triphenyl Borane (PROM, C18H15B)	960-71-4	10	1
Tritolylphosphate (TTP, C21H21P03) -	1330-78-5	100	10
Ligand Hydrolysis Product (LHP, C14H15PO3)	-	100	10
Ligand Degradation Product (LDP, C21H21PO3)	-	100	10
Acrylonitrile (ACRN, CH2CHCN)	107-13-1	330	2.1
Acetonitrile (ACEN, CH3CN)	75-05-8	340	34
Propionitrile (PROPN, CH3CH2CN)	107-12-0	140	14
Biphenyl (C12H10)	92-52-4	13	1.3
n-Hexane (C6H14)	110-54-3	6,200	200
p-Xylene (C8H10)	106-42-3	2,200	180
Toluene (C7H8)	108-88-3	4,500	1,200
Isopentane (i-C5H12)	78-78-4	59,000	7,100
Pentane (as n-C5H12)	109-66-0	59,000	7,100
2,2 Dimethylbutane (C6H14)	75-83-2	3,500	350
2,3 Dimethylbutane (C6H14)	79-29-8	3,500	350

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Compound	CAS No.	Short-term ESL (µg/m³)[A]	Long-term ESL (µg/m³)[A]
2-Methylpentane (C6H14)	107-83-5	3,500	350
3-Methylpentane (C6H14)	96-14-0	3,500	350
2,2-Dimethylpentane (C7H16)	590-35-2	3,500	350
2,3-Dimethylpentane (C7H16)	565-59-3	3,500	350
Methylcyclopentane (C6H12)	96-37-7	2,600	260
2-Methylhexane (C7H16)	591-76-4	3,070	307
3-Methylhexane (C7H16)	589-34-4	3,070	307
Methylcyclohexane (C7H14)	108-87-2	16,100	1,610
Octane (as n-C8H18)	111-65-9	3,500	350
Nonane (as n-C9H20)	111-84-2	10,500	1,050
Butane (as n-C4H10)	106-97-8	66,000	7,200
Isobutane (i-C4H10)	75-28-5	23,000	7,200
Heptane (as n-C7H16)	142-82-5	3,500	350
Decane (as C10H22)	124-18-5	10,000	1,000
Undecane (as C11H24)	1120-21-4	3,500	350
Dodecane (as n-C12H26)	112-40-3	3,500	350
Tridecane (as n-C13H28)	629-50-5	3,500	350
Tetradecane (as n-C14H30)	629-59-4	3,500	350
Pentadecane (as n-C15H32)	629-62-9	2	0.2
Hexadecane (as nC16H34)	544-76-3	3,500	350
Methacrylonitrile (C4H5N)	126-98-7	27	2.7
Isobutyronitrile (C4H7N)	78-82-0	220	22
C&T-2-Butenenitrile (transcrotonitrile, C4H5N)	4786-20-3	70	7
Butanenitrile (n-butyronitrile, C4H7N)	109-74-0	220	22
Pyridine (C5H5N)	110-86-1	30	3
Ethylbenzene (C8H10)	100-41-4	26,000	570
Styrene (C8H8)	100-42-5	110	140
1,2-Dimethylbenzene (o-Xylene, o-C8H10)	95-47-6	2,200	180
Benzofuran (C8H6O)	271-89-6	2	0.2
Aniline (Aminobezene, C6H7N)	62-53-3	80	8
Alpha-Methylstyrene (C9H10)	98-83-9	250	48
m-Methylstyrene (C9H10)	100-80-1	250	48
Glutaronitrile (C5H6N2)	544-13-8	50	5
Indene (C9H8)	95-13-6	240	24
Phenylacetonitrile (C8H7N)	140-29-4	2	0.2
m-Ethylphenol (as p-C8H10O)	620-17-7	290	3.3
Naphthalene (C10H8)	91-20-3	440	50

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Compound	CAS No.	Short-term ESL (µg/m³)[A]	Long-term ESL (µg/m³)[A]
2-Methylnaphthalene (C11H10)	91-57-6	200	20
Diphenylmethane (C13H12)	101-81-5	125	12.5
Formic Acid (CH2O2)	64-18-6	90	9
Sodium Cyanide (NaCN)	143-33-9	50	5
Isopropanol (IPA)	67-63-0	4,920	492
Methanol	67-56-1	3,900	2,100
COD		2	0.2
CDDT		2	0.2
2-Butoxy ethanol	111-76-2	2,900	3,700
Hexamethylenediamine	124-09-4	16	0.54
Cyclohexanone	108-94-1	800	80
Cyclohexanol	108-93-0	630	200
Cyclohexene	110-83-8	10,000	1,000
Caproic Acid	142-62-1	200	48
Pentanal	110-62-3	98	180
Hexanal	66-25-1	330	818
Acetic Acid	64-19-7	250	25
Propionic Acid	79-09-4	85	30
Butyric Acid	107-92-6	26	90
Valeric Acid	109-52-4	63	42
n-Butanol	71-36-3	610	61
Pentanol	71-41-0	360	73
Aliphatic Hydrocarbon	69430-33-7	2,450	245
Ethyl nonafluoroisobutyl ether	163702-06-5	200	20
Ethyl nonafluorobutyl ether	163702-05-4	200	20
1,2-Trans-dichloroethylene	156-60-5	7,900	790
Methyl nonafluoroisobutyl ether	163702-08-7	200	20
Methyl nonafluorobutyl ether	163702-07-6	200	20
Poly(dimethylsiloxane)	63148-62-9	1,000	100
Ethanol	64-17-5	18,800	1,880
1,1-difluoroethane	75-37-6	27,000	2,700
Propyl acetate	109-60-4	8,350	835
Acetone	67-64-1	7,800	4,800
Naphtha (petroleum), hydrotreated light	64742-49-0	3,500	350
Hydrotreated Heavy Alkanes	64742-52-5	1,000	100
C9-15 Heavy Aromatic Hydrocarbons	68132-00-3	2,450	245
Middle Alkanes	64742-46-7	3,500	350
Light Aromatic Hydrocarbons; Stoddard Solvent	8052-41-3	3,500	350

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Compound	CAS No.	Short-term ESL (µg/m³)[A]	Long-term ESL (µg/m³)[A]
1,2,4-Trimethylbenzene	95-63-6	4,400	54
2-(2-butoxyethoxy) ethanol	210818-08-9	600	60
Amyl acetate	628-63-7	2,700	270
2-methylbutyl acetate	624-41-9	2,700	270
VOC-u	-	2	0.2
cis-3-Pentenenitrile (C3PN)	4635-87-4	120	12
trans-3-Pentenenitrile (T3PN)	16529-66-1	120	12
Nicotinonitrile (3-Pyridinecarbonitrile)	100-54-9	2	0.2
Phenyl Propylene Glycol Boronate (PPGB)	-	2	0.2
Propylene Glycol	57-55-6	1,560	156
BDP		2	0.2
ACA	373-04-6	100	10
BHMT	143-23-7	16	0.54
Isophorone	78-59-1	230	23
Methacrylic acid	79-41-4	180	18
MPMD	15520-10-2	250	25
NHA	111-26-2	100	10
Propylene glycol t-Butyl ether	57018-52-7	730	73
Lube Oils	-	1,000	100
Octatriene	-	300	30
oxybismethane	115-10-6	19,000	1,900
1-Butene	106-98-9	19,000	1,600
TBC	98-29-3	20	2
PBCB	-	2	0.2
CPI	-	2	0.2
Chloroform	67-66-3	100	10
Benzaldehyde	100-52-7	90	9
DCH	-	2	0.2
HMI	-	2	0.2
MEK	78-93-3	18,000	2,600
N112	-	2	0.2
Vinyl Acetate	108-05-4	420	300
Dichloromethane	75-09-2	3,600	350

[A] TCEQ, Effects Screening Level List, http://www.tceq.state.tx.us/toxicology/esl/list_main.html/#esl_1; updated September 30, 2015.

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3.2. GENERAL PSD MODELING APPROACH

PSD air quality dispersion modeling analyses are organized into two major sub-sections based on U.S. EPA modeling guidance: the Preliminary (Significance) Analysis and the Cumulative (Full Impact) Analysis. Per EPA Guidance, the Significance Analysis considers the emissions associated *only* with the proposed project to determine whether it will have a significant impact upon the surrounding area. The modeled ground-level concentrations (GLCs) are compared to the corresponding SILs to determine whether any modeled GLCs at any receptor locations are greater than the SIL (i.e., "impact area").

If the Significance Analysis reveals that modeled GLCs for a particular pollutant and averaging period are greater than the applicable SIL, a Full Impact Analysis will be performed within the impact area.[5] The Full Impact Analysis includes a NAAQS analysis and a PSD Increment analysis.

For this project, no criteria pollutant shows a significant impact, as determined based on SILs; thus, a Full Impacts Analysis is not required.

A summary of the tasks that are performed in a standard PSD Class II area air quality modeling analysis is presented in the flow chart provided as Figure 3-1. Special considerations for pollutants and each analysis are discussed in detail below.

[5] Code of Federal Regulations, Title 40-Protection of Environment, Part 51, Appendix W.

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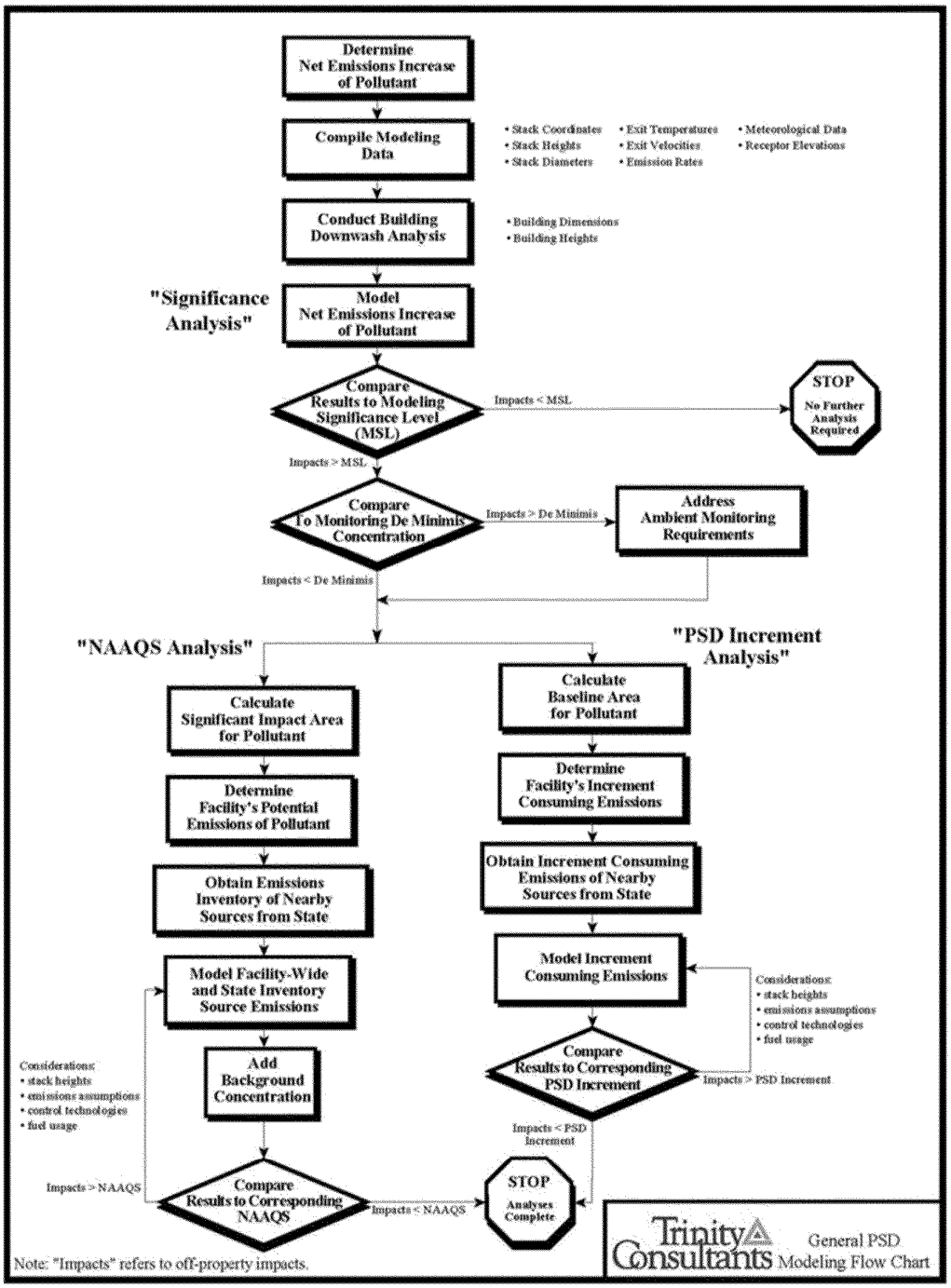
Figure 3-1. PSD Modeling Flowchart



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3.2.1. Significance Analysis

The Significance Analysis is conducted to determine if the emissions increases from a project cause a significant impact upon the area surrounding the facility. "Significant" is defined by ambient concentration thresholds referred to as the Significant Impact Levels (SIL).

In the Significance Analysis, the increase in emissions of NO_2 (1-hour and annual averaging periods), CO (1-hour and 8-hour averaging periods), and SO_2 (1-hour, 3-hour, 24-hour, and annual averaging periods) from the project were evaluated to determine whether they have the potential for a significant impact upon the area surrounding the Victoria Plant. Per EPA and TCEQ modeling guidance, all impacts for the Significance Analysis are reported as the highest first high (H1H) modeled concentration.[6] If the highest ambient concentration for a pollutant is less than the SIL when emissions increases from only the project are modeled, then further analysis (NAAQS) is not required.

The Significance Analysis determines whether INVISTA is required to conduct further analyses for the modeled pollutant for the averaging period and also defines the radius of impact (ROI) within which a Full Impact Analysis is required. According to EPA guidance, the ROI for an air quality dispersion modeling analysis is the farthest distance from the center of the proposed emissions source to the receptor where modeled GLCs are equal to or greater than the applicable SIL for each corresponding averaging period. The largest radius for each pollutant, regardless of averaging period, will be used in the air quality dispersion modeling analysis to establish the pollutant-specific ROI.

As stated above, no criteria pollutant shows a significant impact, as determined based on SILs; thus, a Full Impacts Analysis is not required.

[6] Ibid.

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4. AREA MAP

The project will be located at INVISTA's Victoria Site, 2695 Old Bloomington Road North, Victoria, Texas 77905. The plant is situated in a rural area approximately 10 miles so utheast of the city of Victoria at Latitude 28°40'41" North, Longitude 96°57'17" West. The Victoria Site is currently used for INVISTA's chemical manufacturing facility (nylon intermediates plant). A local map is provided at the in Figure 4-1.

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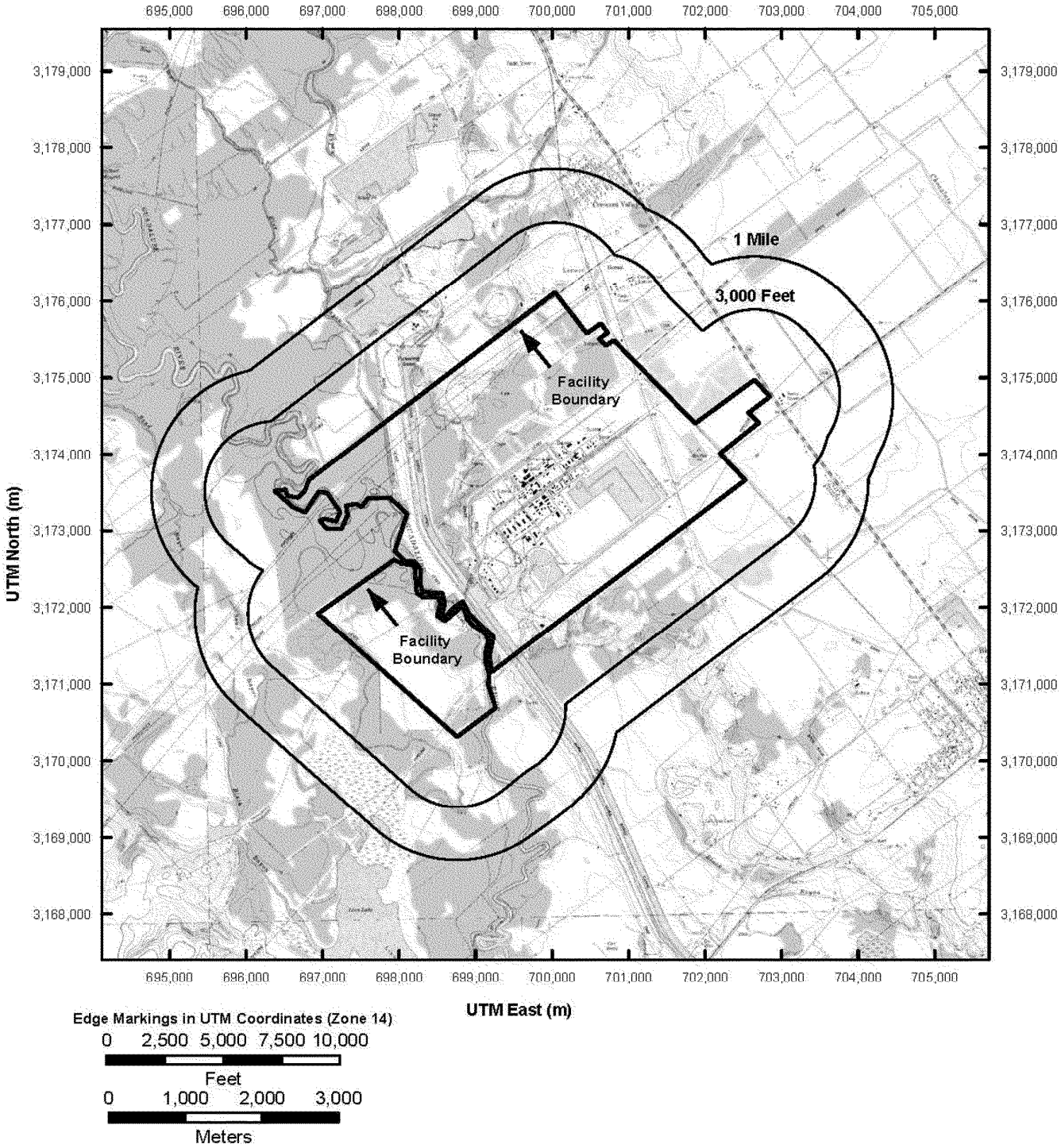
Figure 4-1. Area Map



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5. PLOT PLAN

A complete plot plan depicting the locations of the Victoria facility modeled sources, building structures, and property line is provided in Appendix C.

In all air quality dispersion modeling analysis input and output data files, the location of emission sources, structures, and receptors are represented in the Universal Transverse Mercator (UTM) coordinate system. The U.S. EPA and the TCEQ require that coordinates for permits and air quality dispersion modeling analyses be represented in the UTM system. The UTM grid was originally created by the Defense Mapping Agency of the United States as a special grid for military use throughout the world. In this grid, the world is divided into 60 north-south zones, each covering a strip 6° wide in longitude. The INVISTA Victoria site is located in UTM Zone 14. In each zone, coordinates are measured north and east in meters. The northing values are measured continuously from zero at the Equator, in a northerly direction. A central meridian through the middle of each 6° zone is assigned an easting value of 500,000 meters (m). Grid values to the east of this central meridian, as in the case of the INVISTA Victoria Plant, are greater than 500,000. The center of the INVISTA Victoria Plant is located near UTM coordinates 699,726 m East and 3,173,206 m North, based on the North American Datum (NAD) of 1927.

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E 699000
E 699400
E 699800
E 700200
E 700600
E 701000
E 701400
N 3172400
N 3172800
N 3173200
N 3174000
BARGE SLIP
WEST LANDFILL
CONSTRUCTION PARKING LOT
WATER COOLING BASIN
SOUTHEAST LANDFILL
WETLANDS
CANAL ROAD
SCALE IN METERS
TRUE NORTH
PLANT NORTH
WAID ENVIRONMENTAL
INVISTA S.à r.l.
NAD 83 VICTORIA PLANT PLOT PLAN

6. AIR QUALITY MONITOR DATA

The Victoria Plant is located in Victoria County, and is located within Air Quality Control Region (AQCR) 214, as described in 40 CFR §81.136.[7] The portion of this AQCR that contains Victoria County has been designated by the United States Environmental Protection Agency (U.S. EPA) as "unclassifiable" or "in attainment" for all pollutants in regards to the NAAQS.[8] Issues related to the air quality monitoring data proposed for the air quality analysis are discussed below.

6.1. PRE-CONSTRUCTION MONITORING

The U.S. EPA's monitoring de minimis concentrations establish the levels at which a facility needs to conduct pre-construction ambient air quality monitoring for pollutants subject to PSD review in order to evaluate the existing air quality. If the air quality dispersion modeling analyses show that maximum modeled GLCs from the project emissions increases in the Significance Analysis do not exceed the U.S. EPA monitoring de minimis concentrations, pre-construction monitoring may be avoided. Monitoring de minimis concentrations for the pollutants of concern are summarized in Table 6-1.

Table 6-1. Monitoring De Minimis Concentrations

Pollutant	Averaging Period	Monitoring *De Minimis* Concentration (SMC) (µg/m³)
NO_2	1-Hour	--
	Annual	14
CO	1-hour	--
	8-hour	575

Impacts from the project are less than the SMCs listed above and preconstruction monitoring is not required.

[7] Code of Federal Regulations, 40 CFR §81.136, December 16, 2015.

[8] http://www.tceq.state.tx.us/airquality/sip/victoria-sip/vic-status, December 16, 2015.

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The following sections discuss the Victoria Plant ADN Unit emission sources, other on-property sources and the methodology for obtaining the off-property industrial emission sources that were included in the air quality dispersion modeling analysis.

7.1. ON-PROPERTY PROJECT SOURCES

All on-site project related emissions sources, including fugitive releases, are represented as point, pseudo-point, area, or volume sources for modeling purposes. The following sections describe the methodology that was used to characterize the source parameters for the sources under consideration as well as the methodology used to determine the emission rates for each of the sources. A summary of the on-property source parameters and emission rates associated with this project is included in Appendix B of this report.

7.1.1. Source Parameters

The following procedures were utilized to develop the source inventory for the point sources at INVISTA ADN Unit:

7.1.1.1. Point Sources

- Flares (EPNs 10FLR-001,2,3,3A, 10FLR-004, 10FLR-004A, 10FLR-004B, 10FLR-004C, 10FLR-TMP, 10FLR-ALT, and 10FLR-005) will be modeled using the following parameters, per TCEQ guidance:
  - Velocity = 20 m/s
  - Temperature = 1,273 K
  - The heat release and effective flare diameter are calculated using the following methodology using TCEQ guidance.

    To model emissions from the flares, stack parameters are determined using TCEQ guidance obtained from the *Air Quality Modeling Guidelines*[9]. The effective stack diameter (D) is calculated using the following equations:

    $$D(m) = \sqrt{10^{-6} \cdot q_n}$$

    $$q_n = q \cdot (1 - 0.048\sqrt{MW})$$

    Where:
    q = normal gross heat release of hypothetical flared material
    MW =molecular weight of hypothetical flared material

    The effective flare diameter calculations are presented in Appendix H.

[9] Texas Commission on Environmental Quality, *Air Quality Modeling Guidelines*, APDG-6232, Austin, TX, April 2015, p. 73.

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- Sources with raincaps or horizontal discharges are modeled as pseudo-point sources with the following parameters:

  Velocity = 0.001 m/s
  Diameter[10] = 0.001 m
  Temperature[11] = 0 K

- Tanks are modeled as pseudo-point sources.

7.1.1.2. Area Sources

Fugitive emissions associated with the alternative flare for vent headers (10FLRALTF) are modeled as an area source. For area sources, the dimensions (i.e. length and width) of the modeled source are determined based on the geographical location where emissions could occur. Release heights are reflective of the midway height from ground-level to the maximum potential release height as representative emissions are equally distributed throughout the source area. The source parameters are based on the physical dimensions of the source. Area sources are depicted geographically using the southwest corner as a pivot point and the axis degrees as an indicator of the source configuration relative to the pivot.

Plot plans depicting the location of the applicable sources considered in the Significance Analysis are provided in Section 5.

7.1.1.3. Volume Sources

The fugitive emissions associated with leakages from process piping and equipment, vent headers, tank piping and buildings (EPNs 10FUG, 10MSS-001, 10FUG2, and 10MSS-002) are represented as volume sources. In general, volume source dimensions are based on the criteria documented in Table 7-1 below.

Table 7-1. Volume Source Dimension Criteria

Fugitive Source Location	Horizontal Dimension	Vertical Dimension
Process or piping fugitives (including MSS) inside a building	Building length and width	Building height
Process or piping fugitives (including MSS) located near a tank or loading spot	Length and width of area occupied by fugitive source equipment associated with the tank and loading spot	Tank or loading spot height

Detailed calculations of the volume source parameters are provided in Appendix B of this document. Note that in development of the source inventory for the volume sources at the Victoria Plant, the sources were split into multiple volume sources in the shape of the actual sources, as warranted. Emission rates were then equally distributed among the multiple volume sources.

According to EPA guidance for AERMOD, the initial lateral dimension ($\square_{y0}$) of a series of volume sources is set equal the side length divided by 2.15 while $\square_{y0}$ for single volume sources is set equal the side length divided by 4.3.[12] The initial vertical dimension ($\square_{z0}$) is calculated per EPA guidance (for surface based sources and elevated

[10] Actual diameters are used where available; however, please note that some sources modeled as pseudo-point sources have no physical diameter.

[11] As per the nature of operation, some tanks operate consistently at higher temperatures; hence, such tanks are modeled at their actual temperatures instead of ambient temperature.

[12] Table 3-1, User's Guide for the AMS/ EPA Regulatory Model-AERMOD, EPA-454/B-03-001, September 2004.

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sources on or adjacent to a building) as the volume height (building height) divided by 2.15. The release height is set equal to one-half the volume height.

7.1.2. Modeled Emission Rates Determination

In the development of various source emission rates at the ADN Unit, the following methodology was used:

- For NO_2 and CO hourly averaging periods, only modified sources are modeled. This is because no increase in hourly production is needed for the upstream/downstream sources (boilers) in order to meet the projected annual production rates. Since there will not be any hourly emissions increases from the affected upstream/downstream sources, only modified sources are included in short-term emissions analysis. The hourly emission rates are obtained by using the following equation:

$$\text{[illegible]} = \frac{\text{[illegible]}}{4.38}$$

where:
PAE = Project Actual Emissions (tpy)
BAE = Baseline Actual Emissions (tpy)
4.38 = conversion factor from tpy to lb/hr

- For NO_2 annual averaging period, the modified sources and affected upstream/downstream sources including support facilities are modeled.

- For SO_2, whose emissions increases are less than the PSD Significant Emission Rate (SER), the permit-to-permit maximum allowable emissions increase are modeled for both the short-term and long-term averaging periods.

- The conversion from NO_X emission rates to modeled NO_2 emission rates is accomplished using the Tier 2 Ambient Ratio Method (ARM) wherein a short-term ARM of 0.80 and annual ARM of 0.75 are employed.

- For sources that can either operate in normal mode or MSS mode in a given hour, the normal and MSS emissions are conservatively represented with the ability to occur simultaneously when determining the project proposed emission rate. If source parameters are different in each of the different modes, the worst case is modeled.

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8. SELECTION OF MODEL OPTIONS

The version dated 15181 of the AERMOD air dispersion model is used to estimate maximum ground-level off property concentrations of CO, NO_2, and SO_2.[13] For convenience, a concatenated meteorology file is used in CO, NO_2, and SO_2 short-term analyses. The annual averaging periods are run in separate modeling files, separated by year.

In this analysis, modeling is performed using the regulatory default options, which include stack heights adjusted for stack-tip downwash, buoyancy-induced dispersion, and final plume rise. Ground-level concentrations occurring during "calm" wind conditions are calculated by the model using the calm processing feature. Regulatory default values for wind profile exponents and vertical potential temperature gradients are used since no representative on-site meteorological data are available. As per U.S. EPA requirements, direction-specific building dimensions were used in the downwash algorithms.

[13] EPA, Office of Air Quality Planning and Standards, Federal Register Vol. 70 / No. 216, pp. 68,218-68,261, 40 CFR 51, Appendix W, Revision to Guideline on Air Quality Models, November 9, 2005.

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9. TERRAIN

The Victoria Plant is located in Victoria County, Texas. The terrain surrounding the Victoria Plant varies in elevation from 0.3 feet (0.1 meters) to 110 feet (34 meters) within 10 km of the Victoria Plant. The average elevation at the Victoria Plant is approximately 66 feet (20 meters) above mean sea level.

AERMOD uses advanced terrain characterization to account for the effects of terrain features on plume dispersion and travel. AERMOD's terrain pre-processor, AERMAP, imports digital terrain data and computes a height scale for each receptor from Digital Elevation Model (DEM) data files. A height scale is assigned to each individual receptor and is used by AERMOD to determine whether the plume will go over or around a hill.

The receptor terrain elevations input into AERMAP are the highest elevations extracted from United States Geological Survey (USGS) Seamless database. The data extracted is 1/3 arc second (30 m) data for the area. For each receptor, the maximum possible elevation within a box centered on the receptor of concern and extending halfway to each adjacent receptor is chosen. This is a conservative technique for estimating terrain elevations in that it ensures that the highest terrain elevations are accounted for in the analysis. Source and building elevations are extracted in the same manner, using interpolated elevation values.

All existing and proposed sources and buildings are included at their actual heights above their respective ground level elevations.

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10. BUILDING WAKE EFFECTS (DOWNWASH)

The emission sources are evaluated in terms of their proximity to nearby structures. The purpose of this evaluation is to determine if stack discharges might become caught in the turbulent wakes of these structures. Wind blowing around a building creates zones of turbulence that are greater than if the building was absent.

10.1. GENERAL DISCUSSION

EPA has promulgated stack height regulations that restrict the use of stack heights in excess of "Good Engineering Practice" (GEP) in air dispersion modeling analyses. Under these regulations, that portion of a stack in excess of the GEP height is generally not creditable when modeling to determine source impacts. This essentially prevents the use of excessively tall stacks to reduce ground-level pollutant concentrations. The minimum stack height not subject to the effects of downwash, called the GEP stack height, is defined by the following formula:

$H_{GEP} = H + 1.5L$, where:

H_{GEP} = minimum GEP stack height,

H = structure height, and

L = lesser dimension of the structure (height or projected width).

This equation is limited to stacks located within 5L of a structure. Stacks located at a distance greater than 5L are not subject to the wake effects of the structure. The wind direction-specific downwash dimensions and the dominant downwash structures used in this analysis were determined using BPIP. In general, the lowest GEP stack height for any source is 65 meters by default.[14] None of the stacks at the Victoria Plant exceed a stack height of 65 m.

Direction-specific building dimensions and the dominant downwash structure parameters used as inputs to the dispersion models were determined using the *BREEZE-WAKE/BPIP* software, developed by Trinity Consultants, Inc. This software incorporates the algorithms of the U.S. EPA-sanctioned Building Profile Input Program with PRIME enhancement (BPIP-PRIME), version 04274.[15] BPIP-PRIME is designed to incorporate the concepts and procedures expressed in the GEP Technical Support document, the Building Downwash Guidance document, and other related documents.

The output from the BPIP-PRIME downwash analysis lists the names and dimensions of the structures, and the emission unit locations and heights. In addition, the output contains a summary of the dominant structure for each emission unit (considering all wind directions) and the actual building height and projected widths for all wind directions. This information is then incorporated into the data input files for the AERMOD air dispersion model.

All existing and proposed sources and buildings were included at their actual heights above their respective ground level elevations.

10.2. BUILDING DIMENSIONS

Appendix A provides a summary of structures that are considered in the modeling analysis with their corresponding heights.

[14] 40 CFR §51.100(ii).

[15] U S. Environmental Protection Agency, *User's Guide to the Building Profile Input Program*, Research Triangle Park, NC, EPA-454/R-93-038.

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11. RECEPTOR GRIDS

Based on TCEQ modeling guidance, two different receptor sets have been developed for air quality dispersion modeling analysis. For pollutants triggering PSD modeling, a receptor set was developed covering the region beyond the fence line. The fence line is the combined INVISTA/DuPont/Equistar fence line (corresponding to single property designation). The single property designation documentation is included in Appendix E. This fenceline represents the extents of the INVISTA Victoria Site property that have a physical barrier restricting public access. Access to the DuPont and Equistar properties is controlled by INVISTA via the fenceline and gates. Therefore, INVISTA has concluded that the DuPont and Equistar properties do not constitute ambient air. Although it did not trigger PSD modeling, the SO_2 impacts are modeled using the PSD fence line model setup. For all other modeling purposes, specifically the State Health Effects Evaluation, a receptor set was developed covering the region beyond the combined INVISTA/DuPont/Equistar property line.

For both receptor sets, the modeled ground-level concentrations are determined within four main Cartesian receptor grids. These four grids cover a region extending at least 10 km beyond the Victoria Plant ADN sources. The grids are defined as follows:

11.1. PSD MODELING RECEPTOR SET

- The "fence line grid" (corresponding to single property designation) is a discrete receptor grid with the receptors spaced at 25-m intervals along the combined INVISTA/DuPont/Equistar fence line. Figure 11-1 shows receptor locations for the PSD fence line grid. The fence line grid is at least 300 m away from the sources under consideration. Therefore, a tight grid was not developed.

- The "fine grid" contains 100-m spaced receptors extending at least 1 km from the sources under consideration, excluding the receptors within the fence line grid and the tight grid. Figure 11-2 shows receptor locations for the PSD fine grid.

- The "medium grid" contains 500-m spaced receptors extending 5 km from the sources under consideration, excluding the receptors within the fence line, tight and fine grids. Figure 11-3 shows receptor locations for the PSD medium grid.

- The "coarse grid" contains 1-km spaced receptors extending at least 10 km from the sources under consideration, excluding the receptors in the fence line, tight, fine, and medium grids. Figure 11-4 shows receptor locations for the PSD coarse grid.

11.2. STATE MODELING RECEPTOR SET

- The "property line grid" is a discrete receptor grid with the receptors spaced at 25-m intervals along the combined INVISTA/DuPont/Equistar property line. Figure 11-5 shows receptor locations for the State property line grid. The property line grid is at least 300 m away from the sources under consideration. Therefore, a tight grid was not developed.

- The "fine grid" contains 100-m spaced receptors extending at least 1 km from the sources under consideration, excluding the receptors within the property line grid and the tight grid. Figure 11-6 shows receptor locations for the State fine grid.

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- The "medium grid" contains 500-m spaced receptors extending 5 km from the sources under consideration, excluding the receptors within the property line, tight and fine grids. Figure 11-7 shows receptor locations for the State medium grid.

- The "coarse grid" contains 1-km spaced receptors extending at least 10 km from the sources under consideration, excluding the receptors in the property line, tight, fine, and medium grids. Figure 11-8 shows receptor locations for the State coarse grid.

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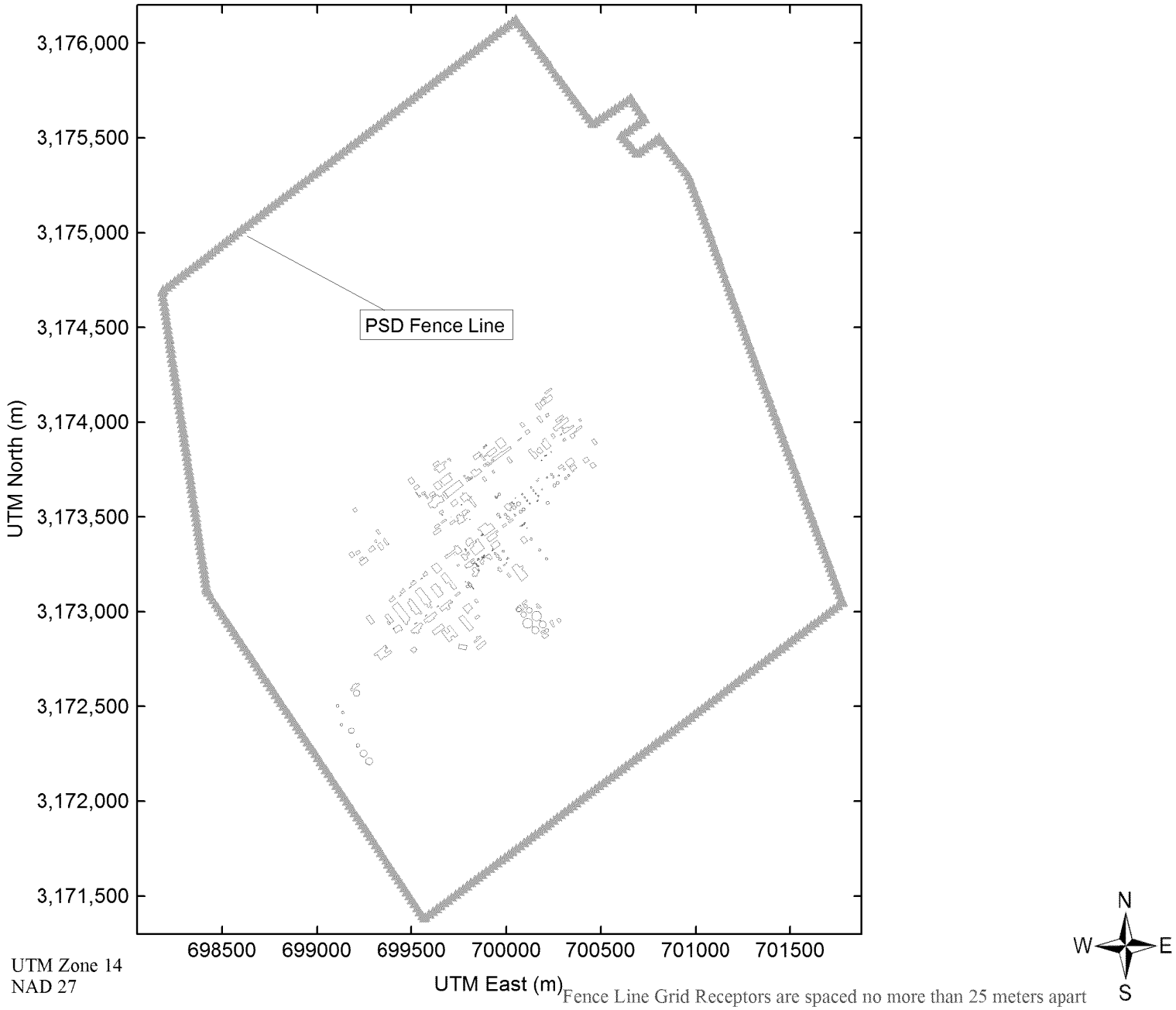
Figure 11-1. Receptor Locations for the PSD Fence Line Grid



Fence Line Grid Receptors are spaced no more than 25 meters apart

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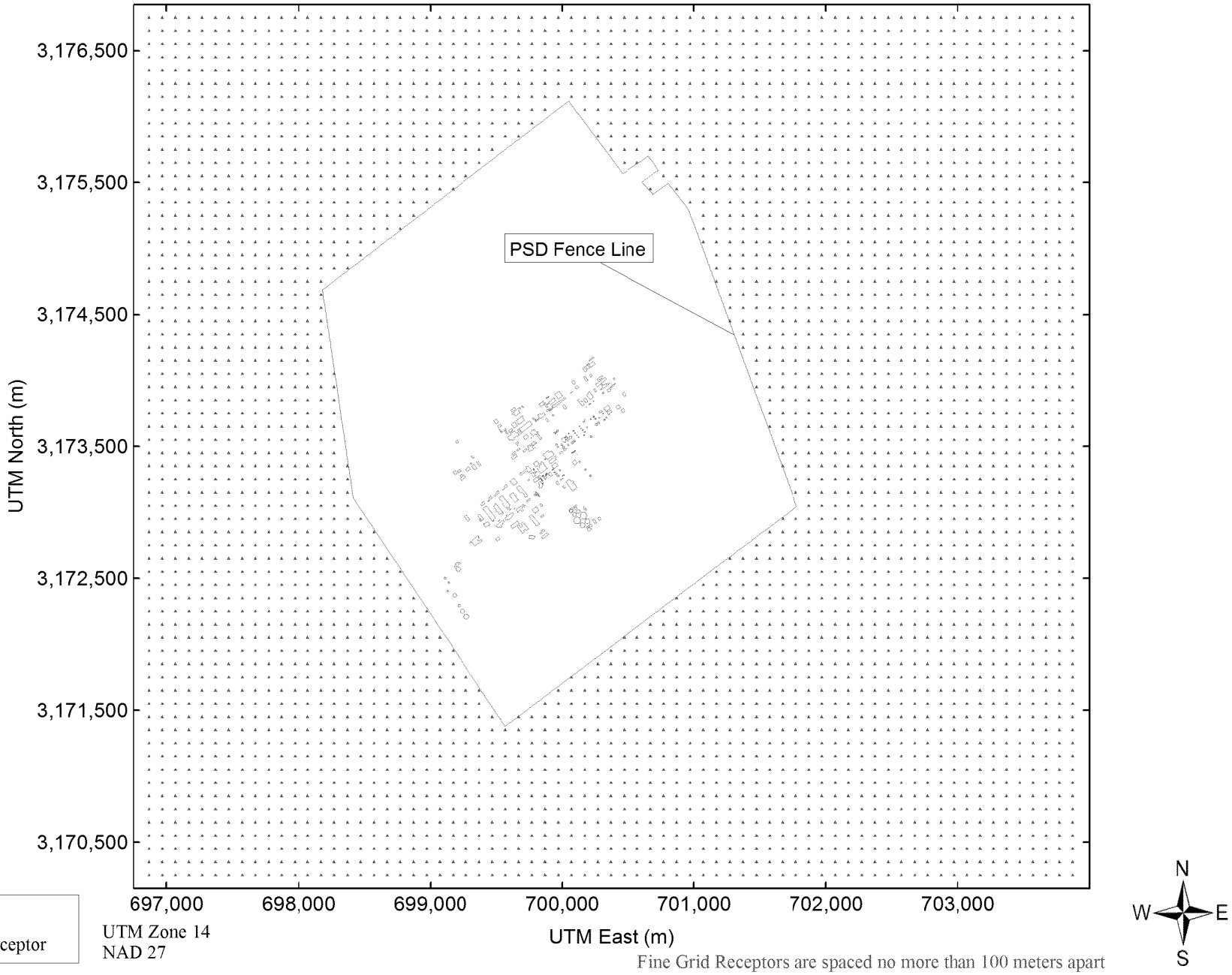
Figure 11-2. Receptor Locations for the PSD Fine Grid



Legend

▲ Fine Grid Receptor

UTM Zone 14
NAD 27

Fine Grid Receptors are spaced no more than 100 meters apart

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Figure 11-3. Receptor Locations for the PSD Medium Grid

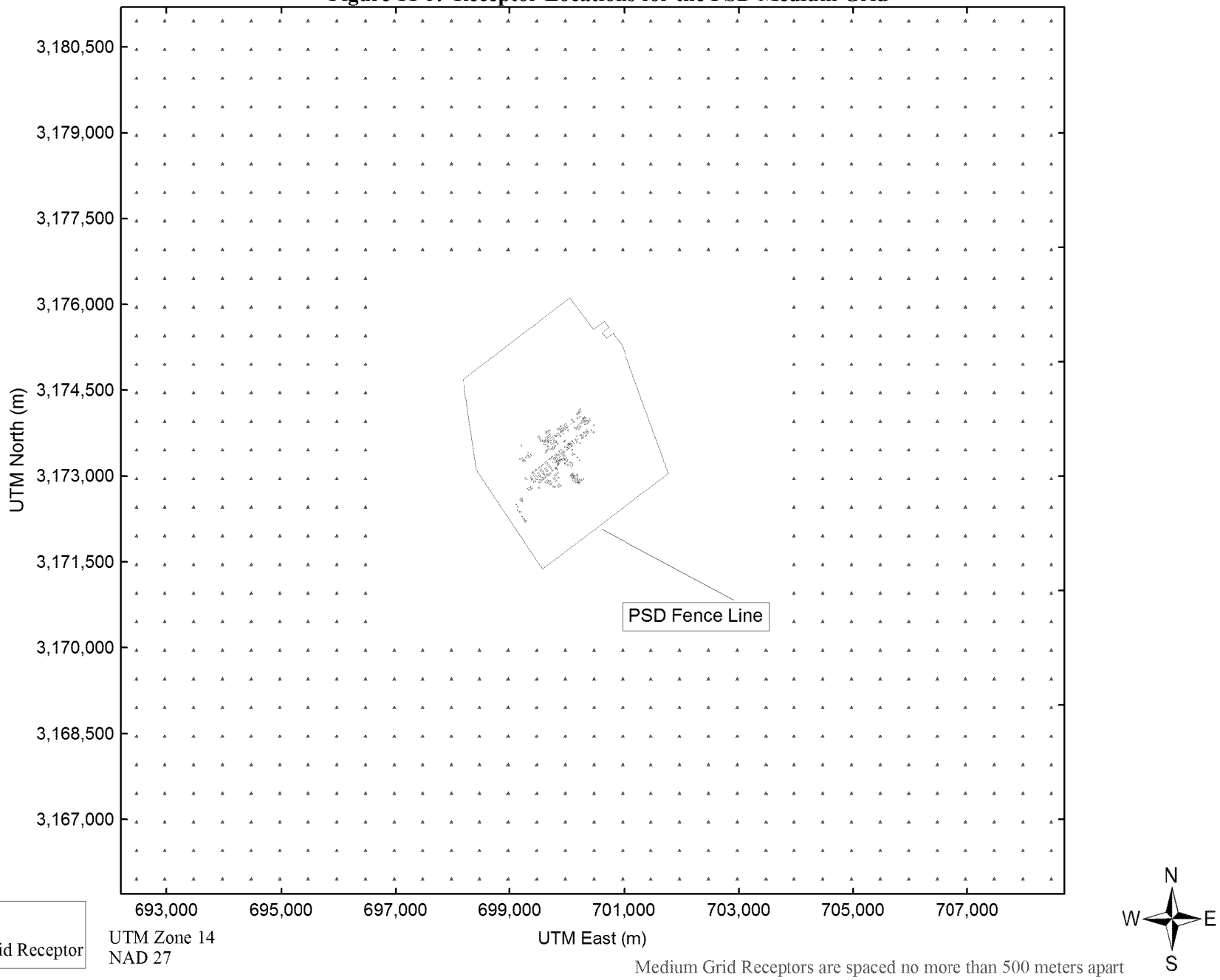

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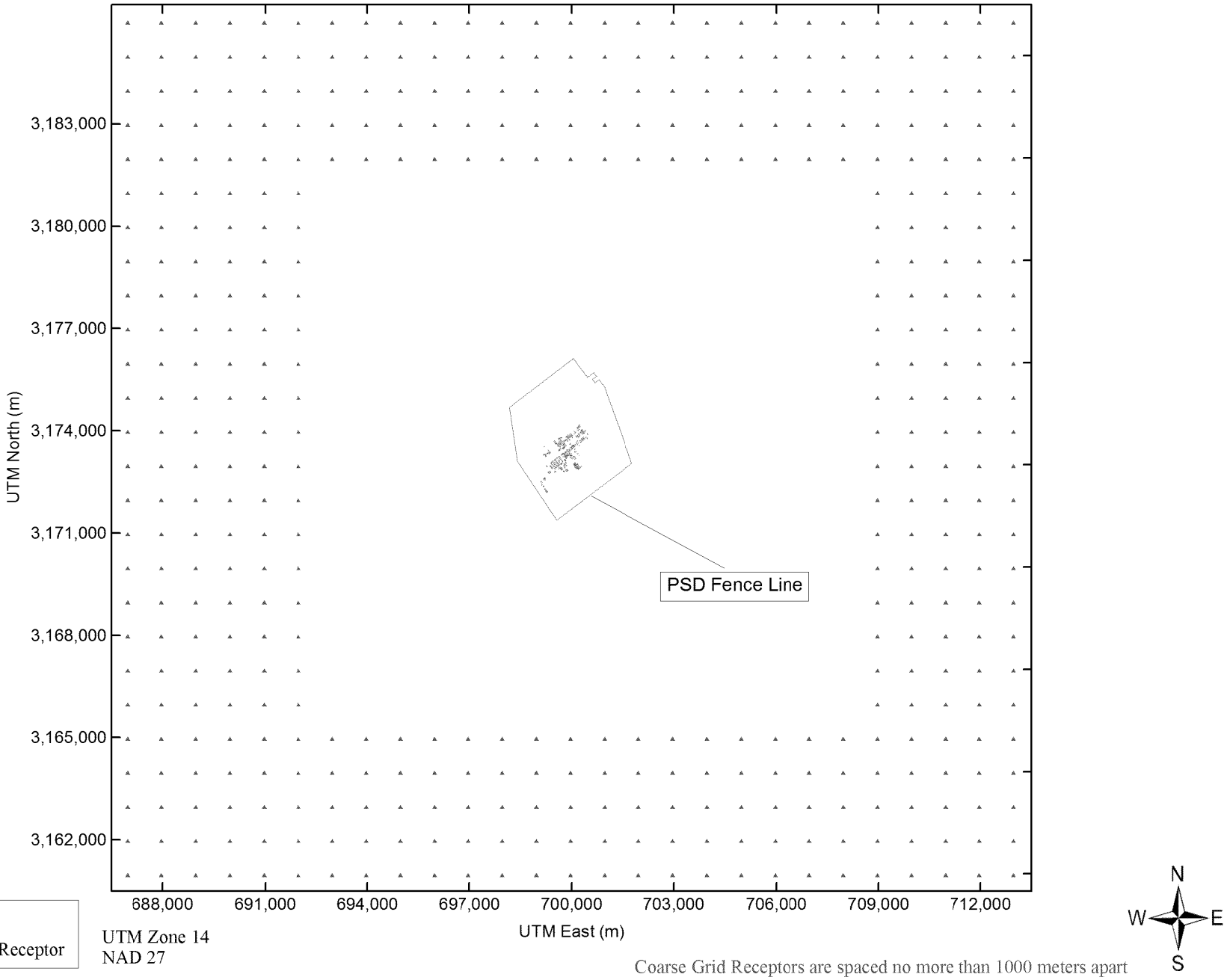
Figure 11-4. Receptor Locations for the PSD Coarse Grid



Coarse Grid Receptors are spaced no more than 1000 meters apart

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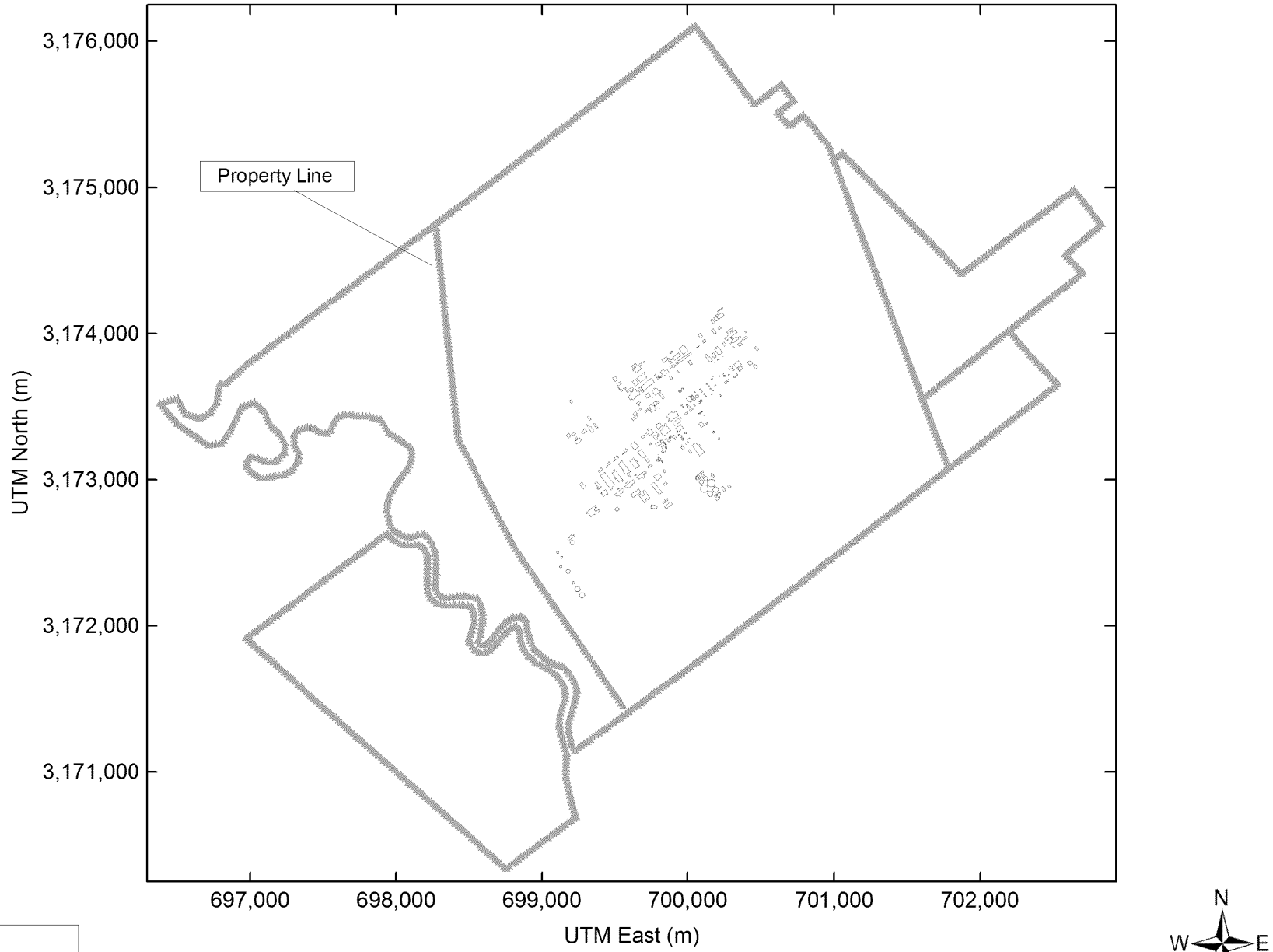
Figure 11-5. Receptor Locations for the State Property Line Grid



Legend

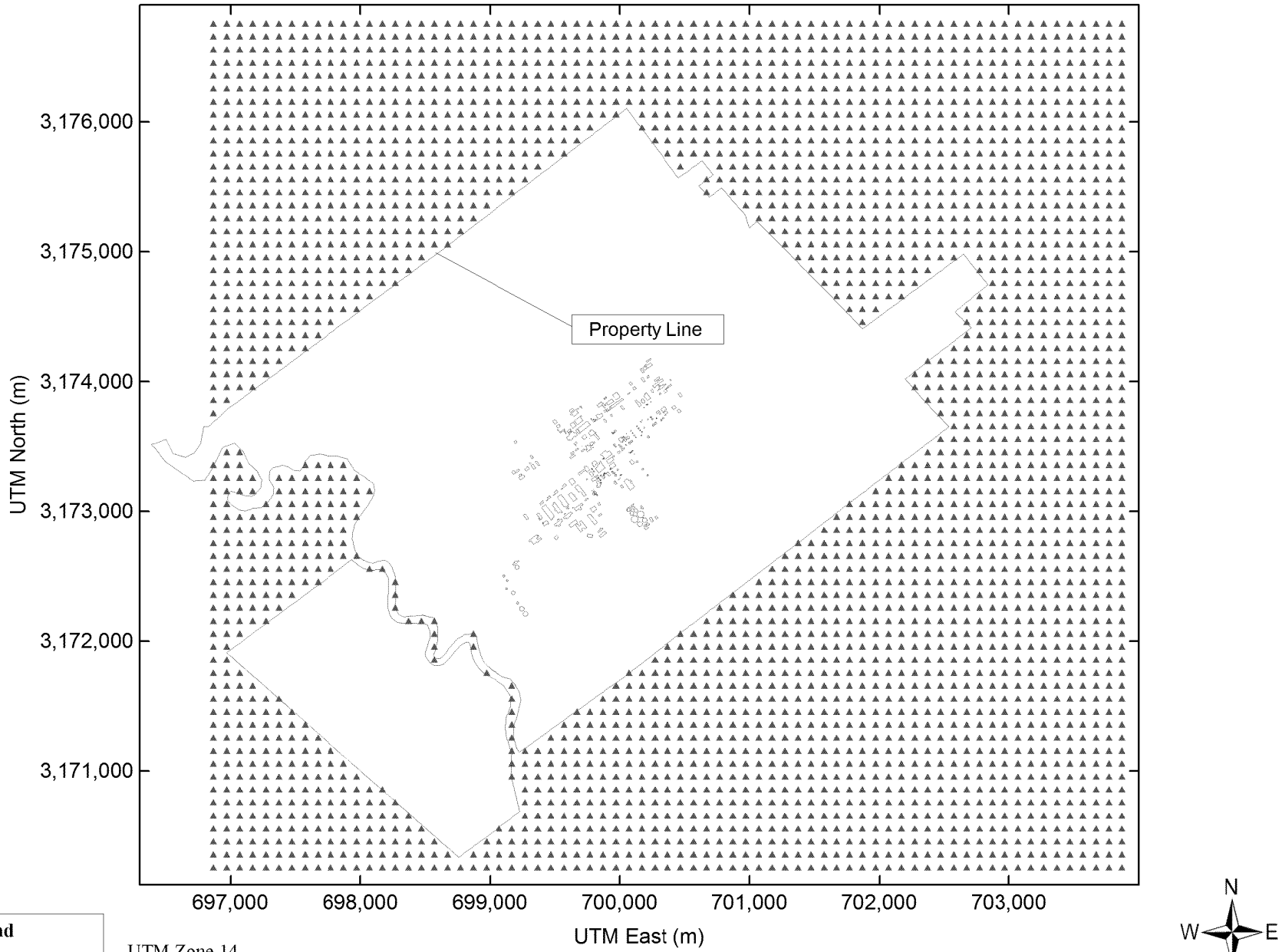
▲ Property Line Receptor

UTM Zone 14
NAD 27

Property Line Grid Receptors are spaced no more than 25 meters apart

N
W E
S

Figure 11-6. Receptor Locations for the State Fine Grid



Legend

▲ Fine Grid Receptor

UTM Zone 14
NAD 27

Fine Grid Receptors are spaced no more than 100 meters apart

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Figure 11-7. Receptor Locations for the State Medium Grid

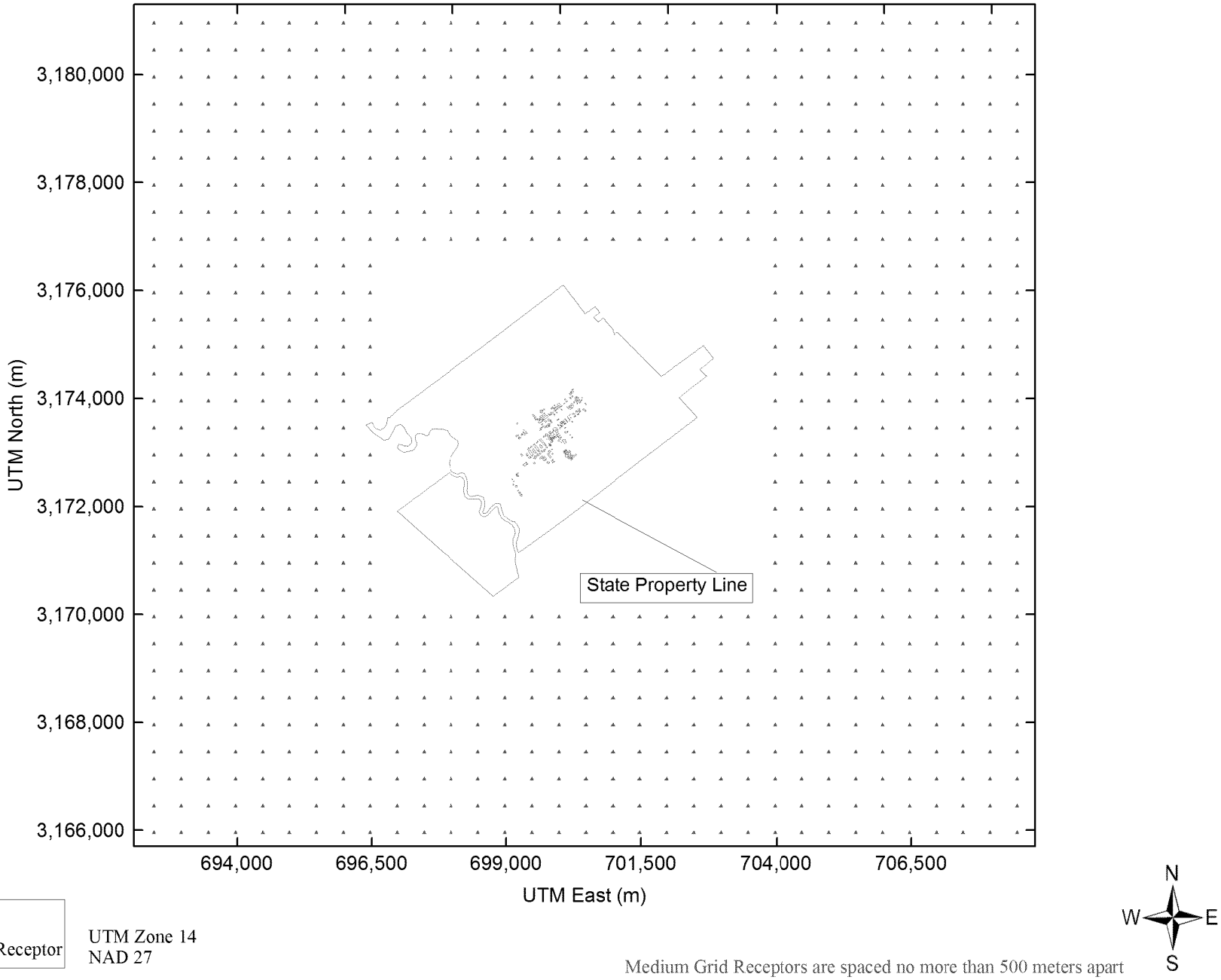

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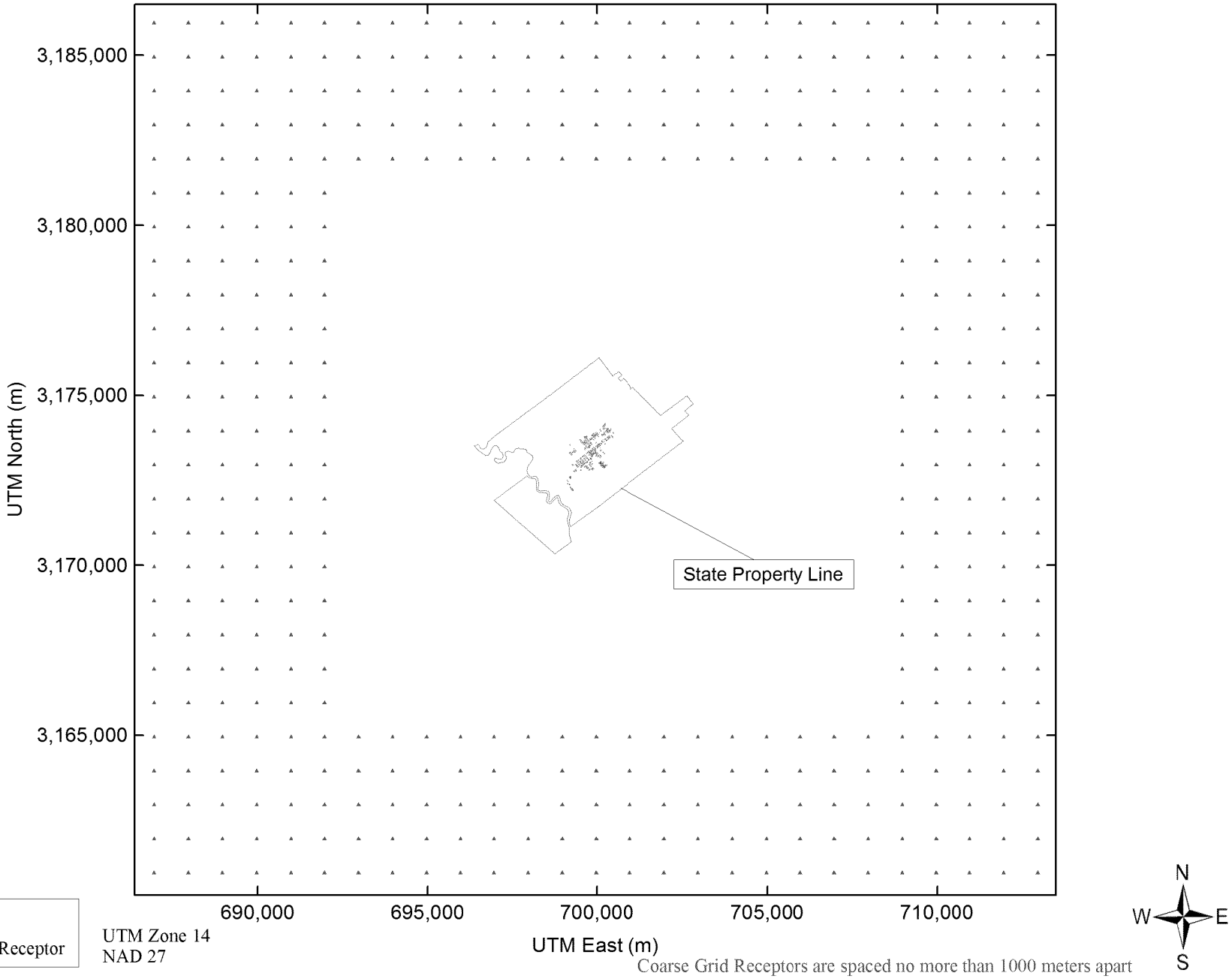
Figure 11-8. Receptor Locations for the State Coarse Grid



Legend

▲ Coarse Grid Receptor

UTM Zone 14
NAD 27

Coarse Grid Receptors are spaced no more than 1000 meters apart

12. METEOROLOGICAL DATA

As recommended by the TCEQ for modeling in Victoria County, pre-processed meteorological data files for the years 2008, 2009, 2010, 2011, and 2012 are based on surface observations taken from the Victoria Regional Airport (Surface ID: VCT, NWS station number 12912), and upper air observations taken from Corpus Christi (Upper Air ID: CRP, NWS station number 12924). The wind roses for Victoria Regional Airport from the years considered in this modeling analysis are provided in Figure 12-1 through Figure 12-5 to supplement the meteorological data used in the modeling analyses. The wind roses show the direction from which the wind is blowing.

According to the EPA AERMOD Users Guide, a land use analysis must be conducted to properly define surface characteristics, such as albedo, Bowen ratio, and surface roughness length, for input into the AERMET meteorological pre-processor. The AERMOD Users Guide provides surface characteristic parameters based on seasons and the following land use characteristics: water (fresh and sea), deciduous forest, coniferous forest, swamp, cultivated land, grassland, urban, and desert shrub land.[16]

Pre-processed meteorological files obtained from the TCEQ allow the choice of varying roughness length (i.e., short, medium, and long) based on the land use surrounding the facility under evaluation. The land use surrounding the Victoria Plant is predominantly cultivated land, grassland and deciduous forest a moderate density of existing commercial, industrial, and residential structures. The typical surface roughness for this type of land use is generally between 0.1 – 0.7 m, which corresponds to the medium surface roughness category.

An analysis performed using the latest version of AERSURFACE (v13016) confirms the appropriate surface roughness data set to be used in the air dispersion modeling analysis. AERSURFACE requires the input of land cover data from U. S. Geological Survey (USGS) National Land Cover Data 1992 archives (NLCD92), which is used to determine the land cover types for the user-specified location.[17] There is more recent NLCD than the 1992 data available, but it is not compatible with the current version of AERSURFACE. In this modeling analysis, the NLCD92 data was downloaded from the National Map Viewer and Download Platform through the following website: http://www.mrlc.gov/viewerjs/.

An AERSURFACE run using a 1 km radius circle centered at the facility is performed for the annual period. The resulting surface roughness estimate using AERSURFACE is 0.216 m. Per TCEQ guidance, since this value is between 0.1 and 0.7 m, the meteorological data with medium surface characteristics was used in the modeling analysis.[18] The AERSURFACE output file is included in Appendix F, and an electronic copy along with the USGS NLCD92 map are provided on the CD in Section 14 of this report.

[16] Section 4.7.7 of the EPA's AERMOD User Guide, Draft Version, January 1999.

[17] AERSURFACE User's Guide, EPA-454/B-08-001, January 2008.

[18] ftp://ftp.tceq.state.tx.us/pub/OPRR/APD/AERMET/AERMETv11103/BackgroundInformation/aermet.pdf, Date accessed: April 19, 2012.

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Figure 12-1. Frequency of Wind Speed and Direction for Meteorological Year 2008

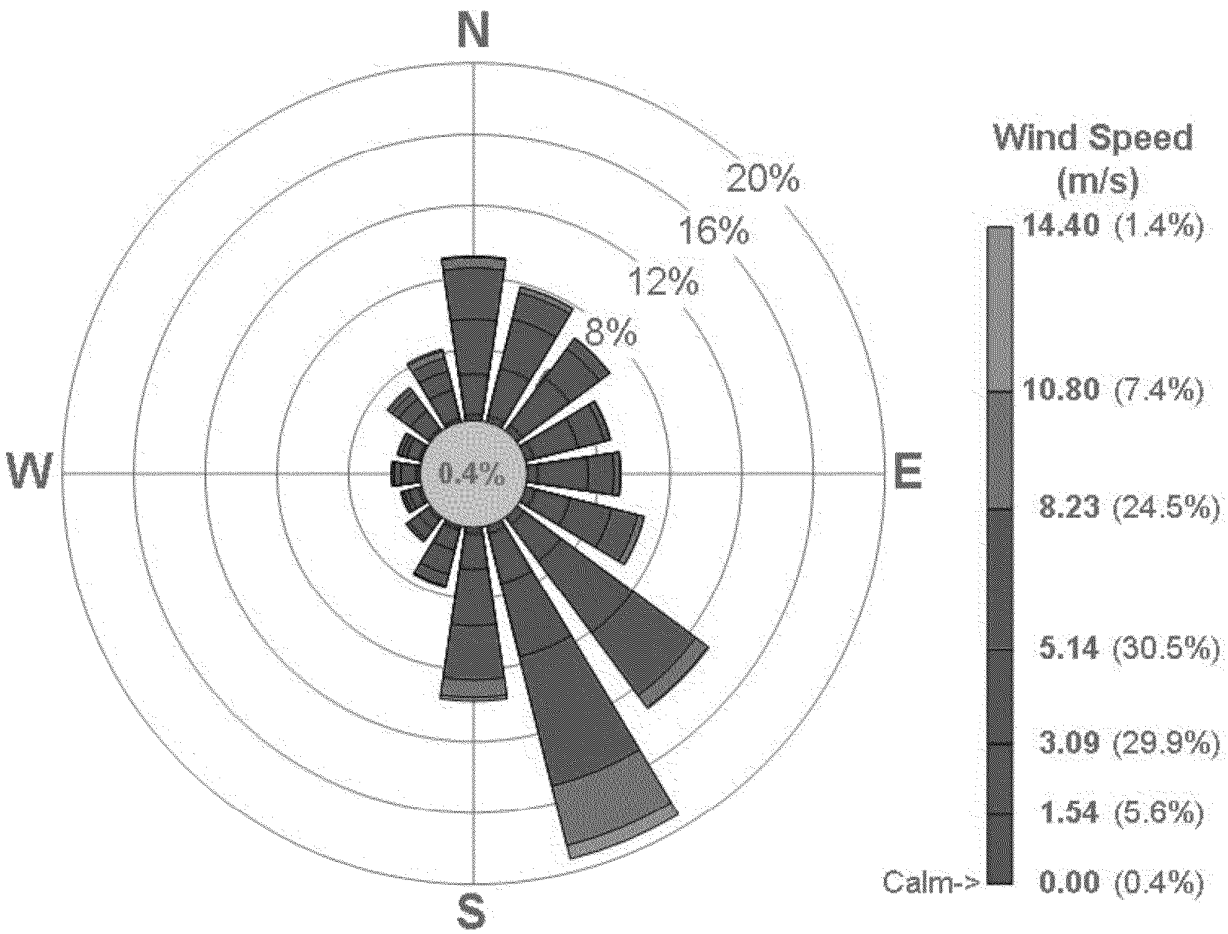

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Figure 12-2. Frequency of Wind Speed and Direction for Meteorological Year 2009

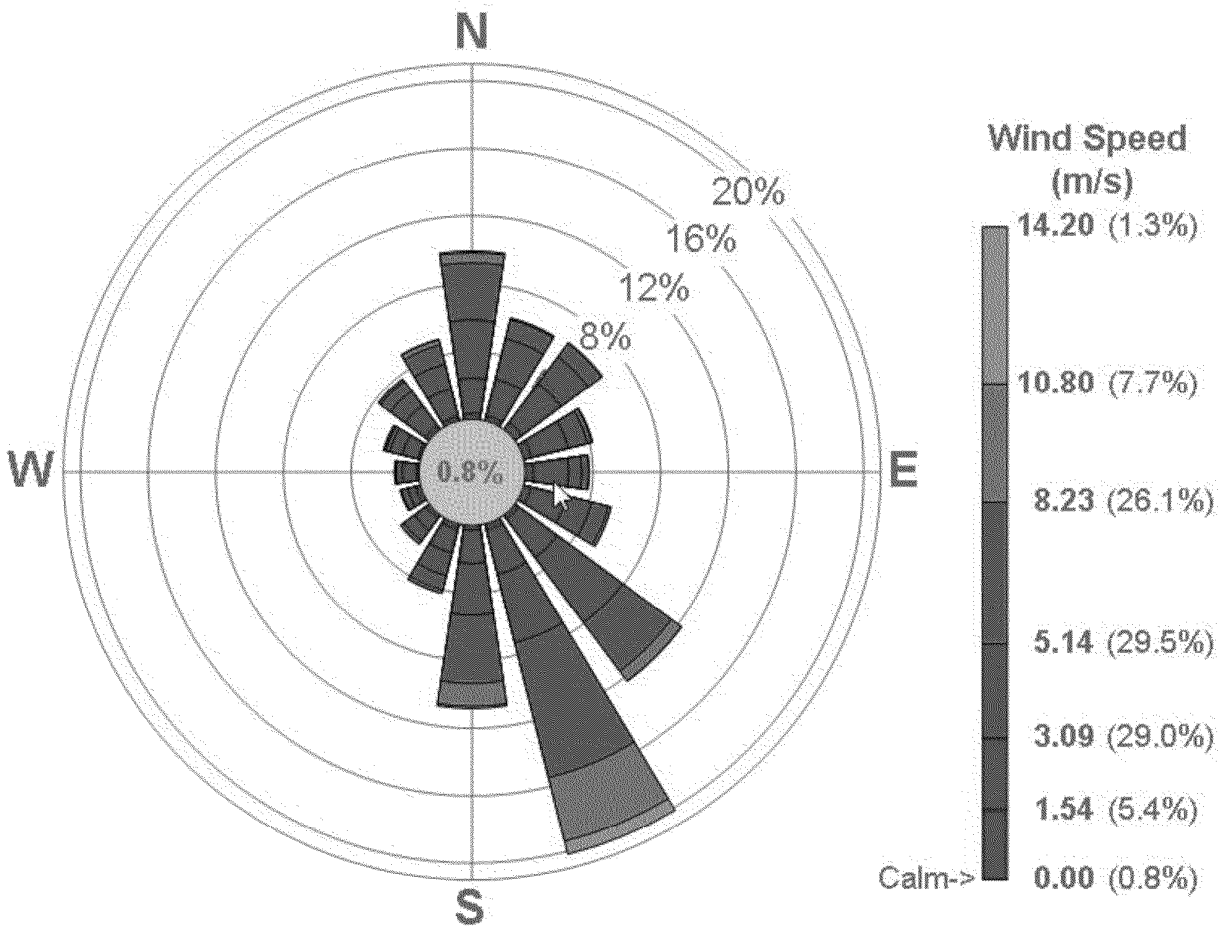

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Figure 12-3. Frequency of Wind Speed and Direction for Meteorological Year 2010

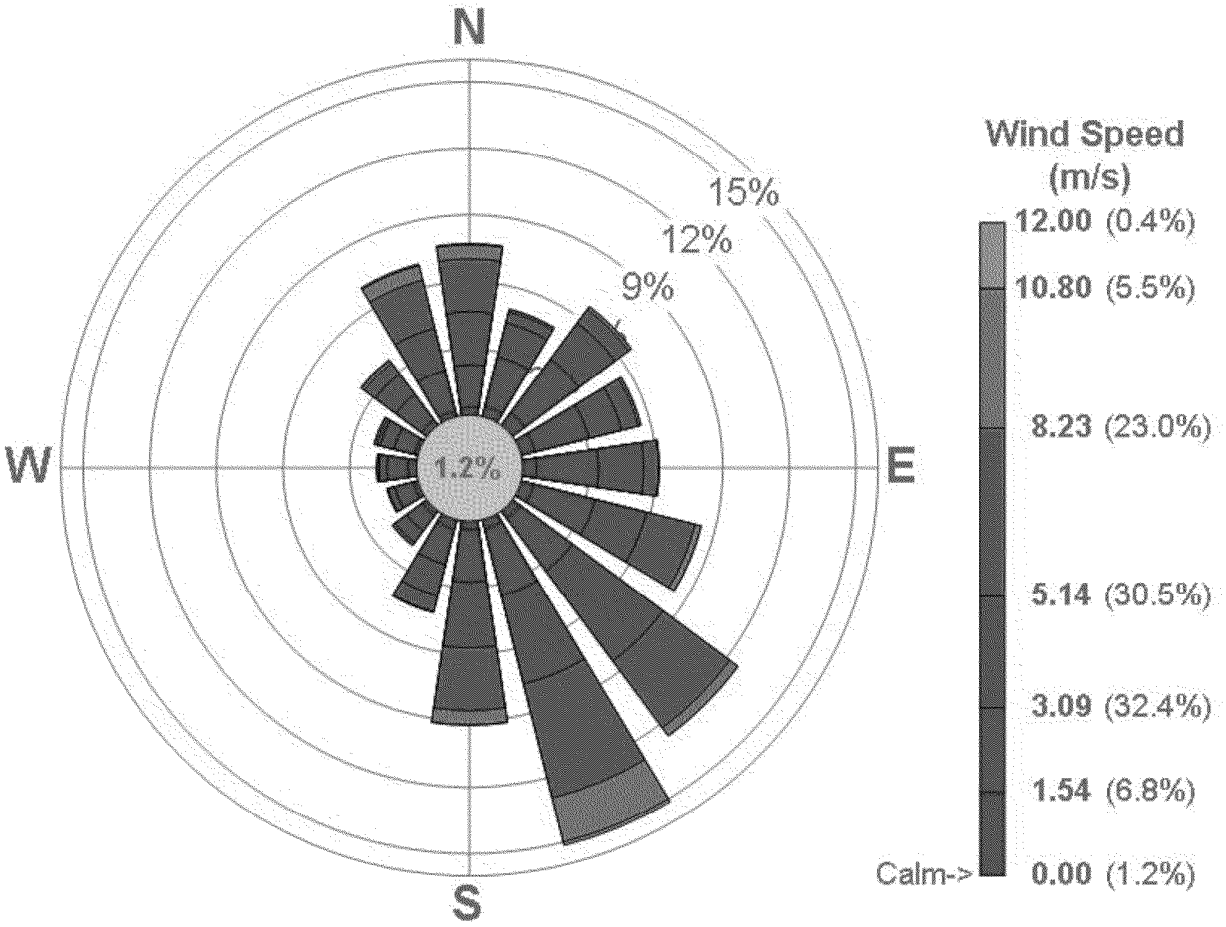

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Figure 12-4. Frequency of Wind Speed and Direction for Meteorological Year 2011

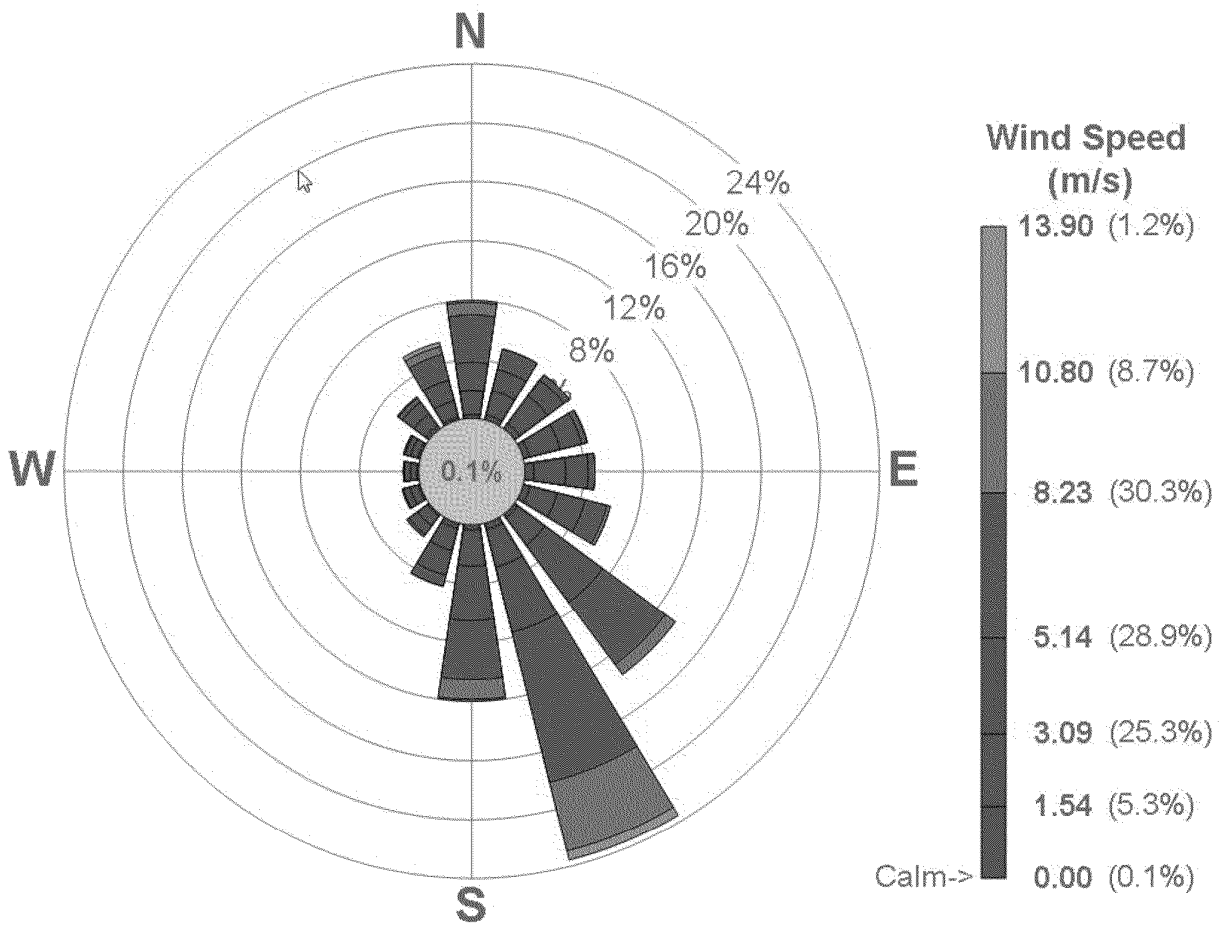

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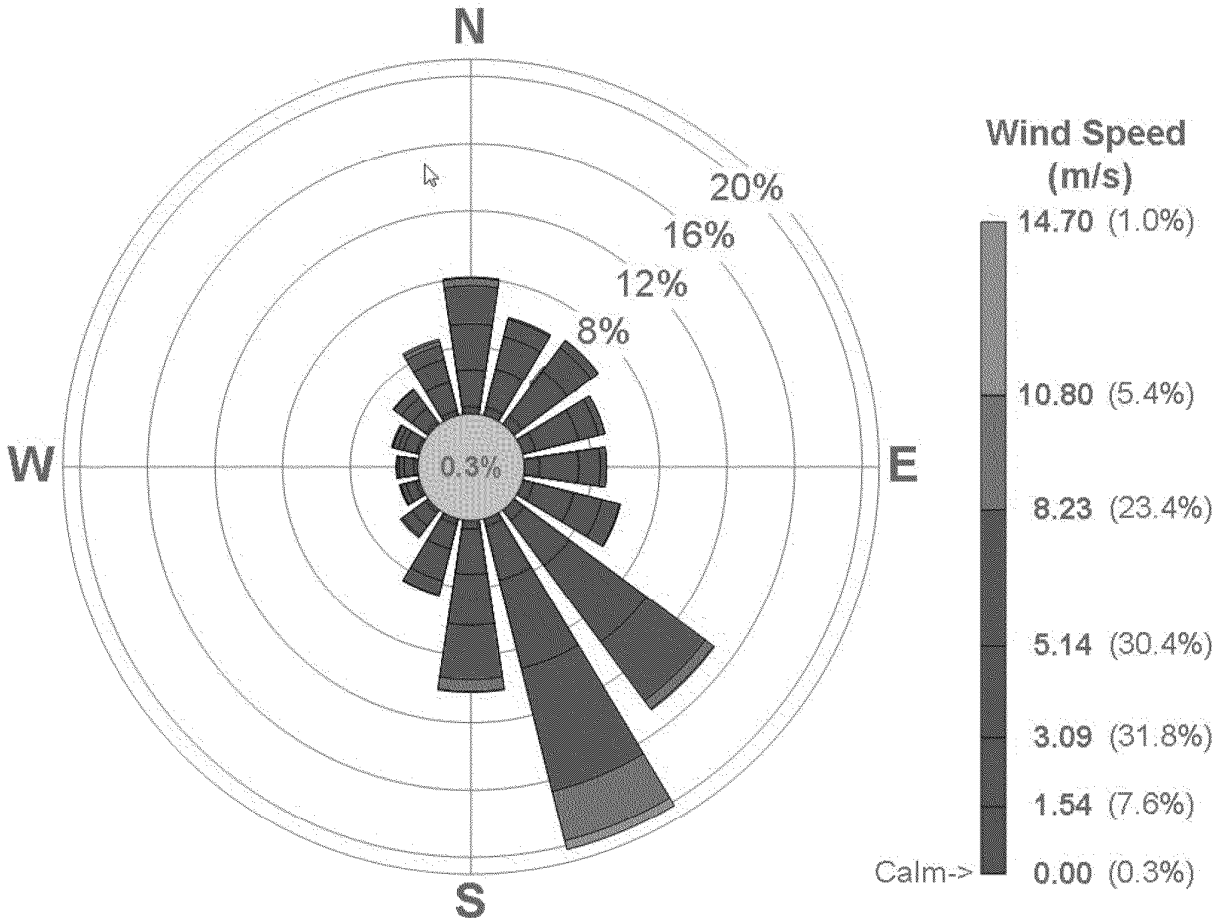
Figure 12-5. Frequency of Wind Speed and Direction for Meteorological Year 2012



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The following section details the results of the PSD Significance Analysis, the State NAAQS analysis, the State Property Line Analysis, the State Health Effects Analysis, the Ozone Impact Assessment, and the Additional Impacts Analysis (i.e., analyses of impacts on growth, soil and vegetation, visibility, and Class I Areas).

13.1. PSD SIGNIFICANCE ANALYSIS

The significance analysis involves modeling the impacts from on-site sources associated with the project to determine if the resulting concentrations exceed the SILs. The results of the AERMOD analysis are presented below in Table 13-1. All impacts are below the corresponding SIL and a Full Impacts Analysis is not triggered.

Table 13-1. PSD Significance Modeling Analysis Results

Pollutant	Averaging Period	UTM East (m)	UTM North (m)	GLC_{max} (µg/m³)	SIL (µg/m³)	Less than SIL?
CO	1-hr	698935.0	3172328.0	21.81	2000	Yes
	8-hr	699254.0	3171849.0	14.67	500	Yes
NO_2	1-hr	698921.0	3172349.0	5.23	7.5	Yes
	Annual	699120.0	3175407.0	0.58	1	Yes

13.2. STATE NAAQS ANALYSIS

The maximum modeled ground-level concentrations of SO_2 obtained using the approach described in Section 3 are presented and compared with applicable concentration standards below in Table 13-2. All impacts are below the corresponding SIL and a Full Impacts Analysis is not triggered.

Table 13-2. State NAAQS Modeling Analysis Results

Pollutant	Averaging Period	UTM East (m)	UTM North (m)	GLC_{max} (µg/m³)	SIL (µg/m³)	Less than SIL?
SO_2	1-hr	698991.0	3172245.0	0.125	7.8	Yes
	3-hr	698852.0	3172453.0	0.093	25	Yes
	24-hr	698977.0	3172266.0	0.026	5	Yes
	Annual	698949.0	3172307.0	0.002	1	Yes

13.3. STATE PROPERTY LINE ANALYSIS

The maximum modeled ground-level concentrations of SO_2 at and beyond the property line obtained using the approach described in Section 3 are compared with applicable concentration standards and the results are shown below in Table 13-3. The maximum modeled concentration is less than 2% of the State Property Line Standard and no further analysis is required.

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Table 13-3. State Property Line Modeling Analysis Results

Pollutant	Averaging Period	UTM East	UTM North	GLC_{max}	State Property Line Standard	GLC_{max} < 2% Standard?
		(m)	(m)	(µg/m³)	(µg/m³)	
SO_2	1-hr	698991.0	3172245.0	0.125	1,021	Yes

13.4. STATE HEALTH EFFECTS EVALUATION

As described in Section 3.1.4 of this modeling report, the speciated constituents were evaluated based on the TCEQ MERA guidance. MERA guidance provides a 12-step procedure for impact analysis. Each step leads to more detailed and refined requirements. If a pollutant can pass any one of the 12 steps, it passes the health impact analysis.

The emission rates used in the MERA analysis are based on tables provided in Appendix B. The ESL values are based on the latest ESL list published by the toxicology group of the TCEQ on September 30, 2015. The results of the MERA analysis are provided in Appendix G.

13.4.1. Step 1 to 3

Table 13-4 summarizes Step 1 through Step 3 of the MERA analysis. As shown in Appendix G; hydrogen cyanide, benzene, and pentane pass the health impact analysis at Step 1C and no further review is required for these chemicals.

Table 13-4. MERA Step 1 to 3

Step	Requirement
1	Constituent has no short-term emission increase
2	Facility is on the Toxicology Emissions Screening List.
3	Project is within an APWL area

13.4.2. Step 4

According to the MERA guidance, if the short-term emission rate of a pollutant meets one of the conditions in Table 13-5 and the long-term ESL of the pollutant is no less than 10% of the short-term ESL, this pollutant passes MERA analysis. No further study is needed.

Table 13-5. MERA Step 4

Short-term ESL, µg/m³	Short-term Emission Increase, lb/hr
2 ≤ ESL < 500	≤ 0.04
500 ≤ ESL < 3500	≤ 0.1
ESL ≥ 3500	≤ 0.4

Table 13-6 lists the chemicals that pass the MERA analysis at Step 4 and do not require further review.

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Table 13-6. Chemicals that Pass MERA at Step 4

Biphenyl (C12H10)	Pentadecane (as n-C15H32)	COD	ACA
Toluene (C7H8)	Hexadecane (as nC16H34)	Cyclohexanone	Isophorone
Isopentane (i-C5H12)	Methacrylonitrile (C4H5N)	Cyclohexanol	Methacrylic acid
2,2 Dimethylbutane (C6H14)	Isobutyronitrile (C4H7N)	Cyclohexene	MPMD
2,3 Dimethylbutane (C6H14)	C&T-2-Butenenitrile (transcrotonitrile, C4H5N)	Caproic Acid	NHA
3-Methylpentane (C6H14)	Butanenitrile (n-butyronitrile, C4H7N)	Pentanal	Propylene glycol t-Butyl ether
2,2-Dimethylpentane (C7H16)	Pyridine (C5H5N)	Hexanal	Octatriene
2,3-Dimethylpentane (C7H16)	Styrene (C8H8)	Acetic Acid	oxybismethane
Methylcyclopentane (C6H12)	Benzofuran (C8H6O)	Propionic Acid	TBC
2-Methylhexane (C7H16)	Aniline (Aminobezene, C6H7N)	Butyric Acid	PBCB
3-Methylhexane (C7H16)	Alpha-Methylstyrene (C9H10)	Valeric Acid	CPI
Methylcyclohexane (C7H14)	m-Methylstyrene (C9H10)	n-Butanol	Chloroform
Octane (as n-C8H18)	Glutaronitrile (C5H6N2)	Pentanol	Acrylic Acid
Nonane (as n-C9H20)	Indene (C9H8)	Propyl acetate	AMC
Isobutane (i-C4H10)	Phenylacetonitrile (C8H7N)	VOC-u	Benzaldehyde
Heptane (as n-C7H16)	Naphthalene (C10H8)	trans-3-Pentenenitrile (T3PN)	DCH
Decane (as C10H22)	2-Methylnaphthalene (C11H10)	Nicotinonitrile (3-Pyridinecarbonitrile)	HMI
Undecane (as C11H24)	Diphenylmethane (C13H12)	Phenyl Propylene Glycol Boronate (PPGB)	MEK
Dodecane (as n-C12H26)	Formic Acid (CH2O2)	cis-3-Pentenenitrile (C3PN)	N112
Tridecane (as n-C13H28)	Sodium Cyanide (NaCN)	Propylene Glycol	Vinyl acetate
Tetradecane (as n-C14H30)	Isopropanol (IPA)	BDP	

13.4.3. Step 5

This step involves determining an allowable emission rate increase for each air toxic that results in a concentration no greater than 10% of the air toxic's respective ESL. INVISTA choose to model the individual sources in AERMOD (using the source parameters described in Section 7.1) for the analysis in Step 5.

According to MERA guidance, the allowable emission increase $E_{i\text{-}n}$ for each pollutant from all possible sources is

$$E_{i\text{-}n} = \frac{0.1 \cdot ESL}{E_{Total}} \left(\frac{E_1}{X_1} + \ldots + \frac{E_n}{X_n} \right)$$

A pollutant passes Step 5 analysis only when the calculated $E_{i\text{-}n}$ is no less than the E_{Total}. For the long-term allowable emission rate, total emission rate and emission rate for each source is first converted from tons/year to lb/hr. Only Ethyl Nonafluoroisobutyl Ether is not screened out up through Step 5, and thus requires further analysis. The list of pollutants that screen out through Step 5 is presented in Table 13-7.

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Table 13-7. Chemicals that Pass MERA at Step 5

Butadiene (BD as 1,3-C4H6)	Phenyl Ethylene Glycol Borane (PEGB)	Ethylbenzene (C8H10)	Acetone
trans 2-Butene (T-C4H8, t-2-C4H8)	Ethyl Succinonitrile (ESN)	1,2-Dimethylbenzene (o-Xylene, o-C8H10)	Naphtha (petroleum), hydrotreated light
Cyclohexane (CYAN, C6H12)	Methylglutaronitrile (MGN, C6H8N2)	m-Ethylphenol (as p-C8H10O)	Hydrotreated Heavy Alkanes
trans-2-Methyl-2-Butenenitrile (T2M2BN)	Adiponitrile (ADN, C6H8N2)	Methanol	C9-15 Heavy Aromatic Hydrocarbons
2-Methyl-3-Butenenitrile (2M3BN)	Triphenyl Borane (PROM, C18H15B)	CDDT	Middle Alkanes
cis-2-Pentenenitrile (C2PN)	Tritolylphosphate (TTP, C21H21P03) - Ligand Hydrolysis Product (LHP, C14H15PO3)	2-Butoxy ethanol	Light Aromatic Hydrocarbons; Stoddard Solvent
Vinylcyclohexene (VCH, C8H12)	Ligand Degradation Product (LDP, C21H21PO3)	Hexamethylenediamine (HMD)	1,2,4-Trimethylbenzene
cis-2-Methyl-2-Butenenitrile (C2M2BN)	Acrylonitrile (ACRN, CH2CHCN)	Aliphatic Hydrocarbon	2-(2-butoxyethoxy) ethanol
Valeronitrile (VN)	Acetonitrile (ACEN, CH3CN)	Ethyl nonafluoroisobutyl ether	Amyl acetate
trans-2-Pentenenitrile (T2PN)	Propionitrile (PROPN, CH3CH2CN)	1,2-Trans-dichloroethylene	2-methylbutyl acetate
Phenol (PHENOL, C6H6O)	n-Hexane (C6H14)	Methyl nonafluoroisobutyl ether	Pentenenitriles (PNs as 3,4 Pentenenitrile)
Benzonitrile (BZNIT, C7H5N)	p-Xylene (C8H10)	Methyl nonafluorobutyl ether	BHMT
IB	2-Methylpentane (C6H14)	Poly(dimethylsiloxane)	Lube Oils
Ethylene Glycol (E-GLYCOL, C2H6O2)	Butane (as n-C4H10)	Ethanol	1-Butene
m-Cresol (MCRESOL, C7H8O)		1,1-difluoroethane	Dichloromethane

13.4.4. Step 6 and 7

As demonstrated in Table 13-8, both Step 6 and 7 are not applicable for this project.

Table 13-8. MERA Step 6 to 7

Step	Requirement
6	Is this an acceptable constituent substitution?
7	Does this project involve annual emission reductions?

13.4.5. Step 8A and 9A

Step 8A and 9A require modeling for the increased emissions. AERMOD is used to model new and increased emissions for planned MSS and production scenarios separately following the methodology described in Sections 5 and 6. According to the MERA guidance, the results from AERMOD compared in Step 9A following the conditions inTable 13-9.

Table 13-9. MERA Step 9A

Planned MSS Only	Production Only
≤25% ESL AND ≤50% ESL from all new and increased planned MSS emissions since the most recent sitewide modeling	≤10% ESL per project AND ≤25% ESL from all new and increased production emissions since the most recent sitewide modeling

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The impact of Ethyl Nonafluoroisobutyl Ether is 27.2 □g/m³. All of the emissions associated with Ethyl Nonafluoroisobutyl Ether are from MSS activities. The impacts are less than 25% of the ESL (and there have been no previous sitewide modeling for this chemical); therefore, further analysis is not required.

13.5. OZONE IMPACTS ANALYSIS

The project increases for ozone precursors are 554 tpy VOC and 604 tpy NO_x. Since the VOC and NO_x emissions are greater than the 100 tpy threshold, a quantitative ozone impact analysis is required.

Available ozone background monitors in Victoria County were evaluated to establish a representative background concentration for the analysis. There are three ozone monitors located in Victoria County. The documentation in Appendix D provides the 3-year average 8-hour high, fourth-high background concentration at each monitor. The Victoria monitor (EPA ID 48-469-0003) meets the EPA completeness criteria for the most recent complete three year period (2013-2015), while the other two monitors do not. In addition, the Victoria monitor is the closest monitor to the INVISTA Victoria site (approximately 18 km). Therefore, the Victoria monitor is chosen as the most representative monitor for purposes of the ozone impacts analysis. As the documentation in Appendix D shows, the 3-year average 8-hour high, fourth-high background concentration at the Victoria monitor is 64 ppb.

INVISTA then evaluated VOC and NO_x emissions in Victoria County using data obtained from the EPA National Emissions Inventory (NEI) to determine that Victoria County is NO_x-limited based on the VOC-to-NO_x ratio obtained from the NEI data. The determination was made as follows: the calculated VOC-to-NOx ratio obtained from the NEI data was multiplied by 2.875, which reflects the molar equivalents based upon parts per billion by volume. The molar equivalent conversion factor of 2.875 represents the ratio of NO_2-to-CH_4 molecular weights, consistent with TCEQ guidance. TCEQ guidance further suggests that, if the adjusted VOC-to-NO_x ratio is greater than 2:1, the county is NO_x-limited. As the adjusted VOC-to-NO_x ratio is greater than 2:1 for Victoria County, INVISTA concludes that the county is NO_x-limited.

INVISTA then evaluated the sitewide emissions in the same manner to determine if the project site is VOC-limited or NO_x-limited. As the documentation in Appendix D shows, the INVISTA Victoria site is VOC-limited; thus additional review is required.

Based on TCEQ guidance, INVISTA employed EPA's recommended ozone impacts screening approach. With this approach, INVISTA evaluated project 1-hr NO_2 impacts at a distance of 10 km from the Victoria Site using AERMOD. The resulting maximum modeled concentration, 0.53 □g/m³, is converted to 0.28 ppb using standard temperature and pressure conditions. Using a maximum yield of 90% and three ppb of ozone per one ppb of NO_2, a maximum predicted ozone concentration on a 1-hour basis is conservatively estimated to be 0.76 ppb. Conservatively assuming that the ozone increase just calculated would occur for every hour of an 8-hour period, the ozone increase is added to the representative background concentration, 64 ppb, for comparison to the ozone NAAQS. In addition, the ozone increase determined as part of the recently approved Permit No. PSDTX1416, 2.22 ppb, is also added to the background concentration (as emissions from this project will not be included in the monitor data). The total predicted ozone impact is 66.98 ppb. As this is less than 70 ppb, the NOx emissions from the project are not expected to cause an exceedance of the ozone NAAQS.

Also, based on the most recent available emission inventory data from NEI, Victoria County is NO_x-limited. Therefore, any additional VOC emissions, like the VOC emissions from this project, are not expected to impact ozone concentrations.

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13.6. ADDITIONAL IMPACTS ANALYSIS

The PSD additional impacts analysis depends on existing air quality, the quantity of emissions, and the sensitivity of local soils, vegetation, and visibility in the source's impact area. The analysis is presented in four parts:

1. Growth analysis
2. Soils and vegetation analysis
3. Visibility impairment analysis
4. Class I area impact analysis

13.6.1. Growth Analysis

The elements of the growth analysis include a projection of the associated industrial, commercial, and residential growth that will occur in the area of impact due to the source, including the potential impact on ambient air due to this growth. Emissions from such growth should be considered if they are specific, well defined, quantifiable, and impact the same general area. Emissions from such growth would be viewed as impacting the same area if they impact an area that is predicted to have impacts from the Victoria Plant's emissions that are greater than the SIL. INVISTA does not anticipate any associated industrial or commercial growth that would impact the significant impact area due to the project. Therefore, negligible growth-related ambient air impacts that would be required to be considered in the PSD application are expected.

13.6.2. Soil and Vegetation Analysis

The U.S. EPA developed the secondary NAAQS in order to protect certain air quality-related values (i.e., soil and vegetation) that were not sufficiently protected by the primary NAAQS. The secondary NAAQS represent ambient air concentrations below which most types of soil and vegetation are unaffected by criteria pollutants. If ambient air concentrations are found to be less than the secondary NAAQS, emissions from the proposed sources will not result in harmful effects to either soil or vegetation.[19] The maximum modeled ground-level concentrations resulting from the proposed emission sources are below the secondary NAAQS and demonstrates no impacts on local soils and vegetation.

13.6.3. Visibility Impairment Analysis

TCEQ guidance states that as part of the Additional Impacts Analysis, a visibility impairment analysis should be performed for a Class I area if the area is within 100 km of the project.[20] The nearest Class I area (Big Bend National Park) is greater than 500 km from the Victoria Plant. Therefore, a Class I area visibility impairment analysis is not required. The facility is located in a Class II area. The Victoria Plant is in compliance with the visibility and opacity requirements in 30 TAC Chapter 111, which is sufficient to satisfy visibility impairment analysis requirements for Class II areas.

13.6.4. Class I Area Impact Analysis

Class I areas are defined by the U.S. EPA's New Source Review Manual as those areas of the nation that are of special natural, scenic, recreational, or historic interest to the public. Class I areas are designated by the Clean Air Act and have a separate set of PSD increments that are more stringent than the typically considered Class II

[19] U.S. EPA, Office of Air Quality Planning and Standards, *New Source Review Workshop Manual*, Research Triangle Park, NC, October 1990.
[20] TCEQ, *Air Quality Modeling Guideline*, APDG-6232, Air Permits Division, Austin, TX, April 2015.

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increments. Federal and TCEQ guidelines require that an air quality dispersion modeling analysis (including visibility analysis) be performed for each Class I area located within 100 km of a facility undergoing an installation/modification that exceeds PSD significant emission rates. Since the nearest Class I area is more than 500 km from the Victoria Plant, a Class I area analysis is not required.

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14. ELECTRONIC FILES

The flash drive included with the modeling report package contains all of the air quality dispersion modeling analysis electronic data files used to generate the results presented in this report. These electronic data files include the following:

- All AERMOD input, output, and plot data
- All BPIP-PRIME (i.e. downwash) input and output data files
- Meteorological Data Files
- National Elevation Dataset (NED) Terrain Data Files

All the AERMOD and BPIP files for each pollutant, averaging period and scenario are included in respective .zip or .amz extension folders, both of which are zipped files.

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Appendix A: LIST OF BUILDINGS/STRUCTURES CONSIDERED IN MODELING

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Table A-1. Circular Buildings

ID	Description	X coordinate	Y coordinate	Elevation	Height	Radius	Corners
		Meters	Meters	Meters	Meters	Meters	
BLD102	08TFX001	700066	3173012	21.34	12.43	11.28	24
BLD103	08RXN006	700092	3172985	21.34	9.75	14.48	24
BLD105	08RXN008	700113	3172940	21.34	9.75	25.45	24
BLD106	08CLF012	700153	3172903	21.34	5.49	18.29	24
BLD107	08RXN007	700121	3173008	21.34	9.75	14.48	24
BLD109	08RXN009	700160	3172977	21.34	9.75	25.45	24
BLD111	08CLF013	700191	3172933	21.34	5.49	18.29	24
BLD113	08TFX016	700213	3172902	21.34	8.53	9.75	24
BLD119	NH3 TANK	699227	3172551	21.03	33.53	16.6	24
BLD121	06TFX013	699129	3172486	20.43	11.28	7.3	24
BLD122	06TFL014	699157	3172451	20.04	11.28	7	24
BLD124	06TFL015	699149	3172388	16.53	11.28	6.8	24
BLD125	06TFL016	699204	3172355	15.59	11.28	14.4	24
BLD126	10TFX080	699270	3172238	14.2	14.63	17.8	24
BLD128	10TANK01	699300	3172198	12.66	8.78	18.29	24
BLD129	07TFX32F	699238	3172277	14.91	8.78	9.14	24
BLD1	04TFX020	700155	3173624.8	21.34	7.01	3.81	24
BLD6	04TFX021	700169	3173611	21.34	7.01	3.81	24
BLD11	04TFX025	700250	3173711	21.34	7.01	5.64	24
BLD13	04TFX026	700238	3173726	21.34	7.01	5.64	24
BLD15	04TFX027	700185	3173800	21.03	7.01	1.83	24
BLD30	04TFX028	700212	3173825	21.03	7.01	2.74	24
BLD34	04TFX029	700204	3173822	21.03	7.01	2.74	24
BLD138	04TFX031	700237	3173843	21.03	7.01	1.52	24
BLD147	06TFX012	699983	3173305	21.03	6.1	1.83	24
BLD180	06TFX033	699930	3173326	21.03	6.1	1.83	24
BLD181	06TFX035	699937	3173321	21.03	4.27	1.52	24
BLD182	06TFX038	699961	3173288	21.03	11.28	7.39	24
BLD183	06TFX041	699865	3173401	20.73	6.1	1.83	24
BLD184	06TFX044	700017	3173276	21.03	9.75	3.58	24
BLD185	06TFX045	700009	3173270	21.03	7.32	2.9	24
BLD186	06TFX054	699933	3173322	21.03	6.1	2.29	24
BLD187	06TFX056	699975	3173270	21.03	11.28	7.39	24

ID	Description	X coordinate	Y coordinate	Elevation	Height	Radius	Corners
		Meters	Meters	Meters	Meters	Meters	
BLD188	06TFX065	699912	3173402	20.73	6.1	3.35	24
BLD189	10TFX027	700084	3173620	21.03	7.32	3.81	24
BLD190	10TFX028	700097	3173603	21.07	7.32	3.81	24
BLD191	10TFX029	700110	3173587	21.26	7.32	3.81	24
BLD192	10TFX030	700123	3173571	21.34	7.32	3.81	24
BLD193	10TFX031	700130	3173656	21.13	6.1	3.81	24
BLD194	10TFX032	700143	3173639	21.34	6.1	3.81	24
BLD195	10TFX035	699963	3173620	20.75	6.1	7.01	24
BLD196	10TFX035B	699941	3173608	20.73	9.14	3.35	24
BLD197	10TFX035C	699954	3173607	20.73	9.14	3.35	24
BLD198	10TFX035D	699948	3173601	20.73	9.14	3.35	24
BLD199	10TFX036	699967	3173498	21.03	6.1	3.81	24
BLD200	10TFX036A	699995	3173513	21.03	12.19	5.94	24
BLD201	10TFX037	699956	3173513	20.99	6.1	7.01	24
BLD202	10TFX037A	700008	3173497	21.03	17.07	8.53	24
BLD203	10TFX054	700167	3173587	21.34	8.84	2.13	24
BLD204	10TFX059	699407	3172911	18.32	7.62	3.05	24
BLD205	10TFX067	699366	3172812	19.91	7.62	2.13	24
BLD206	10TFX33	700130	3173384	21.03	10.98	6.17	24
BLD207	10TFX34A	700175	3173326	21.08	10.98	6.17	24
BLD208	10TFX34B	700212	3173280	21.34	10.98	6.17	24
BLD209	11TFX036	700042	3173551	21.03	7.62	9.14	24
BLD210	11TFX019	700076	3173528	21.03	9.76	7.62	24
BLD211	11TFX018	700091	3173540	21.14	9.76	7.62	24
BLD212	11TFX078	700218	3173575	21.34	9.97	7.62	24
BLD154	04TFX023	700215	3173709	21.29	6.1	3.96	24
BLD213	11TFX55	700048	3173600	21.03	4.27	2.13	24
BLD214	11TFX064	700038	3173570	21.03	2.74	3.05	24
BLD215	11TFX048	700028	3173576	21.03	7.62	4.11	24
BLD216	11SEP055A	700019	3173572	21.03	1.83	1.88	24
BLD217	11TFX070	700022	3173534	21.03	1.22	0.91	24
BLD218	1TFX067	700110	3173441	21.14	12.43	1.07	24
BLD219	11TFX053	700072	3173453	21.03	9.75	1.19	24
BLD221	11TFX052	700081	3173454	21.04	9.75	3.05	24
BLD222	11TFX051	700086	3173458	21.09	5.49	3.05	24

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ID	Description	X coordinate	Y coordinate	Elevation	Height	Radius	Corners
		Meters	Meters	Meters	Meters	Meters	
BLD223	11TFX050	700093	3173463	21.16	9.75	3.05	24
BLD224	11TFX049	700098	3173468	21.21	9.75	3.05	24
BLD225	15TFX021	699792	3173492	20.73	5.49	1.83	24
BLD226	15TFX023	699808	3173488	20.73	8.53	0.84	24
BLD228	15TFX022	699765	3173564	20.73	33.53	1.83	24
BLD229	15TFX024	699709	3173500	20.73	11.28	0.76	24
BLD220	Head Tank 1	700138	3172921	21.34	11.28	1.98	24
BLD227	Head Tank 2	700178	3172952	21.34	11.28	1.98	24
BLD230	18TFX028	699796	3173134	21.34	7.01	7.39	24
BLD231	18TFX062	699786	3173159	21.34	14.63	1.52	24
BLD232	18TFX062A	699799	3173171	21.34	8.78	0.38	24
BLD233	18TFL030	699801	3173153	21.34	6.4	4.88	24
BLD234	18TFL027	699809	3173144	21.34	7.01	7.39	24
BLD235	18TFX072	699811	3173129	21.34	7.01	1.52	24
BLD237	18TFX073	699818	3173134	21.34	7.01	2.29	24
BLD238	18TFL065	699823	3173128	21.34	7.01	2.13	24
BLD239	18TFX061	699828	3173121	21.34	7.01	2.13	24
BLD240	07TFX023	699857	3173216	21.34	7.01	1.52	24
BLD241	07TFX040	699852	3173222	21.34	7.01	4.57	24
BLD242	07TFX025	699825	3173255	21.34	7.01	1.37	24
BLD243	07TFX057	699829	3173254	21.34	6.1	1.83	24
BLD244	07TFX038B	699835	3173260	21.34	6.1	3.35	24
BLD245	07TFX040A	699841	3173253	21.33	4.27	3.35	24
BLD246	07TFX038A	699846	3173246	21.34	11.28	3.35	24
BLD247	97TFX024	699852	3173240	21.34	6.1	3.35	24
BLD248	07TFX034	699849	3173276	21.26	9.75	3.35	24
BLD249	07TFX033A	699854	3173281	21.19	7.32	1.83	24
BLD250	07TFX033B	699857	3173277	21.18	6.1	1.83	24
BLD251	07TFX032C	699872	3173288	21.03	11.28	1.83	24
BLD252	07TFX032D	699875.5	3173285.2	21.03	6.1	1.83	24
BLD253	07TFX032B	699876	3173291	21.03	7.32	1.83	24
BLD254	07TFX032A	699879	3173294	21.03	7.32	1.83	24
BLD255	07TFX032E	699884.4	3173290.9	21.03	7.32	1.83	24
BLD236	10TFX054A	700163	3173584	21.34	7.32	2.13	24
BLD256	10TFX032B	700063	3173570	21.03	6.1	10.69	24

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ID	Description	X coordinate	Y coordinate	Elevation	Height	Radius	Corners
		Meters	Meters	Meters	Meters	Meters	
BLD257	06TFX387	699989	3173313	21.03	7.62	5.33	24
BLD258	07TFX039	699846.8	3173240.8	21.34	5.79	1.83	24
BLD259	07TFX697	699782.3	3173330.3	21.12	5.49	3.35	24
BLD260	07TFX013A	699879.3	3173287.8	21.03	3.05	1.83	24
BLD261	07TFX013B	699881.9	3173285.2	21.03	3.05	1.83	24
BLD262	07TFX014	699882	3173297	21.03	2.74	1.83	24
BLD263	07TFX017	699885	3173299	21.03	6.1	1.37	24
BLD264	07TFX698	699787.6	3173324.5	21.15	5.49	3.35	24
BLD265	07TFX035	699730	3173301	21.34	1.83	0.81	24
BLD266	07TFX054A	699883	3173271	21.08	0.76	0.46	24
BLD145	17TFX547	699892	3173877	20.73	9.14	4.57	24
BLD268	17TFX548	699882	3173868	20.73	9.14	4.57	24
04TFX22B		700317	3173704	21.34	9.14	5.79	24
04TFX22A		700332.4	3173719	21.34	9.14	5.79	24
4TFX034A	04TFX034A	700257	3173666	21.34	9.75	7.92	24
4TFX034B	04TFX034B	700274	3173679	21.34	9.7536	7.9248	24
4TFX044	04TFX044	700280	3173719	21.34	7.32	3.66	24

Table A-2. Polygon Buildings

ID	Description	X coordinate	Y coordinate	Elevation	Height
		Meters	Meters	Meters	Meters
BLD4	BLDG 11	699268.9	3173326.4	19.81	7.28
BLD16	BLDG 1	699611.7	3173776.6	20.64	4.27
BLD20	BLDG 531	699813.8	3173737.8	20.73	5.43
BLD25	BLDG 530	699926.2	3173810.1	20.73	4.39
BLD26	BLDG 539	699936.6	3173867.5	20.73	16.37
BLD40	BLDG 2	699705.7	3173793.5	20.73	2.8
BLD52	BLDG 551	700182.7	3173996	21.03	6.71
BLD53	BLDG 561	700212.2	3174026.4	21.03	19.81
BLD56	BLDG 560A	700191.8	3174086.1	21.03	7.62
BLD57	BLDG 560	700190.4	3174125	21.03	5.49
BLD60	BLDG 570	699724.3	3173115.7	21.34	4.21
BLD61	BLDG 404	699558.8	3173197	20.73	7.38

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ID	Description	X coordinate	Y coordinate	Elevation	Height
		Meters	Meters	Meters	Meters
BLD62	BLDG 460	699601.8	3173129.1	20.74	22.86
BLD63	BLDG 403	699505.4	3173136.4	20.42	7.38
BLD64	BLDG 450	699520.4	3173108.3	20.2	19.66
BLD65	BLDG 402	699450.1	3173094.8	20.12	7.28
BLD66	BLDG 440	699495.5	3173070.8	20.12	32.77
BLD67	BLDG 401	699391.9	3173050.7	19.92	7.28
BLD68	BLDG 430	699399.5	3173027.8	19.81	38.28
BLD69	REGRIG	699404.1	3172907.9	18.22	14.05
BLD74	OFFICES	699828.5	3172844.1	20.42	3.57
BLD78	BLDG 611	699796.8	3172988.9	20.98	4.57
BLD84	BLDG 323	700352.8	3173737.8	21.34	7.53
BLD88	OPER 4	699851.1	3173430	20.73	27.22
BLD89	OPER 2&3	699914.9	3173362.2	21.03	25.36
BLD90	OPER 1	699941.6	3173320.8	21.03	44.78
BLD94	OFFICE & CCR	699836.5	3173298	21.15	7.07
BLD99	OP 16	699685.3	3173280.2	21.34	27.61
BLD115	BLDG 387	700187.3	3172874	21.34	15.24
BLD116	BLDG 382	700248.3	3172917.4	21.34	7.44
BLD120	NH3 STG&REFRIG	699202.7	3172570.8	21.03	10.67
BLD135	BLRS 1THRU4	699736.2	3173502.8	20.73	18.29
BLD136	OPER 5	699796.9	3173589.2	20.73	22.4
BLD137	SHOP	699800.3	3173344.3	21.03	7.62
BLD141	OP 13	699855.1	3173208.6	21.34	18.84
BLD142	OP 12	699860.1	3173267.2	21.22	16.64
BLD143	OP 11	699907.3	3173284.5	21.03	16.25
BLD150	PRIMARY FILTRATION BLDG	699989.1	3173557.1	21.02	14.51
BLD155	BLDG 542	700151.4	3173805.8	21.03	15.24
BLD156	BLDG 543	700180	3173834	21.03	6.71
BLD163	AOP	699797.8	3173590	20.73	22.4
BLD165	BLDG 540	700183.8	3173890.1	21.03	24.44
BLD167	BLDG 553	700263	3173954.1	21.03	13.72
BLD168	BLDG 554 & 556	700293	3173971.8	21.03	6.1
BLD170	BLDG 558 & 559	700351.1	3173912.8	21.03	27.43
BLD171	BLDG 557	700364.2	3173943.6	21.03	6.1

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ID	Description	X coordinate	Y coordinate	Elevation	Height
		Meters	Meters	Meters	Meters
BLD173	BLDG 555A	700305.2	3173898.1	21.03	5.49
BLD2	Natural Gas Purification	699494.6	3172800.6	16.32	9.27
BLD18	TANK FARM #3	699663.7	3173003	20.15	12.5
BLD19	TANK FARM #2	699565.2	3172955	18.39	12.31
BLD21	TANK FARM #1	699497.2	3172900.9	17.48	15.36
BLD22	CUBE SHOP	699700.4	3172841.7	19.92	9.6
BLD23	OP 15	699783.7	3173269.8	21.34	14.02
BLD24	OP 14	699790.6	3173230.9	21.34	20.97
BLD41	WW EQUALIZATION	700089.9	3173031.4	21.34	9.24
BLD49	ACIDS WW EQUALIZATION	700061	3173025.1	21.34	15.03
BLD55	COOLING TOWERS	700159.1	3173026.3	21.34	5.52
BLD80	BLDG 491	700047.4	3173504.4	21.03	4.15
BLD81	SWITCH GEAR ROOM	699778.4	3173506.8	20.73	5.43
BLD92	BLDG 3	699607.2	3173596.2	20.42	4.45
BLD104	BLDG 5	699649.2	3173694.8	20.62	9.42
BLD127	CHEMICAL BLDG	699904.7	3173767.5	20.73	4.15
BLD140	WATER BLDG	699882.9	3173795.8	20.73	5.09
BLD149	POWERHOUSE	699838.2	3173802.3	20.73	18.35
BLD178	BLDG 13	699373.1	3173352.3	19.81	4.45
BLD179	NRU PROCESS BLDG	699336.6	3172746.9	20.89	38.28
BLD267	Op 11 A	699953.7	3173231.9	21.03	7.62

Table A-3. Rectangular Buildings

ID	Description	X coordinate	Y coordinate	Elevation	Height	X length	Y length	Angle
		Meters	Meters	Meters	Meters	Meters	Meters	Degree
BLD31	Abatement Complex	699181.9	3173286.1	20.1	2.44	20.1	24.2	-37.7
BLD32	BLDG 36	699210.4	3173301.1	19.81	4.45	23.6	14	-37.9
BLD33	BLDG 8	699338.2	3173323.2	19.81	6.61	20.7	36.9	-37.9
BLD35	BLDG 6	699325.8	3173408.3	19.82	5.88	11	24.5	-38.3
BLD36	BLDG 15	699500.4	3173671.6	20.42	5.09	23	30.4	-36.2
BLD37	BLDG 16	699521.3	3173641.3	20.42	5.18	27.4	17.6	-37.7
BLD38	BLDG 10	699684.1	3173597	20.73	5.18	12.6	36.4	-37.6

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ID	Description	X coordinate	Y coordinate	Elevation	Height	X length	Y length	Angle
		Meters	Meters	Meters	Meters	Meters	Meters	Degree
BLD39	BLDG 4	699695.9	3173606.9	20.73	11.77	97.8	36	-37.7
BLD42	BLDG 109	699796.3	3173687.5	20.73	5.18	9.7	19.8	-37.5
BLD43	BLDG 119	699780.1	3173708.7	20.73	5.09	7.4	10.4	-38.4
BLD44	BLDG 525	699887.7	3173686.6	20.73	5.52	13.2	24.1	-37.9
BLD45	BLDG 101 & 102	699932.5	3173730	20.73	5.18	9.8	14.4	-33.4
BLD46	BLDG 537	699928	3173788.8	20.73	5.91	8	15.1	-38.4
BLD47	BLDG 538	699887.3	3173816.4	20.73	4.57	10.3	6	-38.3
BLD48	BLDG 526	700021.7	3173782.9	20.73	5.03	14.5	32.3	-36.3
BLD50	BLDG 12	700085	3173972.5	21.03	5.79	17.1	22.9	-37.4
BLD51	BLDG 544	700108.1	3173935.4	21.03	5.79	22.3	18	-35.9
BLD54	BLDG 591	700175.5	3174065.3	21.03	5.49	13.2	35.5	-37.9
BLD58	BLDG 567	700206.3	3174148.5	21.03	4.27	41.2	7.9	-38
BLD59	BLDG 420	699632.1	3173203.5	21.34	5.12	35.1	44.1	-38.2
BLD70	BLDG 418	699623.1	3172877.6	18.45	6.74	64.9	24.1	-36.8
BLD73	PIPE SHOP	699808.1	3172898.4	20.42	8.23	24.7	90.2	-39.7
BLD75	ADMINISTRATION	699852.9	3172800.7	20.42	4.72	55	18.1	-38.6
BLD76	RECEIVING AND STORES	699748.8	3172805.2	20.12	6.4	40.3	22.8	8.4
BLD77	PAINT SHOP	699842	3172961.7	20.73	5.79	24.2	12.5	-38.3
BLD79	BLDG 552	700271.4	3174000.6	21.03	6.71	45.2	13.2	-36.8
BLD82	BLDG 324	700332.3	3173764.6	21.34	7.04	40.1	31.9	-36.8
BLD85	SHOPS	700420.3	3173782.9	21.34	6.1	24.5	24.9	-37.7
BLD86	CHANGE ROOM	700458.7	3173758.1	21.34	4.57	20.4	25.6	-36.8
BLD87	BLDG 568	700470.5	3173880.2	21.34	5.49	16.2	30.2	-38.2
BLD100	OP SHELTER	699745.2	3173239.5	21.34	3.9	10.3	8.7	-41.4
BLD101	BLDG 572	699734.7	3173080.8	21.34	3.96	30.4	10.3	-36.6
BLD114	DEWATERING	700186.4	3172883.9	21.34	7.19	20.4	9.4	-35.2
BLD117	BLDG 339	700281.4	3172941.8	21.34	5.61	15.8	20.1	-39.3
BLD118	BLDG 417	699285.7	3172934.7	19.42	4.57	20	44.5	-37.7
BLD130	COGEN TURBINE	699625	3173404.6	20.68	19.51	39.9	16.9	-37.7
BLD131	EIR	699629.2	3173437.9	20.72	6.49	25.8	13.4	-37.1
BLD133	SHOP	699710.1	3173458.1	20.73	7.62	29.2	12.3	-37.3
BLD134	BLDG 17	699661.6	3173465.7	20.73	9.63	28.3	9.2	-37.7
BLD144	OP 1A	700016.5	3173180.4	21.03	4.79	11.1	23.5	-37.3
BLD146	OPERATION 1A	700088.1	3173154.7	21.34	16.76	49.7	91	-37
BLD148	NICKEL WHSE	700093.2	3173359.1	21.03	6.1	24.9	30.7	-37.3

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ID	Description	X coordinate	Y coordinate	Elevation	Height	X length	Y length	Angle
		Meters	Meters	Meters	Meters	Meters	Meters	Degree
BLD151	BLDG 509B	700186.3	3173640.2	21.34	10.06	7.9	6.4	-35.7
BLD153	BLDG 509A	700161.5	3173685.3	21.14	8.23	9.9	8.1	-36.4
BLD158	SUB 27 ECR	700307.7	3173745.1	21.34	4.57	10.2	8	-38.2
BLD160	BLDG 4093	700284.9	3173752.7	21.34	9.57	24.1	13.4	-36.4
BLD161	GARAGE	699842	3173046.4	21.32	6.1	12.6	18.9	-37
BLD162	BLDG 528	699654.5	3173514.2	20.68	15.88	21.4	13.2	-36.1
BLD164	ACIDS POWER SHOP	699721.5	3173553.8	20.73	2.44	31.6	25.9	-36.8
BLD166	BLDG 108	700060.7	3173901	20.73	4.45	23.3	3.4	-35.4
BLD169	BLDG N2	700392.4	3174005.1	21.03	6.61	9.9	11.2	-36.4
BLD172	BLDG 589TF	700249.1	3173914.5	21.03	5.88	13.9	23.8	-35.1
BLD174	BLDG 555B	700290.4	3173930.1	21.03	5.09	12.6	5.1	-37
BLD3	BLDG 483	699392.6	3172939.4	19.36	5.18	17.6	49.4	-39.9
BLD5	ChemTRT	699383.6	3172931.9	18.99	5.18	8.9	18.5	-39.6
BLD7	DVH1	699437.1	3173081.9	20.12	11.77	12.6	2.8	-38.2
BLD8	DVH2	699489.7	3173123	20.35	5.18	12.7	2.9	-38
BLD9	DVH3	699550.8	3173170.7	20.6	5.09	13	3	-38.5
BLD10	DVH4	699519.4	3172933.4	17.91	5.52	12.8	3.4	-37
BLD12	DVH5	699573.6	3172975.8	18.88	5.18	11.4	3.3	-37.9
BLD14	MAINT PAD	699604.5	3173018.4	19.93	5.91	8.7	5.2	-39.4
BLD17	DVH6	699635.1	3173024.5	20.14	4.57	12.7	3.1	-39.2
BLD27	OPSHELTERB	699987.8	3173242.3	21.03	5.03	10	4.3	-38.9
BLD28	OPER SHELTER	699998.9	3173254.3	21.03	5.79	5.5	3.1	-36.9
BLD29	INFLUENT COOLING TOWERS	700086.3	3173036.4	21.34	5.79	29.7	8.7	-38.7
BLD71	COOLING TOWER	699986	3173444.5	21.03	5.49	22.2	12.3	-38.8
BLD72	COOLING TOWER	700017.1	3173468.6	21.03	4.27	23.1	10.6	-38.3
BLD83	DRY STORAGE	699662.4	3173506.6	20.73	5.12	4.3	5.3	-42.2
BLD91	BLDG 3A	699603	3173606.1	20.42	6.74	29.9	15.4	-37.5
BLD93	LIBRARY	699612.3	3173600.9	20.42	8.23	21.9	9.7	-37.4
BLD95	COVERED STORAGE	699561.1	3173616.2	20.42	4.72	18.5	10	-37.3
BLD96	COVERED DRUM STORAGE	699583.8	3173597.1	20.42	6.4	6.4	25.5	-36.7
BLD97	COVERED STORAGE	699542.8	3173603.1	20.42	5.79	9.2	9.9	-35.8
BLD98	COVERED CYL STORAGE	699534.8	3173613.8	20.42	6.71	3.2	21.9	-41.2
BLD108	STORES WAREHOUSE	699638.1	3173640.9	20.5	7.04	30.5	36.3	-37.3

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ID	Description	X coordinate	Y coordinate	Elevation	Height	X length	Y length	Angle
		Meters	Meters	Meters	Meters	Meters	Meters	Degree
BLD110	FIRETRUCK SHELTER	699808	3173693	20.73	6.1	6.3	20.2	-38
BLD112	FTBLDG1	699814.5	3173698.4	20.73	4.57	4.3	5.9	-37.4
BLD123	FTBLDG2	699818.8	3173701.4	20.73	5.49	8.5	8.8	-39.7
BLD132	WATER TREATMENT	699900.9	3173774.1	20.73	3.9	13.3	12.2	-36.4
BLD139	WATER BLDG	699884.4	3173763.7	20.73	3.96	15.8	12.8	-37.3
BLD157	DELUGE	700170.5	3173702.2	21.04	5.61	3.8	2.4	-35.4
BLD159	ARTHUR BROS PAINT SHOP	699198.2	3173525.2	20.12	4.57	16.5	17.5	-36.9
BLD175	BLDG 31	699236.4	3173243.4	19.81	19.51	42.8	22.2	-38.1
BLD176	PAINT SHOP	699231.4	3173268.4	19.81	6.49	19.5	13.5	-37.5
BLD177	OIL DRUM STORAGE	699309.4	3173364.3	19.81	7.62	8.4	12.9	-36.3
USFLTR	US Filter Building	699969	3173860	20.73	9.63	40.23	45.72	-37

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Appendix B: SOURCE PARAMETERS AND EMISSION RATES

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Table B-1. Project-wide Modeled Point Source Parameters

Emission Points			UTM Coordinates of Emission Points			Stack Height	Stack Exit Data		
							Diameter	Velocity	Temp
Model ID	EPN	Source Description	Zone	East (meters)	North (meters)	(ft)	(ft)	(fps)	(°F)
10FLR03	10FLR-001 10FLR-002 10FLR-003 10FLR-003A	Converter Flares	14	699420	3173000	140	8.50	65.6168	1831.73
10FLR4	10FLR-004	Ammonia Startup Flare	14	699397	3173250	140	0.003	65.6168	1831.73
10FLR04A	10FLR-004A	Ammonia Tank Flare	14	699252	3172593	35	0.33	65.6168	1831.73
10FLR04B	10FLR-004B	Butadiene Flare	14	699252	3172593	35	0.003	65.6168	1831.73
10FLR05	10FLR-005	Adiponitrile Flare	14	699473	3172901	151	0.003	65.6168	1831.73
10VNT255	10VNT-255	Pump Tank Scrubber and Closed Sump	14	699448	3173161	0	0.003	0.78	76
TFX010	10TFX-010	Fresh Ligand Tank	14	699530	3172913	24	0.003	0.003	104
TFX025A	10TFX-025A	South WFE Feed Tank	14	699705	3173044	24	0.003	0.003	104
TFX025B	10TFX-025B	North WFE Feed Tank	14	699707	3173056	24	0.003	0.003	104
TFX027	10TFX-027	Refined ADN Tank#1	14	700085	3173621	24	0.003	0.003	104
TFX028	10TFX-028	Refined ADN Tank#2	14	700098	3173604	24	0.003	0.003	104
TFX029	10TFX-029	Refined ADN Tank#3	14	700110	3173588	24	0.003	0.003	104
TFX030	10TFX-030	Refined ADN Tank#4	14	700123	3173572	24	0.003	0.003	104

Emission Points			UTM Coordinates of Emission Points			Stack Height	Stack Exit Data		
							Diameter	Velocity	Temp
Model ID	EPN	Source Description	Zone	East (meters)	North (meters)	(ft)	(ft)	(fps)	(°F)
TFX031	10TFX-031	Refined ADN Tank#5	14	700130	3173657	20	0.003	0.003	104
TFX032	10TFX-032	Refined ADN Tank#6	14	700144	3173640	20	0.003	0.003	104
TFX032B	10TFX-032B	Refined ADN Tank#7	14	700064	3173569	24	0.003	0.003	104
TFX035A	10TFX-035A	TG MGN Tank	14	699963	3173621	20	0.003	0.003	104
TFX036	10TFX-036	REF MGN Tank	14	699968	3173500	20	0.003	0.003	110
TFX037	10TFX-037	Crude DN/MGN Tank	14	699956	3173514	20	0.003	0.003	104
TFX037A	10TFX-037A	Crude DN/MGN Sphere	14	700008	3173499	56	0.003	0.003	104
TFX047	10TFX-047	Methanol Tank	14	699450	3172905	25	0.003	0.003	104
TFX059	10TFX-059	Ammonium Salt Tank	14	699407	3172919	24	0.003	0.003	104
TFX080	10TFX-080	Barge Dock Refined ADN Tk	14	699269	3172237	48	0.003	0.003	100
TFX085	10TFX-085	MDEA – Amine Tank	14	699524	3172804	8	0.003	0.003	76
11TFX036	11TFX-036	HCN/HDN AWST	14	700042	3173552	110	0.003	0.003	77
11TFX047	11TFX-047	HCN Hold Up Tank	14	700020	3173570	25	0.003	0.003	77
11TFX048	11TFX-048	Nitriles Hold Up Tank	14	700029	3173577	25	0.003	0.003	77
11TFX053	11TFX-053	ROF Filtrate Tank #1	14	700074	3173449	22.5	0.003	0.003	77
11TFX055	11TFX-055	311 Area Wastewater Tank	14	700050	3173603	21	0.003	0.003	77
11TFX064	11TFX-064	Netz Filter Feed Tank	14	700037	3173572	17.6	0.003	0.003	77
11TFX070	11TFX-070	Netz Effluent Tank	14	700023	3173554	8	0.003	0.003	77

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Emission Points			UTM Coordinates of Emission Points			Stack Height	Stack Exit Data		
							Diameter	Velocity	Temp
Model ID	EPN	Source Description	Zone	East (meters)	North (meters)	(ft)	(ft)	(fps)	(°F)
11TFX076	11TFX-076	Waste Collection Tank	14	700018	3173564	12	0.003	0.003	77
11TFX153	11TFX-153	Precoat Tank #1	14	699999	3173552	6.75	0.003	0.003	104

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Table B-2. Modeled Volume Source Parameters

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Emission Point			UTM Coordinates of Emission Points			Fugitive Data		
						Release Height	Init. Lat. Dimension	Init. Vert. Dimension
Model ID	EPN	Source Description	Zone	East (meters)	North (meters)	(ft)	(ft)	(ft)
ADNST1A	10FUG	ADN Fugitives (Step 1 Bldg)	14	699496	3173047	55.25	39.07001	48.58999
ADNST1B		ADN Fugitives (Step 1 Bldg)	14	699513	3173027	55.25	39.07001	48.58999
ADNST1C		ADN Fugitives (Step 1 Bldg)	14	699527	3173006	55.25	39.07001	48.58999
ADNST2A		ADN Fugitives (Step 2 Bldg)	14	699542	3173109	33.75	51.15	28.61
ADNST2B		ADN Fugitives (Step 2 Bldg)	14	699563	3173082	33.75	51.15	28.61
ADNST2C		ADN Fugitives (Step 2 Bldg)	14	699580	3173054	33.75	51.15	28.61
ADNTF1A		ADN Fugitives (TF 1)	14	699511	3172899	25.7	34.32999	21.05
ADNTF1B		ADN Fugitives (TF 1)	14	699529	3172914	26.7	35.32999	22.05
ADNTF1C		ADN Fugitives (TF 1)	14	699546	3172930	26.7	35.32999	22.05
ADNTF2A		ADN Fugitives (TF 2)	14	699579	3172956	21.7	27.92	17.39
ADNTF2B		ADN Fugitives (TF 2)	14	699594	3172966	21.7	27.92	17.39
ADNTF2C		ADN Fugitives (TF 2)	14	699609	3172977	21.7	27.92	17.39
ADNTF2D		ADN Fugitives (TF 2)	14	699624	3172987	21.7	27.92	17.39
ADNTF3A		ADN Fugitives (TF 3)	14	699662	3173020	22	26.97	17.68
ADNTF3B		ADN Fugitives (TF 3)	14	699676	3173031	22	26.97	17.68
ADNTF3C		ADN Fugitives (TF 3)	14	699689	3173042	22	26.97	17.68
ADNTF3D		ADN Fugitives (TF 3)	14	699703	3173052	22	26.97	17.68
ADNREFA		ADN Fugitives (Ref Bldg)	14	699625	3173128	39	51.15	33.5
ADNREFB		ADN Fugitives (Ref Bldg)	14	699645	3173101	39	51.15	33.5
ADNRFLD		ADN Fugitives (Ref Loading)	14	699427	3172908	24.5	24.84	20.01
ADNNSC		ADN NSC Fugitives	14	699342	3172777	64.3	33.72999	57.02001
ADNVH1		ADN Vent Header	14	699475	3172905	20.5	0.46	0.23
ADNVH2		ADN Vent Header	14	699506	3172929	20.5	0.46	0.23
ADNVH3		ADN Vent Header	14	699538	3172954	20.5	0.46	0.23
ADNVH4		ADN Vent Header	14	699569	3172978	20.5	0.46	0.23
ADNVH5		ADN Vent Header	14	699601	3173003	20.5	0.46	0.23
ADNVH6		ADN Vent Header	14	699632	3173028	20.5	0.46	0.23

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ADNVH7		ADN Vent Header	14	699664	3173052	20.5	0.46	0.23
ADNVH8		ADN Vent Header	14	699696	3173077	20.5	0.46	0.23
ADNVH9		ADN Vent Header	14	699719	3173096	20.5	0.46	0.23
HCNA		ADN Fugitives (HCN Bldg)	14	699425	3173022	64.25	55.81001	56.98999
HCNB		ADN Fugitives (HCN Bldg)	14	699447	3172994	64.25	55.81001	56.98999
HCNC		ADN Fugitives (HCN Bldg)	14	699470	3172966	64.25	55.81001	56.98999
TF1	10FUG2	TF1 Piping Fugitives	14	700092	3173462	10.5	9.32	6.99
2PNTK		2PN Tank Component Fugitives	14	699947	3173606	17	7.05	12.11
311RC1		311 RC Loading/Unloading	14	699941	3173597	21	13.94	0.92
311RC2		311 RC Loading/Unloading	14	699947	3173590	21	13.94	0.92
311RC3		311 RC Loading/Unloading	14	699952	3173583	21	13.94	0.92
311RC4		311 RC Loading/Unloading	14	699958	3173576	21	13.94	0.92
311RC5		311 RC Loading/Unloading	14	699964	3173569	21	13.94	0.92
311RC6		311 RC Loading/Unloading	14	700003	3173592	21	13.94	0.92
311RC7		311 RC Loading/Unloading	14	699996	3173587	21	13.94	0.92
311RC8		311 RC Loading/Unloading	14	699989	3173581	21	13.94	0.92
311RC9		311 RC Loading/Unloading	14	699982	3173575	21	13.94	0.92
311RC10		311 RC Loading/Unloading	14	699975	3173569	21	13.94	0.92
311RC11		311 RC Loading/Unloading	14	699968	3173564	21	13.94	0.92
SLSMP		Misc. Slurry Sump Piping Fugitives	14	700103	3173463	2.5	0.75	1.41
1819		11TFX018, 19 Fugitives	14	700084	3173534	17.5	11.61	13.48
78		11TFX078 Fugitives	14	700206	3173575	17.59	11.61	13.58

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Table B-3. Emission Increases and Modeled Emission Rates for PSD Analysis

Pollutant	Affected Source EPN	Source Description	Project Increase	Modeled Emission Rate [1]	
			tpy	lb/hr	tpy
NO_2	10FLR-001 10FLR-002 10FLR-003 10FLR-003A	Converter Flares	9.55	1.74	7.16
	10FLR-004	Ammonia Startup Flare	4.50	0.82	3.38
	10FLR-004A	Ammonia Tank Flare	0.84	0.15	0.63
	10FLR-004B	Butadiene Flare	2.85	0.52	2.14
	10FLR-005	Adiponitrile Flare	163.25	29.82	163.25
	15STK-006	Boiler 3 & 4 Stack	180.52	--	135.39
	17STK-007	Boiler 7 & 8 Stack	242.65	--	181.99
CO	10FLR-001 10FLR-002 10FLR-003 10FLR-003A	Converter Flares	27.46	6.27	27.46
	10FLR-004	Ammonia Startup Flare	8.66	1.98	8.66
	10FLR-004A	Ammonia Tank Flare	2.23	0.51	2.23
	10FLR-004B	Butadiene Flare	9.92	2.26	9.92
	10FLR-005	Adiponitrile Flare	2240.21	511.46	2240.21
	10FUG	ADN Fugitives	0.08	0.02	0.08
	10VNT-255	Pump Tank Scrubber and Closed Sump	0.07	0.02	0.07
	15STK-006	Boiler 3 & 4 Stack	35.75	--	35.75
	17STK-007	Boiler 7 & 8 Stack	14.39	--	14.39

1. Modeled Emission Rate reflects NO_2 emission rate, based on applying the ARM ratio of 0.80 to (lb/hr) NO_X rates and 0.75 to (tpy) NO_X rates

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Table B-4. Emission Increases and Modeled Emission Rates for State NAAQS Analysis

Pollutant	Affected Source EPN	Source Description	Proposed Emission Rates		Current Emission Rates Authorized under Permit # 7186		Emission Increases		Modeled Emission Rate	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
SO_2	10FLR-004A	Ammonia Tank Flare	0.04	0.02	0.02	0.02	0.02	--	0.02	--

Appendix C: **PLOT PLAN**

ED_001261_00097513

Emission Point Number None	Location Easting, Northing (meters)
04CWA-035	700806, 3173832
04DGR-001	699870, 3173950
04FLR-032	699902, 3173911
04FUG	700122, 3173425
04FUG-MSS	700135, 3174023
04LBA-006A	699157, 3172361
04LBA-006F	699132, 3172338
04LIR-020B	700171, 3173862
04LIR-022B	700101, 3173935
04LIR-022C	700251, 3173954
04LIR-025B	700258, 3173932
04LIR-028B	700117, 3173940
04LIR-033B	700161, 3174013
04LIR-036B	699961, 3173782
04LIR-037B	699903, 3173738
04LRC-006	700226, 3173994
04LRC-006F	700253, 3174016
04LTR-018	700094, 3173865
04LTR-018F	700159, 3173850
04SEP-001	700136, 3174027
04SWT-002	700144, 3174006
04TANKOPEN	700223, 3173851
04TFX-020	700125, 3173831
04TFX-021	700136, 3173815
04TFX-025	700218, 3173915
04TFX-028	700180, 3174030
04TFX-029	700172, 3174027
04TFX-506	700122, 3174036
04TFX-508	700115, 3174046
04TVS-023	700183, 3173914
04TVS-033	700141, 3173999
04TVS-034	700223, 3173882
04VNT-007	700170, 3174071
04VNT-009	700131, 3174030
04VNT-010	700119, 3174013
04VNT-013	700094, 3174056
06BIN-011	699844, 3173661
06BIN-012	699839, 3173669
06CEN-006	699851, 3173620
06CEN-026	699866, 3173629
06CEN-062	699880, 3173639
06CLR-017	699856, 3173642
06CLR-037	699859, 3173638
06CLT-090	699975, 3173674
06CRY-066	699862, 3173601
06CRY-067	699869, 3173606
06CRY-068	699863, 3173602
06CRY-069	699871, 3173607
06CWA-091	700919, 3173688
06DRY-008	699846, 3173618
06DRY-009	699851, 3173622
06DRY-028	699862, 3173636
06DRY-029	699867, 3173639
06DRY-050	699885, 3173655
06FLT-004	699854, 3173609
06FLT-005	699863, 3173616
06FLT-024	699888, 3173631
06FLT-027	699913, 3173601
06FUG	700037, 3173337
06HUT-003	699865, 3173618
06HUT-071	699873, 3173618
06LBA-047	699020, 3172482
06LBA-084	699070, 3172384
06LIR-055	700056, 3173433
06LIR-075	700073, 3173365
06LRC-086	699821, 3173639
06LRC-094	700025, 3173837
06LRC-111	699846, 3173658
06LRC-113A	[illegible]
06LRC-113B	699879, 3173680
06LTR-019	699927, 3173617
06LTR-074	699985, 3173446
06LTR-116	699920, 3173546
06LTR-117	700065, 3173418
06MNT-DP1	699125, 3172654
06MNT-DP1A	699117, 3172591
06TFL-014	699171, 3172559
06TFL-015	699951, 3173511
06TFL-016	699097, 3172690
06TFX-012	699912, 3173539
06TFX-013	699898, 3173532
06TFX-032	699921, 3173493
06TFX-033	699905, 3173527
06TFX-034	699929, 3173575
06TFX-035	699833, 3173493
06TFX-038	[illegible]
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06TFX-044	699985, 3173607
06TFX-045	699977, 3173482
06TFX-046	700048, 3173476
06TFX-048	700041, 3173449
06TFX-051	700032, 3173451
06TFX-054	699901, 3173527
06TFX-056	699943, 3173475
06TFX-060	700040, 3173419
06TFX-061	700031, 3173431
06TFX-063	700047, 3173420
06TFX-065	699842, 3173607
06TFX-288	699900, 3173643
06TFX-387	699957, 3173517
06VNT-001	699915, 3173552
06VNT-002	699920, 3173546
06VNT-021	700062, 3173421
06VNT-022	700065, 3173418
06VNT-092A	699924, 3173564
06VNT-092B	699904, 3173548
06VNT-093A	700026, 3173436
06VNT-093B	700065, 3173384
07CWA-041	700919, 3173688
07DIS-026G	699696, 3173544
07DIS-512	699716, 3173546
07FLT-013	699748, 3173490
07FLT-014	699745, 3173488
07FLT-028	699757, 3173497
07FLT-100A	699855, 3173505
07FLT-100B	699854, 3173506
07FLT-101	699936, 3173420
07FLT-102A	699882, 3173504
07FLT-102B	699883, 3173503
07FLT-103	699937, 3173419
07FLT-104A	699880, 3173506
07FLT-104B	699881, 3173505
07FLT-105A	699804, 3173423
07FLT-105B	699804, 3173423
07FLT-105C	699794, 3173432
07FLT-105D	699824, 3173415
07FLT-105E	699825, 3173416
07FLT-105F	699826, 3173417
07FLT-106A	699827, 3173418
07FLT-106B	699828, 3173445
07FLT-106C	699826, 3173446
07FLT-106D	699825, 3173447
07FLT-107A	699824, 3173448
07FLT-107B	699774, 3173449
07FLT-108A	699774, 3173450
07FLT-108B	699803, 3173403
07FLT-109	699714, 3173531
07FLT-113A	699733, 3173532
07FLT-113B	699714, 3173548
07FLTDCCA	699885, 3173479
07FLTDCCB	699865, 3173382
07FLTMDTT	699865, 3173380
07FLTVNDM	699857, 3173392
07FUG	699859, 3173390
07FUG-1	699796, 3173441
07FUGMSS	699739, 3173439
07LTR-015A	699695, 3173536
07LTR-015AF	699699, 3173548
07LTR-015D	699786, 3173432
07LTR-016	699700, 3173540
07LTR-016F	699872, 3173509
07LTR-025A	699931, 3173441
07LTR-025AF	699930, 3173442
07LTR-026C	699892, 3173493
07LTR-028A	699838, 3173493
07LTR-028B	699840, 3173490
07LTR-040B	699819, 3173486
07RSY-026F	699846, 3173483
07SMP-011	[illegible]
07SMP-011A	[illegible]
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07SMP-011D	[illegible]
07SMP-011E	[illegible]
07SMP-012	[illegible]
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07SMP-012B	[illegible]
07SMP-013A	[illegible]
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07SMP-013C	[illegible]
07SMP-013D	699825, 3173402
07SMP-013E	699816, 3173408
07SMP-013F	699834, 3173401
07SMP-013N	699828, 3173432
07SMP-014	699825, 3173445
07SMP-014A	699849, 3173408
07SMP-014B	699816, 3173398
07SMP-014C	699779, 3173401
07SMP-015	699782, 3173467
07SMP-015A	699805, 3173470
07SMP-015B	699807, 3173472
07SMP-015C	699755, 3173499
07SMP-016	699764, 3173519
07SMP-016A	699723, 3173544
07SMP-016B	699765, 3173553
07SMP-016C	699683, 3173543
07TFX-005	699781, 3173464
07TFX-005A	699777, 3173470
07TFX-005B	699788, 3173464
07TFX-005C	699789, 3173459
07TFX-013A	699851, 3173497
07TFX-013B	699855, 3173491
07TFX-014	699854, 3173506
07TFX-017	699855, 3173503
07TFX-023	699825, 3173421
07TFX-024	699820, 3173445
07TFX-025	699793, 3173460
07TFX-026A	699758, 3173502
07TFX-026B	699782, 3173471
07TFX-031A	699833, 3173481
07TFX-032A	699848, 3173499
07TFX-032B	699844, 3173496
07TFX-032C	699840, 3173493
07TFX-032D	699845, 3173492
07TFX-032E	699851, 3173497
07TFX-032F	699208, 3172481
07TFX-033A	699822, 3173486
07TFX-033B	699825, 3173482
07TFX-034	699818, 3173481

Emission Point Number None	Location Easting, Northing (meters)
07TFX-035	699857, 3173492
07TFX-036	699699, 3173506
07TFX-037A	699794, 3173481
07TFX-037B	699790, 3173478
07TFX-037C	699786, 3173475
07TFX-038A	699815, 3173451
07TFX-038B	699803, 3173466
07TFX-039	699821, 3173445
07TFX-040	699810, 3173458
07TFX-040A	699875, 3173427
07TFX-051	699870, 3173494
07TFX-052A	699872, 3173492
07TFX-053	699871, 3173502
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07TFX-609	[illegible]
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07TFX-632B	[illegible]
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07VNT-008	[illegible]
07VNT-029	[illegible]
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08CLT-005	[illegible]
08FLT-017	[illegible]
08FLT-028	[illegible]
08RXN-006	[illegible]
08RXN-007	[illegible]
08RXN-008	[illegible]
08RXN-009	[illegible]
08RXN-010	[illegible]
08TFX-002	[illegible]
08TFX-016	[illegible]
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10FLR-003	[illegible]
10FLR-003A	[illegible]
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10FLR-ALT	[illegible]
10FLR-TMP	[illegible]
10FLRALTF	[illegible]
10FLT-063	[illegible]
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10FUG	[illegible]
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10FUGMSS	[illegible]
10FUGMSS2	[illegible]
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10LBA-061D	[illegible]
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10LDR-326B	[illegible]
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10LRC-041B	[illegible]
10LRC-041C	[illegible]
10LRC-041E	[illegible]
10LRC-041F	[illegible]
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10LRC-074F	[illegible]
10LTR-036	[illegible]
10LTR-056	[illegible]
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10LTR-058A	[illegible]
10LTR-061	[illegible]
10LTR-062	[illegible]
10LTR-072	[illegible]
10LTR-073	[illegible]
10LTR-074	[illegible]
10LTR-087	[illegible]
10MSS-001	[illegible]
10MSS-002	[illegible]
10RPF-001	[illegible]
10RPF-002	[illegible]
10RPF-005	[illegible]
10SCB-154	[illegible]
10TFX-010	[illegible]
10TFX-025A	[illegible]
10TFX-025B	[illegible]
10TFX-027	[illegible]
10TFX-028	[illegible]
10TFX-029	[illegible]
10TFX-030	[illegible]
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10TFX-047	[illegible]
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10TFX-086	[illegible]
10TFX-087	[illegible]
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10VNT-002	[illegible]
10VNT-003	[illegible]
10VNT-255	[illegible]
11LTR-067A	[illegible]
11DDP-055B	[illegible]
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11TFX-036	[illegible]
11TFX-047	[illegible]
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11TFX-153	[illegible]
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14FUG	[illegible]
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15CAT-001	[illegible]
15FUG	[illegible]
15LTR-023	[illegible]
15STK-005	[illegible]
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15TFX-022	[illegible]
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15TFX-025	[illegible]
16FTX-005	[illegible]
16FTX-006	[illegible]
16STK-001	[illegible]
16VNT-002	[illegible]
16VNT-004	[illegible]
17FUG	[illegible]
17STK-007	[illegible]
17TFX-004	[illegible]
17TFX-008	[illegible]
17TFX-009	[illegible]
17TFX-547	[illegible]
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18FLT-120	[illegible]
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18LTR-027	[illegible]
18LTR-030	[illegible]
18LTR-073	[illegible]
18SEP-075	[illegible]
18SMP-063	[illegible]
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18TFL-027	[illegible]
18TFL-030	[illegible]
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18TFX-028	[illegible]
18TFX-061	[illegible]
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18TFX-062A	[illegible]
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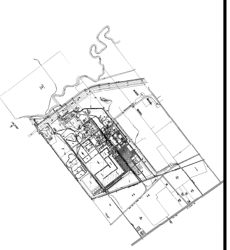
GEN-2	[illegible]
GEN-2FUG	[illegible]
GEN-3	[illegible]
GEN-3FUG	[illegible]



WAID ENVIRONMENTAL

INVISTA S.a r.l.

NAD 83 VICTORIA PLANT PLOT PLAN

Drawn By	Start Date	Rev. Date	DWG Name	Rev. No.
DWW	2/1/05	4/5/16	TCEQINVICBASE	58

H:\CLIENTS\INVISTA-VIC\INV4563\ACAD

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Appendix D: **OZONE ANALYSIS DATA**

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Table D-1. Victoria County Emissions[1]

Year	NOx (tpy)	VOC (tpy)	VOC-to-NOx	Adjusted VOC-to-NOx[2]	Conclusion
2011	6,500	5,933	0.91	2.62	NOx-limited
2008	8,191	7,268	0.89	2.55	NOx-limited

[1]Source: http://www3.epa.gov/ttn/chief/eiinformation.html

[2] Adjusted using molar equivalent conversion factor of 2.875, representing the ratio of NO_2-to-CH_4 molecular weights.

Table D-2. INVISTA Victoria Site Emissions

	NOx (tpy)	VOC (tpy)	VOC-to-NOx	Adjusted VOC-to-NOx[1]	Conclusion
Sitewide	6,139	1,357	0.22	0.64	VOC-limited

[1] Adjusted using molar equivalent conversion factor of 2.875, representing the ratio of NO_2-to-CH_4 molecular weights.

Table D-3. Monitor Data (H4H)[1,2]

Monitor ID	Name	2015	2014	2013	2012	Average
48-469-0003	Victoria	70	62	62	66	64
48-469-0609	Inez	--	55	58	58	57
48-175-0624	Coleto	--	58	58	59	58

[1]Source: https://www.tceq.texas.gov/cgi-bin/compliance/monops/8hr_4highest.pl

[2]Complete data is not available at this time for 2015 for the Inez and Coleto monitors.

Table D-4. Screening Modeling Analysis Summary

	NO_2 (1-hr)	
	(□g/m^3)	ppb
Project NO_2 GLC_{max} @ 10km	0.53045	0.2821543

0.76 ppb O3 increase
2.22 ppb O3 increase from recent Permit No. PSDTX1416
66.98 ppb O3 concentration

PASS

Appendix E: **SPLD DOCUMENTATION**

ED_001261_00097513

PETITION OF E. I. DU PONT DE NEMOURS AND CO., EQUISTAR CHEMICALS, LP, AND INVISTA S.A. R L. FOR DESIGNATION OF SITE IN VICTORIA COUNTY, TEXAS AS A SINGLE PROPERTY	§ § § § §	**BEFORE THE** **TEXAS COMMISSION ON** **ENVIRONMENTAL QUALITY**

FINDINGS OF FACT, CONCLUSIONS OF LAW, AND DESIGNATION OF E. I. DU PONT DE NEMOURS AND CO., EQUISTAR CHEMICALS, LP, AND INVISTA S.A. R L. FOR DESIGNATION OF SITE IN VICTORIA COUNTY, TEXAS AS A SINGLE PROPERTY

On the date entered below, came to be considered by the Executive Director of the Texas Commission on Environmental Quality (TCEQ or the Commission) the Petition of E.I. du Pont de Nemours and Company, Equistar Chemicals, LP, and INVISTA S.a r.l. (individually, a Petitioner and collectively, the Petitioners) to have a property located in Victoria, Victoria County (collectively identifiable as the "Site") designated as a single property for purposes of demonstrating compliance with TCEQ air quality regulations and the control of air emissions pursuant to 30 TEX. ADMIN. CODE § 101.2(b).

I. FINDINGS OF FACT

Based on representations in the Petition the Executive Director FINDS as follows:

1. The properties that are the subject of the Petition, which are more fully depicted in the map attached to the Petition as Exhibits A and C, are contiguous except for intervening roads, railroads and rights-of-way, which are part of the property.
2. The properties that are the subject of this Petition are not separated by any public right-of-way.
3. The Site depicted in the map attached to the Petition as Exhibit A is owned by E.I. du Pont de Nemours (DuPont). DuPont leases tracts at the Site to Equistar Chemicals, LP (Equistar), and INVISTA S.a r.l. (INVISTA). Since June 9, 1987, Equistar and, or, its predecessors in interest have leases and operated the tract marked on Exhibit A as "Equistar Operations." Since April 30, 2004, INVISTA has leased and operated the tract marked on Exhibit A as "INVISTA Operations & Single Property Boundary." These two tracts are identifiable as the "Leased Tracts." DuPont operates all portions of the facility other than the Leased Tracts. Therefore, the Site was originally under the control of a singly entity and has been divided and placed under the control of separate entities, such that there are different internal boundaries.

4. The Petition, the terms of which are incorporated herein, includes all information and documentation required by 30 TEX. ADMIN. CODE § 101.2(b) (TAC) as follows: (1) a general description of the manner in which the control of emissions and demonstration of compliance with commission regulations will be administered and controlled; (2) designation of the parties who accept responsibility for off-property impacts; (3) the existing account number for each Petitioner, if applicable; (4) a description of how the Petitioners meet the requirements of the rule; (5) a copy of a sworn written agreement between the Petitioners who consent to having their properties so designated, and which details the mechanisms of control exercised on all properties; and (6) a United States Geological Survey map or equivalent indicating geographical features, present land uses in the surrounding areas, the boundaries of the Petitioners' properties and the area to be included in the single property designation.

II. CONCLUSIONS OF LAW

Based on these findings, the Executive Director CONCLUDES as follows:

1. The Executive Director's decision concerning the substance of this Petition is governed by 30 TAC § 101.2(b).
2. Petitioners have demonstrated their Petition satisfies the requirements of 30 TAC§ 101.2(b).
3. The Texas Clean Air Act (TCAA), TEX. HEALTH & SAFETY CODE (THSC) § 382.023(a), authorizes the Commission to issue orders and make determinations to carry out the purposes of the TCAA.
4. The TEX. WATER CODE § 5.122 authorizes the Commission to delegate uncontested matters to the Executive Director.
5. The Executive Director is authorized to approve a petition for a single property designation under 30 TEX. ADMIN. CODE § 101.2(b)(2)(F).

III. ORDER

It is therefore ORDERED as follows:

1. Subject to the conditions contained in these Findings of Fact and Conclusions of Law, the Petition for designation of single property is hereby GRANTED.
2. For purposes of evaluating whether emissions from facilities owned and/or operated by the Petitioners at the Site cause or contribute to exceedances of any ambient air quality

standards or guideline concentrations, the TCEQ shall not consider the properties of any Petitioner within the Single Property Designation boundary line denoted on the site maps labeled as Exhibit A as off-property receptors of one another.

3. This Designation does not constitute a determination the Site is a single property for any other purpose under state or federal law and does not affect Petitioners' responsibilities under, or obligations to comply with, applicable federal air quality statutes and rules, including, but not limited to, permits issued under the Federal Clean Air Act, Title I, Parts C (Prevention of Significant Deterioration) and D (Nonattainment), and Title V (Operating Permits).

4. This Designation does not relieve the Petitioners from meeting the requirements of THSC § 382.0518(b) regarding best available control technology and protection of public health for any new or amended permits issued by the TCEQ.

5. Each Petitioner shall be responsible under the TCAA and the rules, orders and permits issued by the TCEQ pursuant to the TCAA for controlling emissions from facilities that it operates.

6. If a Petitioner or any successor in interest seeks a change in emissions of an air contaminant that is or will be common to other Petitioners, the Executive Director may require modeling of all sources for that air contaminant within the designated single property boundary. If such a requirement is imposed, all Petitioners must provide, in a timely manner, available information necessary for the applicant Petitioner to conduct the required modeling.

7. Upon becoming aware of any changes affecting the accuracy of the Findings of Fact set forth in this Designation, Petitioners are responsible for ensuring that the TCEQ Executive Director is notified in writing of such changes. Upon determining the facts no longer support this Designation, the TCEQ Executive Director or any Petitioner may petition the Commission for modification or termination of this Designation.

8. This Designation is binding upon all Petitioners and their successors and assigns as to the subject properties, unless and until amended or rescinded by further designation of the Executive Director. Each Petitioner shall provide notice of this Designation to any successor-in-interest prior to transfer of ownership of all or part of that Petitioner's facilities and properties affected by this Designation and, within ten days of any such transfer, provide the appropriate TCEQ Regional Office with written confirmation that such notice has been given. This Single Property Designation is not applicable to subsequent divisions of the interests in real property that are the subject of this Designation or that would change responsibility for control of emissions under the Single Property Agreement, unless authorized by the Executive Director or as provided by TCEQ rules.

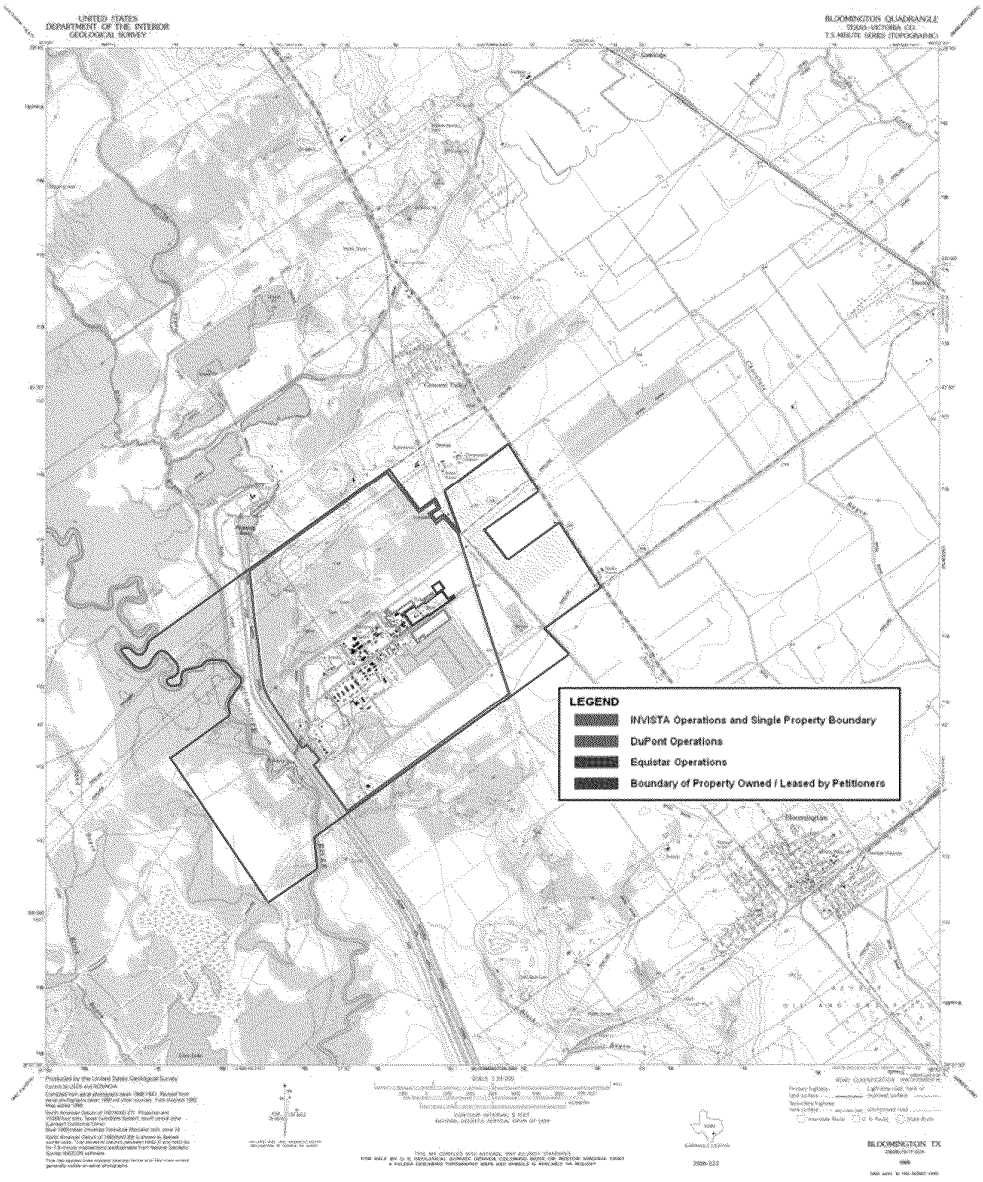
9. If a Petitioner transfers the ownership or operational control of a source of emissions, the Petitioner must provide the following documentation to the Executive Director: (1) a list

of current emissions sources and the associated emission point numbers (EPNs); and (2) a list of proposed emission sources and the associated EPNs.

10. The Executive Director shall provide a copy of this Designation to the Petitioners.
11. This Designation will become effective on the date entered below by the Executive Director.

APPROVED AND ENTERED by the Director of the Air Permits Division on behalf of the Executive Director on August 9, 2010.

Steve Hagle, P.E.
Director, Air Permits Division


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
BLOOMINGTON QUADRANGLE
TEXAS-VICTORIA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
LEGEND
INVISTA Operations and Single Property Boundary
DuPont Operations
Equistar Operations
Boundary of Property Owned / Leased by Petitioners
Bloomington
BLOOMINGTON, TX

```
** Generated by AERSURFACE, dated 13016
** Generated from "c:\users\jgamez\desktop\INV VIC\Map.tif"
** Center UTM Easting (meters):    699702.0
** Center UTM Northing (meters):  3173783.0
** UTM Zone:  14    Datum: NAD83
** Study radius (km) for surface roughness:   1.0
** Airport? N, Continuous snow cover? N
** Surface moisture? Average, Arid region? N
** Month/Season assignments? Default
** Late autumn after frost and harvest, or winter with no snow: 12 1 2
** Winter with continuous snow on the ground: 0
** Transitional spring (partial green coverage, short annuals): 3 4 5
** Midsummer with lush vegetation: 6 7 8
** Autumn with unharvested cropland: 9 10 11


   FREQ_SECT  ANNUAL  1
   SECTOR   1    0  360
**                    Sect    Alb      Bo        Zo
   SITE_CHAR    1       1     0.16     0.39     0.216
```


ED_001261_00097513

Appendix G: MERA ANALYSIS RESULTS

ED_001261_00097513

Table X-1. MERA Step 1C Chemicals

Component	Hourly Emission Rates (lb/hr)					Annual Emission Rates (tpy)					Screen out at Step 1C?
	Proposed		Existing		Project Net Increases	Proposed Annual		Existing Annual		Project Net Increases	(Yes/No)
	Normal	MSS	Normal	MSS		Normal	MSS	Normal	MSS		
Hydrogen Cyanide (HCN	14.94	1,119.18	17.10	1,118.67	-1.65	22.24	55.72	25.56	55.52	-3.12	Yes
Benzene (C6H6)	10.90	12.33	17.14	11.70	-5.61	12.56	0.27	13.02	0.19	-0.39	Yes
Pentane (as n-C5H12)	7.58	41.73	8.39	41.33	-0.40	16.54	2.23	16.83	2.19	-0.25	Yes

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Table X-1. MERA Anslysis, Step 4C, 4D, and 5

MERA Steps 4C,4D, and 5

Constituent	CAS No.	Normal - Hourly (lb/hr)	MSS - Hourly (lb/hr)	Total Hourly Emissions Increase (lb/hr)	Normal - Annual (lb/hr)	MSS - Annual (lb/hr)	Total Annual Emissions Increase (lb/hr)	Short-Term ESL ($\mu g/m^3$)	Long-Term ESL ($\mu g/m^3$)	Annual ESL ≥ 10% Short term ESL?	Step 4 Flowchart Step 4C: Is Increase ≤ 0.04 lb/hr & 2 ≤ ESL < 500 $\mu g/m^3$? Is Increase ≤ 0.1 lb/hr & 500 ≤ ESL < 3500 $\mu g/m^3$? Is Increase ≤ 0.4 lb/hr& ESL ≥ 3500 $\mu g/m^3$?	Is Increase ≤ 0.04 lb/hr & ESL < 2 $\mu g/m^3$?	Step 5 Allowable Short-term Total Emissions (lb/hr)	Allowable Annual Total Emissions (lb/hr)	Screen out at Step 5?
Butadiene (BD as 1,3-C4H6)	106-99-0	4.3450	2.9811	7.3260	0.2862	0.0518	0.3380	510	9.9	No	No	No	844.98	524.51	Yes
trans 2-Butene (T-C4H8, t-2-C4H8)	107-01-7	0.9910	1.3760	2.3670	0.0729	0.0543	0.1272	10000	480	No	No	No	11,421.36	33,470.88	Yes
Cyclohexane (CYAN, C6H12)	110-82-7	43.5114	5.5690	49.0803	2.8763	0.0607	2.9371	3400	340	Yes	No	No	8,764.92	--	Yes
trans-2-Methyl-2-Butenenitrile (T2M2BN)	30574-97-1	0.7695	0.9331	1.7026	0.0187	6.83E-03	0.0256	70	7	Yes	No	No	87.31	--	Yes
2-Methyl-3-Butenenitrile (2M3BN)	16529-56-9	10.1250	0.9669	11.0919	0.1762	3.24E-03	0.1794	800	80	Yes	No	No	1,995.15	--	Yes
cis-2-Pentenenitrile (C2PN)	25899-50-7	1.0277	0.5845	1.6123	0.0345	2.81E-03	0.0373	700	70	Yes	No	No	1,174.66	--	Yes
Vinylcyclohexene (VCH, C8H12)	695-12-5	1.5963	0.1190	1.7153	0.2570	1.11E-03	0.2581	2000	200	Yes	No	No	5,439.85	--	Yes
cis-2-Methyl-2-Butenenitrile (C2M2BN)	20068-02-4	1.4016	0.6532	2.0548	0.0330	4.26E-03	0.0372	70	7	Yes	No	No	136.73	--	Yes
Valeronitrile (VN)	110-59-8	0.4382	0.2280	0.6662	0.0107	1.41E-03	0.0121	220	22	Yes	No	No	419.40	--	Yes
trans-2-Pentenenitrile (T2PN)	26294-98-4	0.8998	0.4920	1.3918	0.0212	2.85E-03	0.0240	700	70	Yes	No	No	1,303.79	--	Yes
Phenol (PHENOL, C6H6O)	108-95-2	0.1953	0.0525	0.2477	0.0366	4.01E-05	0.0367	150	3.3	No	No	No	83.52	2.87	Yes
Benzonitrile (BZNIT, C7H5N)	100-47-0	0.3327	0.8479	1.1805	0.0896	6.38E-04	0.0902	500	50	Yes	No	No	66.78	--	Yes
IE	-	0.0445	0.0508	0.0953	7.53E-04	4.70E-05	8.00E-04	2	0.2	Yes	No	No	2.11	--	Yes
Ethylene Glycol (E-GLYCOL, C2H6O2)	107-21-1	0.0247	0.6617	0.6864	3.45E-04	1.06E-03	1.41E-03	260	26	Yes	No	No	24.23	--	Yes
m-Cresol (MCRESOL, C7H8O)	108-39-4	0.1849	0.2132	0.3981	0.0791	1.75E-04	0.0792	4.4	10	Yes	No	No	2.24	--	Yes
Phenyl Ethylene Glycol Borane (PEGB)	-	9.24E-03	0.0393	0.0486	3.95E-04	3.14E-05	4.26E-04	2	0.2	Yes	No	No	0.60	--	Yes
Ethyl Succinonitrile (ESN)	110-61-2	0.1534	0.0656	0.2190	0.0558	8.61E-05	0.0559	200	20	Yes	No	No	9.24	--	Yes
Methylglutaronitrile (MGN, C6H8N2)	4553-62-2	1.7361	1.5196	3.2557	0.2707	1.95E-03	0.2726	80	8	Yes	No	No	32.96	--	Yes
Adiponitrile (ADN, C6H8N2)	111-69-3	17.9409	2.7328	20.6738	1.7302	0.0109	1.7411	90	9	Yes	No	No	20.71	--	Yes
Triphenyl Borane (PROM, C18H15B)	960-71-4	0.0189	0.1369	0.1558	1.09E-03	2.04E-04	1.30E-03	10	1	Yes	No	No	0.27	--	Yes
Tritolylphosphate (TTP, C21H21PO3) -	1330-78-5	0.4767	2.8818	3.3585	0.4017	9.23E-03	0.4109	100	10	Yes	No	No	6.24	--	Yes
Ligand Hydrolysis Product (LHP, C14H15PO3)	-	3.86E-03	0.0665	0.0704	4.31E-04	7.35E-05	5.05E-04	100	10	Yes	No	No	1.94	--	Yes
Ligand Degradation Product (LDP, C21H21PO3)	-	5.84E-03	0.0975	0.1033	7.36E-04	1.36E-04	8.72E-04	100	10	Yes	No	No	2.24	--	Yes
Acrylonitrile (ACRN, CH2CHCN)	107-13-1	0.0669	1.81E-03	0.0687	0.0109	2.75E-05	0.0109	330	2.1	No	No	No	703.30	49.21	Yes
Acetonitrile (ACEN, CH3CN)	75-05-8	0.1754	0.3081	0.4835	0.0368	5.58E-04	0.0374	340	34	Yes	No	No	153.02	--	Yes
Propionitrile (PROPN, CH3CH2CN)	107-12-0	0.0643	8.90E-03	0.0732	0.0126	3.08E-05	0.0126	140	14	Yes	No	No	203.42	--	Yes
Biphenyl (C12H10)	92-52-4	4.68E-04	2.71E-08	4.68E-04	4.66E-04	1.25E-07	4.66E-04	13	1.3	Yes	Yes, No Further Review	--	--	--	Yes
n-Hexane (C6H14)	110-54-3	0.0110	0.5923	0.6033	0.0101	0.0173	0.0274	6200	200	No	No	No	48.51	9,061.64	Yes
p-Xylene (C8H10)	106-42-3	5.08E-04	3.13E-05	5.40E-04	4.84E-04	6.33E-07	4.84E-04	2200	180	No	No	No	15.54	106.52	Yes
Toluene (C7H8)	108-88-3	0.1189	0.0106	0.1295	0.0356	2.62E-04	0.0358	4500	1200	Yes	Yes, No Further Review	--	--	--	Yes
Isopentane (i-C5H12)	78-78-4	0.1833	0.1015	0.2849	0.2267	2.07E-03	0.2288	59000	7100	Yes	Yes, No Further Review	--	--	--	Yes
2,2 Dimethylbutane (C6H14)	75-83-2	1.11E-03	7.36E-06	1.12E-03	1.11E-03	3.60E-07	1.11E-03	3500	350	Yes	Yes, No Further Review	--	--	--	Yes
2,3 Dimethylbutane (C6H14)	79-29-8	9.63E-04	4.86E-06	9.67E-04	9.61E-04	2.67E-07	9.61E-04	3500	350	Yes	Yes, No Further Review	--	--	--	Yes
2-Methylpentane (C6H14)	107-83-5	3.77E-03	0.6000	0.6038	3.76E-03	0.0171	0.0209	3500	350	Yes	No	No	31.66	--	Yes
3-Methylpentane (C6H14)	96-14-0	1.82E-03	8.40E-06	1.83E-03	1.82E-03	5.20E-07	1.82E-03	3500	350	Yes	Yes, No Further Review	--	--	--	Yes
2,2-Dimethylpentane (C7H16)	590-35-2	3.98E-04	7.32E-07	3.99E-04	3.98E-04	7.80E-08	3.98E-04	3500	350	Yes	Yes, No Further Review	--	--	--	Yes
2,3-Dimethylpentane (C7H16)	565-59-3	3.41E-04	3.79E-07	3.41E-04	3.41E-04	6.74E-08	3.41E-04	3500	350	Yes	Yes, No Further Review	--	--	--	Yes
Methylcyclopentane (C6H12)	96-37-7	1.49E-03	5.04E-06	1.49E-03	1.48E-03	4.04E-07	1.48E-03	2600	260	Yes	Yes, No Further Review	--	--	--	Yes
2-Methylhexane (C7H16)	591-76-4	6.39E-04	9.39E-07	6.40E-04	6.38E-04	1.72E-07	6.38E-04	3070	307	Yes	Yes, No Further Review	--	--	--	Yes
3-Methylhexane (C7H16)	589-34-4	4.54E-04	0.0600	0.0605	4.53E-04	1.71E-03	2.17E-03	3070	307	Yes	Yes, No Further Review	--	--	--	Yes
Methylcyclohexane (C7H14)	108-87-2	3.54E-03	7.08E-05	3.61E-03	2.78E-03	1.39E-06	2.78E-03	16100	1610	Yes	Yes, No Further Review	--	--	--	Yes
Octane (as n-C8H18)	111-65-9	1.29E-03	1.11E-05	1.30E-03	1.14E-03	3.31E-07	1.14E-03	3500	350	Yes	Yes, No Further Review	--	--	--	Yes
Nonane (as n-C9H20)	111-84-2	9.26E-04	2.10E-03	3.02E-03	8.71E-04	2.49E-06	8.73E-04	10500	1050	Yes	Yes, No Further Review	--	--	--	Yes
Propane (C3H8)	74-98-6	2.7223	13.8523	16.5746	6.2618	0.4292	6.6910	asphyxiant	asphyxiant	--	Simple Asphyxiant, No Further Review	--	--	--	Yes
Butane (as n-C4H10)	106-97-8	0.8315	0.3799	1.2114	1.1356	7.04E-03	1.1427	66000	7200	Yes	No	No	91,044.61	--	Yes
Isobutane (i-C4H10)	75-28-5	0.1149	0.2157	0.3306	1.2741	4.26E-03	1.2783	23000	7200	Yes	Yes, No Further Review	--	--	--	Yes
Heptane (as n-C7H16)	142-82-5	2.92E-03	0.0633	0.0662	7.92E-04	1.72E-03	2.51E-03	3500	350	Yes	Yes, No Further Review	--	--	--	Yes
Decane (as C10H22)	124-18-5	1.35E-03	3.74E-07	1.35E-03	1.07E-03	1.90E-08	1.07E-03	10000	1000	Yes	Yes, No Further Review	--	--	--	Yes
Undecane (as C11H24)	1120-21-4	2.12E-03	2.28E-07	2.12E-03	1.90E-03	1.08E-08	1.90E-03	3500	350	Yes	Yes, No Further Review	--	--	--	Yes
Dodecane (as n-C12H26)	112-40-3	3.38E-03	1.42E-07	3.38E-03	3.21E-03	4.99E-06	3.21E-03	3500	350	Yes	Yes, No Further Review	--	--	--	Yes

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Table X-1. MERA Anslysis, Step 4C, 4D, and 5

MERA Steps 4C,4D, and 5

Constituent	CAS No.	Normal - Hourly (lb/hr)	MSS - Hourly (lb/hr)	Total Hourly Emissions Increase (lb/hr)	Normal - Annual (lb/hr)	MSS - Annual (lb/hr)	Total Annual Emissions Increase (lb/hr)	Short-Term ESL ($\mu g/m^3$)	Long-Term ESL ($\mu g/m^3$)	Annual ESL ≥ 10% Short-term ESL?	Step 4 Flowchart Step 4C: Is Increase ≤ 0.04 lb/hr & 2 ≤ ESL < 500 $\mu g/m^3$? Is Increase ≤ 0.1 lb/hr & 500 ≤ ESL < 3500 $\mu g/m^3$? Is Increase ≤ 0.4 lb/hr& ESL ≥ 3500 $\mu g/m^3$?	Step 5 Is Increase ≤ 0.04 lb/hr & ESL < 2 $\mu g/m^3$?	Allowable Short-term Total Emissions (lb/hr)	Allowable Annual Total Emissions (lb/hr)	Screen out at Step 5?
Tridecane (as n-C13H28)	629-50-5	2.76E-03	2.37E-08	2.76E-03	2.68E-03	1.75E-09	2.68E-03	3500	350	Yes	Yes, No Further Review	--	--	--	Yes
Tetradecane (as n-C14H30)	629-59-4	1.82E-03	9.22E-09	1.82E-03	1.79E-03	3.41E-09	1.79E-03	3500	350	Yes	Yes, No Further Review	--	--	--	Yes
Pentadecane (as n-C15H32)	629-62-9	4.29E-03	7.66E-09	4.29E-03	4.24E-03	2.83E-10	4.24E-03	2	0.2	Yes	Yes, No Further Review	--	--	--	Yes
Hexadecane (as nC16H34)	544-76-3	1.38E-03	1.15E-09	1.38E-03	1.37E-03	1.45E-14	1.37E-03	3500	350	Yes	Yes, No Further Review	--	--	--	Yes
Methacrylonitrile (C4H5N)	126-98-7	0.0356	5.25E-04	0.0361	7.20E-03	5.53E-06	7.21E-03	27	2.7	Yes	Yes, No Further Review	--	--	--	Yes
Isobutyronitrile (C4H7N)	78-82-0	1.38E-03	7.58E-06	1.38E-03	4.71E-04	1.26E-07	4.71E-04	220	22	Yes	Yes, No Further Review	--	--	--	Yes
C&T-2-Butenenitrile (transcrotonitrile, C4H5N)	4786-20-3	0.0164	1.06E-04	0.0166	4.29E-03	1.85E-06	4.29E-03	70	7	Yes	Yes, No Further Review	--	--	--	Yes
Butanenitrile (n-butyronitrile, C4H7N)	109-74-0	0.0203	7.97E-05	0.0204	6.47E-03	1.79E-06	6.47E-03	220	22	Yes	Yes, No Further Review	--	--	--	Yes
Pyridine (C5H5N)	110-86-1	5.22E-03	1.99E-05	5.24E-03	1.79E-03	4.33E-07	1.79E-03	30	3	Yes	Yes, No Further Review	--	--	--	Yes
Ethylbenzene (C8H10)	100-41-4	3.48E-04	0.3000	0.3003	2.42E-04	0.0114	0.0117	26000	570	No	No	No	259.27	461.44	Yes
Styrene (C8H8)	100-42-5	1.79E-04	2.75E-08	1.79E-04	1.64E-04	1.49E-09	1.64E-04	110	140	Yes	Yes, No Further Review	--	--	--	Yes
1,2-Dimethylbenzene (o-Xylene, o-C8H10)	95-47-6	2.25E-04	7.31E-09	2.25E-04	1.83E-04	3.74E-10	1.83E-04	2200	180	No	No	No	1,100.27	265.83	Yes
Benzofuran (C8H6O)	271-89-6	1.55E-04	2.56E-07	1.56E-04	1.55E-04	1.89E-08	1.55E-04	2	0.2	Yes	Yes, No Further Review	--	--	--	Yes
Aniline (Aminobezene, C6H7N)	62-53-3	3.60E-04	3.83E-08	3.60E-04	3.28E-04	1.95E-09	3.28E-04	80	8	Yes	Yes, No Further Review	--	--	--	Yes
Alpha-Methylstyrene (C9H10)	98-83-9	1.92E-03	9.07E-07	1.92E-03	1.38E-03	4.85E-08	1.38E-03	250	48	Yes	Yes, No Further Review	--	--	--	Yes
m-Methylstyrene (C9H10)	100-80-1	1.90E-04	1.77E-08	1.90E-04	1.79E-04	9.33E-10	1.79E-04	250	48	Yes	Yes, No Further Review	--	--	--	Yes
Glutaronitrile (C5H6N2)	544-13-8	1.73E-04	7.42E-11	1.73E-04	1.72E-04	3.66E-12	1.72E-04	50	5	Yes	Yes, No Further Review	--	--	--	Yes
Indene (C9H8)	95-13-6	1.61E-04	3.94E-09	1.61E-04	1.58E-04	2.02E-10	1.58E-04	240	24	Yes	Yes, No Further Review	--	--	--	Yes
Phenylacetonitrile (C8H7N)	140-29-4	6.19E-04	1.40E-08	6.19E-04	6.02E-04	6.92E-10	6.02E-04	2	0.2	Yes	Yes, No Further Review	--	--	--	Yes
m-Ethylphenol (as p-C8H10O)	620-17-7	2.00E-04	1.02E-09	2.00E-04	1.98E-04	4.65E-11	1.98E-04	290	3.3	No	No	No	7.37	1.69	Yes
Naphthalene (C10H8)	91-20-3	3.85E-04	6.90E-09	3.85E-04	3.65E-04	3.15E-10	3.65E-04	440	50	Yes	Yes, No Further Review	--	--	--	Yes
2-Methylnaphthalene (C11H10)	91-57-6	1.67E-04	4.45E-10	1.67E-04	1.67E-04	1.86E-11	1.67E-04	200	20	Yes	Yes, No Further Review	--	--	--	Yes
Diphenylmethane (C13H12)	101-81-5	1.67E-04	1.16E-10	1.67E-04	1.67E-04	5.72E-12	1.67E-04	125	12.5	Yes	Yes, No Further Review	--	--	--	Yes
Formic Acid (CH2O2)	64-18-6	6.07E-04	8.32E-05	6.91E-04	1.69E-04	4.88E-08	1.69E-04	90	9	Yes	Yes, No Further Review	--	--	--	Yes
Sodium Cyanide (NaCN)	143-33-9	4.43E-07	1.25E-05	1.30E-05	4.43E-07	7.14E-09	4.51E-07	50	5	Yes	Yes, No Further Review	--	--	--	Yes
Isopropanol (IPA)	67-63-0	1.46E-04	0.3000	0.3001	1.46E-04	8.56E-03	8.71E-03	4920	492	Yes	Yes, No Further Review	--	--	--	Yes
Methanol	67-56-1	5.3231	2.0963	7.4194	0.0432	3.42E-03	0.0466	3900	2100	Yes	No	No	8.61	--	Yes
COD		0	1.61E-04	1.61E-04	0.0737	1.85E-07	0.0737	2	0.2	Yes	Yes, No Further Review	--	--	--	Yes
CDDT		0.2080	3.75E-08	0.2080	0.0271	4.30E-11	0.0271	2	0.2	Yes	No	No	5.87	--	Yes
2-Butoxy ethanol	111-76-2	0	1.9644	1.9644	0	0.2859	0.2859	2900	3700	Yes	No	No	18.88	--	Yes
Hexamethylenediamine (HMD)	124-09-4	2.27E-03	6.15E-03	8.42E-03	1.08E-04	3.51E-06	1.12E-04	16	0.54	No	No	No	0.09	0.77	Yes
Cyclohexanone	108-94-1	0	3.10E-03	3.10E-03	0	1.77E-06	1.77E-06	800	80	Yes	Yes, No Further Review	--	--	--	Yes
Cyclohexanol	108-93-0	0	7.97E-03	7.97E-03	0	4.55E-06	4.55E-06	630	200	Yes	Yes, No Further Review	--	--	--	Yes
Cyclohexene	110-83-8	0	8.69E-07	8.69E-07	0	4.96E-10	4.96E-10	10000	1000	Yes	Yes, No Further Review	--	--	--	Yes
Caproic Acid	142-62-1	0	6.32E-06	6.32E-06	0	3.61E-09	3.61E-09	200	48	Yes	Yes, No Further Review	--	--	--	Yes
Pentanal	110-62-3	0	1.41E-05	1.41E-05	0	8.06E-09	8.06E-09	98	180	Yes	Yes, No Further Review	--	--	--	Yes
Hexanal	66-25-1	0	3.36E-05	3.36E-05	0	1.92E-08	1.92E-08	330	818	Yes	Yes, No Further Review	--	--	--	Yes
Acetic Acid	64-19-7	0	3.05E-05	3.05E-05	0	1.74E-08	1.74E-08	250	25	Yes	Yes, No Further Review	--	--	--	Yes
Propionic Acid	79-09-4	0	4.79E-08	4.79E-08	0	2.73E-11	2.73E-11	85	30	Yes	Yes, No Further Review	--	--	--	Yes
Butyric Acid	107-92-6	0	1.18E-05	1.18E-05	0	6.76E-09	6.76E-09	26	90	Yes	Yes, No Further Review	--	--	--	Yes
Valeric Acid	109-52-4	0	2.10E-05	2.10E-05	0	1.20E-08	1.20E-08	63	42	Yes	Yes, No Further Review	--	--	--	Yes
n-Butanol	71-36-3	0	1.32E-05	1.32E-05	0	7.51E-09	7.51E-09	610	61	Yes	Yes, No Further Review	--	--	--	Yes
Pentanol	71-41-0	0	7.34E-05	7.34E-05	0	4.19E-08	4.19E-08	360	73	Yes	Yes, No Further Review	--	--	--	Yes
Aliphatic Hydrocarbon	69430-33-7	0	4.0800	4.0800	0	0.1553	0.1553	2450	245	Yes	No	No	22.15	--	Yes
Ethyl nonafluoroisobutyl ether	163702-06-5	0	2.7000	2.7000	0	0.1027	0.1027	200	20	Yes	No	No	1.81	--	No
Ethyl nonafluorobutyl ether	163702-05-4	0	1.5000	1.5000	0	0.0571	0.0571	200	20	Yes	No	No	1.81	--	Yes
1,2-Trans-dichloroethylene	156-60-5	0	1.5000	1.5000	0	0.0571	0.0571	7900	790	Yes	No	No	71.43	--	Yes
Methyl nonafluoroisobutyl ether	163702-08-7	0	0.6000	0.6000	0	0.0228	0.0228	200	20	Yes	No	No	1.81	--	Yes
Methyl nonafluorobutyl ether	163702-07-6	0	0.6000	0.6000	0	0.0228	0.0228	200	20	Yes	No	No	1.81	--	Yes
Poly(dimethylsiloxane)	63148-62-9	0	0.1200	0.1200	0	4.57E-03	4.57E-03	1000	100	Yes	No	No	9.04	--	Yes

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Table X-1. MERA Anslysis, Step 4C, 4D, and 5

MERA Steps 4C,4D, and 5

Constituent	CAS No.	Normal - Hourly (lb/hr)	MSS - Hourly (lb/hr)	Total Hourly Emissions Increase (lb/hr)	Normal - Annual (lb/hr)	MSS - Annual (lb/hr)	Total Annual Emissions Increase (lb/hr)	Short-Term ESL ($\mu g/m^3$)	Long-Term ESL ($\mu g/m^3$)	Annual ESL ≥ 10% Short term ESL?	Step 4 Flowchart Step 4C: Is Increase ≤ 0.04 lb/hr & 2 ≤ ESL < 500 $\mu g/m^3$? Is Increase ≤ 0.1 lb/hr & 500 ≤ ESL < 3500 $\mu g/m^3$? Is Increase ≤ 0.4 lb/hr& ESL ≥ 3500 $\mu g/m^3$?	Step 5 Is Increase ≤ 0.04 lb/hr & ESL < 2 $\mu g/m^3$?	Allowable Short-term Total Emissions (lb/hr)	Allowable Annual Total Emissions (lb/hr)	Screen out at Step 5?
Ethanol	64-17-5	0	1.2000	1.2000	0	0.0342	0.0342	18800	1880	Yes	No	No	169.97	--	Yes
1,1-difluoroethane	75-37-6	0	1.5000	1.5000	0	0.0428	0.0428	27000	2700	Yes	No	No	244.11	--	Yes
Propyl acetate	109-60-4	0	0.1800	0.1800	0	5.14E-03	5.14E-03	8350	835	Yes	Yes, No Further Review	--	--	--	Yes
Acetone	67-64-1	0.0304	5.4000	5.4304	5.04E-03	0.1541	0.1592	7800	4800	Yes	No	No	70.34	--	Yes
Naphtha (petroleum), hydrotreated light	64742-49-0	0	2.4000	2.4000	0	0.0685	0.0685	3500	350	Yes	No	No	31.64	--	Yes
Hydrotreated Heavy Alkanes	64742-52-5	0	1.2000	1.2000	0	0.0457	0.0457	1000	100	Yes	No	No	9.04	--	Yes
C9-15 Heavy Aromatic Hydrocarbons	68132-00-3	0	1.2000	1.2000	0	0.0457	0.0457	2450	245	Yes	No	No	22.15	--	Yes
Middle Alkanes	64742-46-7	0	0.9000	0.9000	0	0.0342	0.0342	3500	350	Yes	No	No	31.64	--	Yes
Light Aromatic Hydrocarbons; Stoddard Solvent	8052-41-3	0	1.2000	1.2000	0	0.0457	0.0457	3500	350	Yes	No	No	31.64	--	Yes
1,2,4-Trimethylbenzene	95-63-6	0	0.6000	0.6000	0	0.0228	0.0228	4400	54	No	No	No	39.78	41.89	Yes
2-(2-butoxyethoxy) ethanol	210818-08-9	0	0.6000	0.6000	0	0.0228	0.0228	600	60	Yes	No	No	5.42	--	Yes
Amyl acetate	628-63-7	0	0.3000	0.3000	0	0.0114	0.0114	2700	270	Yes	No	No	24.41	--	Yes
2-methylbutyl acetate	624-41-9	0	0.3000	0.3000	0	0.0114	0.0114	2700	270	Yes	No	No	24.41	--	Yes
VOC-u	-	4.53E-04	0	4.53E-04	4.53E-04	0	4.53E-04	2	0.2	Yes	Yes, No Further Review	--	--	--	Yes
trans-3-Pentenenitrile (T3PN)	16529-66-1	4.16E-03	0	4.16E-03	1.61E-04	0	1.61E-04	120	12	Yes	Yes, No Further Review	--	--	--	Yes
Nicotinonitrile (3-Pyridinecarbonitrile)	100-54-9	1.39E-05	0	1.39E-05	1.38E-05	0	1.38E-05	2	0.2	Yes	Yes, No Further Review	--	--	--	Yes
Phenyl Propylene Glycol Boronate (PPGB)	-	4.25E-03	0	4.25E-03	2.79E-05	0	2.79E-05	2	0.2	Yes	Yes, No Further Review	--	--	--	Yes
cis-3-Pentenenitrile (C3PN)	4635-87-4	8.06E-05	0	8.06E-05	3.11E-06	0	3.11E-06	120	12	Yes	Yes, No Further Review	--	--	--	Yes
Pentenenitriles (PNs as 3,4 Pentenenitrile)	4635-87-4	64.3288	12.3139	76.6427	0.4320	0.0667	0.4987	120	12	Yes	No	No	203.01	--	Yes
Propylene Glycol	57-55-6	6.31E-04	0	6.31E-04	3.36E-06	0	3.36E-06	1560	156	Yes	Yes, No Further Review	--	--	--	Yes
BDP		3.06E-06	0	3.06E-06	3.06E-06	0	3.06E-06	2	0.2	Yes	Yes, No Further Review	--	--	--	Yes
ACA	373-04-6	8.39E-06	0	8.39E-06	3.34E-07	0	3.34E-07	100	10	Yes	Yes, No Further Review	--	--	--	Yes
BHMT	143-23-7	2.30E-07	0	2.30E-07	7.36E-09	0	7.36E-09	16	0.54	No	No	No	0.06	0.90	Yes
Isophorone	78-59-1	1.19E-05	0	1.19E-05	2.33E-07	0	2.33E-07	230	23	Yes	Yes, No Further Review	--	--	--	Yes
Methacrylic acid	79-41-4	9.25E-03	0	9.25E-03	4.57E-04	0	4.57E-04	180	18	Yes	Yes, No Further Review	--	--	--	Yes
MPMD	15520-10-2	4.35E-05	0	4.35E-05	2.20E-06	0	2.20E-06	250	25	Yes	Yes, No Further Review	--	--	--	Yes
NHA	111-26-2	5.54E-04	0	5.54E-04	2.92E-05	0	2.92E-05	100	10	Yes	Yes, No Further Review	--	--	--	Yes
Propylene glycol t-Butyl ether	57018-52-7	8.38E-05	0	8.38E-05	4.21E-06	0	4.21E-06	730	73	Yes	Yes, No Further Review	--	--	--	Yes
Lube Oils	-	0.0808	0.1243	0.2052	5.83E-03	3.22E-08	5.83E-03	1000	100	Yes	No	No	5.24	--	Yes
Octatriene	-	4.00E-04	0	4.00E-04	4.00E-04	0	4.00E-04	300	30	Yes	Yes, No Further Review	--	--	--	Yes
oxybismethane	115-10-6	4.00E-04	0	4.00E-04	4.00E-04	0	4.00E-04	19000	1900	Yes	Yes, No Further Review	--	--	--	Yes
1-Butene	106-98-9	2.60E-03	0	2.60E-03	2.60E-03	0	2.60E-03	19000	1600	No	No	No	123.69	776.70	Yes
TBC	98-29-3	1.02E-04	0	1.02E-04	1.35E-05	0	1.35E-05	20	2	Yes	Yes, No Further Review	--	--	--	Yes
PBCB	-	5.08E-05	0	5.08E-05	1.59E-05	0	1.59E-05	2	0.2	Yes	Yes, No Further Review	--	--	--	Yes
CPI	-	2.36E-03	0	2.36E-03	1.22E-03	0	1.22E-03	2	0.2	Yes	Yes, No Further Review	--	--	--	Yes
Chloroform	67-66-3	1.94E-05	0	1.94E-05	1.05E-06	0	1.05E-06	100	10	Yes	Yes, No Further Review	--	--	--	Yes
Acrylic Acid	79-10-7	8.03E-03	0	8.03E-03	1.08E-03	0	1.08E-03	60	6	Yes	Yes, No Further Review	--	--	--	Yes
AMC	-	1.87E-07	0	1.87E-07	8.65E-09	0	8.65E-09	2	0.2	Yes	Yes, No Further Review	--	--	--	Yes
Benzaldehyde	100-52-7	2.67E-03	0	2.67E-03	1.01E-04	0	1.01E-04	90	9	Yes	Yes, No Further Review	--	--	--	Yes
DCH	-	3.29E-04	0	3.29E-04	1.56E-05	0	1.56E-05	2	0.2	Yes	Yes, No Further Review	--	--	--	Yes
HMI	-	1.34E-03	0	1.34E-03	7.19E-05	0	7.19E-05	2	0.2	Yes	Yes, No Further Review	--	--	--	Yes
MEK	78-93-3	7.39E-03	0	7.39E-03	3.89E-04	0	3.89E-04	18000	2600	Yes	Yes, No Further Review	--	--	--	Yes
N112	-	6.74E-06	0	6.74E-06	3.15E-07	0	3.15E-07	2	0.2	Yes	Yes, No Further Review	--	--	--	Yes
Vinyl acetate	108-05-4	0.0365	0	0.0365	5.59E-03	0	5.59E-03	420	300	Yes	Yes, No Further Review	--	--	--	Yes
Dichloromethane	75-09-2	1.82E-04	0	1.82E-04	9.91E-06	0	9.91E-06	3600	350	No	No	No	8.16	485.93	Yes

Appendix H: EFFECTIVE FLARE DIAMETER CALCULATIONS

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Flare Effective Stack Diameter Calculation

Component	MW	LHV	Flow to Flare			Average Molecular Weight of Stream	Total BTU
	(lb/lbmol)	(Btu/scf)	lb/hr	lbmol/hr	Mole%	(lb/lbmol)	(MMBtu/hr)
Butadiene (BD as 1,3-C4H6)	54.09	2688	10442.77	193.06	0.019	1.01	200.00
trans 2-Butene (T-C4H8, t-2-C4H8)	56.11	2823	1506.3	26.85	0.003	0.15	29.21
Hydrogen Cyanide (HCN)	27.03	695	477.86	17.68	0.002	0.05	4.74
Benzene (C6H6)	78.11	3499	225.56	2.89	0.000	0.02	3.89
Cyclohexane (CYAN, C6H12)	84.16	4079	6217.02	73.87	0.007	0.60	116.13
trans-2-Methyl-2-Butenenitrile (T2M2BN)	81.11	3202	51.61	0.64	0.000	0.00	0.79
2-Methyl-3-Butenenitrile (2M3BN)	81.11	3202	564.18	6.96	0.001	0.05	8.58
cis-2-Pentenenitrile (C2PN)	81.11	3202	65.66	0.81	0.000	0.01	1.00
Vinylcyclohexene (VCH, C8H12)	108.18	5162	256.16	2.37	0.000	0.02	4.71
cis-2-Methyl-2-Butenenitrile (C2M2BN)	81.11	3202	99.05	1.22	0.000	0.01	1.51
Valeronitrile (VN)	83.13	3373	32.02	0.39	0.000	0.00	0.50
Pentenenitriles (PNs as 3,4 Pentenenitrile)	81.11	3202	2838.44	34.99	0.003	0.27	43.19
trans-2-Pentenenitrile (T2PN)	81.11	3202	64.37	0.79	0.000	0.01	0.98
Benzonitrile (BZNIT, C7H5N)	103.12	3932	11.2	0.11	0.000	0.00	0.16
m-Cresol (MCRESOL, C7H8O)	108.14	1936	4.07	0.04	0.000	0.00	0.03
Methylglutaronitrile (MGN, C6H8N2)	108.14	3794	25.36	0.23	0.000	0.00	0.34
Adiponitrile (ADN, C6H8N2)	108.14	3809	81.93	0.76	0.000	0.01	1.11
Acrylonitrile (ACRN, CH2CHCN)	53.06	1886	9.83	0.19	0.000	0.00	0.13
Acetonitrile (ACEN, CH3CN)	41.05	1328	200.26	4.88	0.000	0.02	2.50
Propionitrile (PROPN, CH3CH2CN)	55.08	2009	8.72	0.16	0.000	0.00	0.12
n-Hexane (C6H14)	86.17	4302	73.13	0.85	0.000	0.01	1.41
p-Xylene (C8H10)	106.16	4835	0.09	0.00	0.000	0.00	0.00
Toluene (C7H8)	92.13	4166	15.32	0.17	0.000	0.00	0.27
Isopentane (i-C5H12)	72.15	3615	323.18	4.48	0.000	0.03	6.24
Pentane (as n-C5H12)	72.15	3621	280.18	3.88	0.000	0.03	5.42
2,2 Dimethylbutane	86.18	4286	0.01	0.00	0.000	0.00	0.00
2,3 Dimethylbutane	86.18	4293	0.01	0.00	0.000	0.00	0.00
2-Methylpentane	86.18	4295	0.03	0.00	0.000	0.00	0.00
3-Methylpentane	86.18	4297	0.01	0.00	0.000	0.00	0.00
Methylcyclopentane	84.16	4100	0.01	0.00	0.000	0.00	0.00
Methylcyclohexane	98.19	4750	0.42	0.00	0.000	0.00	0.01
Propane (C3H8)	44.09	2280	8999.01	204.11	0.020	0.87	179.35
Butane (as n-C4H10)	58.12	2965	1323.38	22.77	0.002	0.13	26.02
Isobutane (i-C4H10)	58.12	2956	1271.52	21.88	0.002	0.12	24.92
Methacrylonitrile (C4H5N)	64.09	2503	2.09	0.03	0.000	0.00	0.03
C&T-2-Butenenitrile (transcrotonitrile, C4H5N)	67.09	2543	0.84	0.01	0.000	0.00	0.01
Butanenitrile (n-butyronitrile, C4H7N)	69.11	2695	0.92	0.01	0.000	0.00	0.01
Pyridine (C5H5N)	79.1	2982	0.23	0.00	0.000	0.00	0.00
Ethylbenzene	106.17	4848	0.01	0.00	0.000	0.00	0.00
Alpha-Methylstyrene	118.18	5380	0.03	0.00	0.000	0.00	0.00
Phenyl Propylene Glycol Boronate (PPGB)	162	5377	0.21	0.00	0.000	0.00	0.00
Propylene Glycol	76.09	1878	0.03	0.00	0.000	0.00	0.00
Isopropanol (IPA)	60.1	2042	0.93	0.02	0.000	0.00	0.01
COD	108	5023	299.1	2.77	0.000	0.03	5.36
CDDT	162.3	7549	11.4	0.07	0.000	0.00	0.20
Ammonia (NH3)	17.03	354	131.66	7.73	0.001	0.01	1.05
Methane (CH4)	16.04	896	5251.09	327.37	0.032	0.51	113.05
Ethane	30.07	1594	9190.05	305.62	0.030	0.89	187.75
Hydrogen (H2)	2.02	270	13930.91	6896.49	0.666	1.35	717.63
Carbon Monoxide (CO)	28.01	316	31458.48	1123.12	0.109	3.04	136.78
Other Non-Air Contaminants*	27.19002637	2.76715543	39077.04	1437.18	0.139	3.78	1.53
Total:			#######	**10349.192**	**1.000**	**10.721**	**1393.747**

The effective flare tip diameter is determined using the following equation:

$$D = \sqrt{\pi(10^{-6})q(1-0.048\sqrt{(MW)})}$$

where
D = effective flare tip diameter, meters,
q = net or lower heat release, cal/sec, and
MW = volume average molecular weight, lb/lb-mole.

$$\frac{16.86 \times 1000000 \times 251.9958}{\frac{3600}{1}}$$

Net Heat Release	1393.75	MMBtu/hr
Gross Heat Release (q) =	97560630.16	cal/sec
Average Molecular Weight of Waste Stream	10.72	lb/lbmol
Effect Stack Diameter	9.07	meters
	29.75	ft

Table H-1. Detailed Flare Diameter Calculations

Model ID	Calculated Heat Release (MMBtu/hr)	Weighted-Average MW of Material Flared (lb/lbmol)	Calculated Heat Release (cal/sec)	qn	Modeled Diameter Dm (m)	Modeled Diameter (ft)
10FLR03	55.2	17.5	3.867E+06	3.091E+06	1.76	5.77
10FLR04	83.1	20.1	5.817E+06	4.565E+06	2.14	7.01
10FLR04A	15.9	17.5	1.113E+06	8.892E+05	0.94	3.09
10FLR04B	16.42	26.7	1.149E+06	8.645E+05	0.93	3.05
10FLR04B	16.98	23.2	1.188E+06	9.139E+05	0.96	3.14
10FLR05	1393.7	10.7	9.756E+07	8.223E+07	9.07	29.75

Appendix I: TABLE 1(A)

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Permit Number:	7186	RN Number: 102663671		Date:	April 2016
Company Name:	INVISTA S.a r.l.				

AIR CONTAMINANT DATA					
1. Emission Point				3. Air Contaminant Emission Rate	
EPN (A)	FIN(B)	NAME (C)	2. Component or Air Contaminant Name	Pounds per Hour (A)	TPY(B)
10FLR-001 10FLR-002 10FLR-003 10FLR-003A	10FLR001 10FLR002 10FLR003 10FLR003A	Converter Flares (Normal operations)	CO	1.29	5.66
			NH3	0.01	0.03
			NOx	0.16	0.72
			SO2	0.01	0.04
			VOC	0.28	1.23
10FLR-001 10FLR-002 10FLR-003 10FLR-003A	10FLR001 10FLR002 10FLR003 10FLR003A	Converter Flares (MSS)	CO	331.84	24.50
			NH3	125.46	8.22
			NOx	133.24	9.79
			SO2	0.22	0.02
			VOC	347.29	13.91
10FLR-004	10FLR004	Ammonia Startup Flare (normal operations)	CO	0.19	0.80
			NH3	0.05	0.20
			NOx	0.03	0.10
			SO2	0.01	0.01
			VOC	0.04	0.16
10FLR-004	10FLR004	Ammonia Startup Flare (MSS)	CO	116.00	10.58
			NH3	95.80	8.75
			NOx	55.66	5.62
			SO2	0.13	0.02
			VOC	22.54	1.32
10FLR-004A	10FLR004A	Ammonia Tank Flare (Normal Operations)	CO	0.77	2.10
			NH3	0.47	0.80
			NOx	0.33	0.65
			SO2	0.01	0.01
			VOC	0.45	1.31

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Permit Number:	7186	RN Number: 102663671	Date:	April 2016
Company Name:	INVISTA S.a r.l.			

AIR CONTAMINANT DATA			EMISSION POINT DISCHARGE PARAMETERS									
						Source						
1. Emission Point			4. UTM COORDINATES OF EMISSION PT.			5. HEIGHT ABOVE GROUND (FT)	6. Stack Exit Data			7. Fugitives		
EPN (A)	FIN(B)	NAME (C)	ZONE	EAST (meters)	NORTH (meters)		DIA. (ft)	VEL. (fps)	TEMP. (°F)	LENGTH (ft)	WIDTH (ft)	AXIS DEGREES (C)
10FLR-001	10FLR001	Converter Flares (Normal operations)	14	699401	3173191	140	3.25	66*	1831*			
10FLR-002	10FLR002			699395	3173198	140	3.25	66*	1831*			
10FLR-003	10FLR003			699395	3173198	140	3.25	66*	1831*			
10FLR-003A	10FLR003A			699386	3173209	140	3.25	66*	1831*			
10FLR-001	10FLR001	Converter Flares (MSS)	14	699401	3173191	140	3.25	66*	1831*			
10FLR-002	10FLR002			699395	3173198	140	3.25	66*	1831*			
10FLR-003	10FLR003			699395	3173198	140	3.25	66*	1831*			
10FLR-003A	10FLR003A			699386	3173209	140	3.25	66*	1831*			
10FLR-004	10FLR004	Ammonia Startup Flare (normal operations)	14	699397	3173250	140	1.75	66*	1831*			
10FLR-004	10FLR004	Ammonia Startup Flare (MSS)	14	699397	3173250	140	1.75	66*	1831*			
10FLR-004A	10FLR004A	Ammonia Tank Flare (Normal Operations)	14	699222	3172797	35	1.67	66*	1831*			

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Permit Number:	7186	RN Number: 102663671		Date:	April 2016
Company Name:	INVISTA S.a r.l.				

AIR CONTAMINANT DATA					
1. Emission Point				3. Air Contaminant Emission Rate	
EPN (A)	FIN(B)	NAME (C)	2. Component or Air Contaminant Name	Pounds per Hour (A)	TPY(B)
10FLR-004A	10FLR004A	Ammonia Tank Flare (Startup, Shutdown, Maintenance)	CO	22.08	0.68
			NH3	21.33	0.54
			NOx	15.10	0.37
			SO2	0.03	0.01
			VOC	8.71	0.30
10FLR-004B	10FLR004B	Butadiene Flare (Normal operation)	CO	9.32	10.51
			NOx	2.21	3.65
			SO2	0.01	0.02
			VOC	2.74	3.40
10FLR-004B	10FLR004B	Butadiene Flare (Startup, Shutdown and Maintenance)	CO	15.61	1.59
			NOx	5.23	0.29
			SO2	0.03	0.01
			VOC	9.64	0.53
10FLR-005	10FLR005 and other	Adiponitrile Flare (ADN Operating Flare) Emissions from Continuous and Non-Continuous Vents from Normal Operation Only	CO	1637.38	2568.15
			NH3	1.32	1.04
			NOx	140.95	184.08
			SO2	0.04	0.08
			VOC	623.50	516.99

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Permit Number:	7186	RN Number: 102663671	Date:	April 2016
Company Name:	INVISTA S.a r.l.			

AIR CONTAMINANT DATA			EMISSION POINT DISCHARGE PARAMETERS									
1. Emission Point						Source						
			4. UTM COORDINATES OF EMISSION PT.			5. HEIGHT ABOVE GROUND (FT)	6. Stack Exit Data			7. Fugitives		
EPN (A)	FIN(B)	NAME (C)	ZONE	EAST (meters)	NORTH (meters)		DIA. (ft)	VEL. (fps)	TEMP. (°F)	LENGTH (ft)	WIDTH (ft)	AXIS DEGREES (C)
10FLR-004A	10FLR004A	Ammonia Tank Flare (Startup,	14	699222	3172797	35	1.67	66*	1831*			
10FLR-004B	10FLR004B	Butadiene Flare (Normal operation)	14	699222	3172797	35	0.25	66*	1831*			
10FLR-004B	10FLR004B	Butadiene Flare	14	699222	3172797	35	0.25	66*	1831*			
10FLR-005	10FLR005 and other	Adiponitrile Flare (ADN Operating Flare) Emissions from Continuous and Non-Continuous Vents from Normal Operation Only	14	699443	3173105	151	4.29	66*	1831*			

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Permit Number:	7186	RN Number: 102663671		Date:	April 2016
Company Name:	INVISTA S.a r.l.				

AIR CONTAMINANT DATA					
1. Emission Point				3. Air Contaminant Emission Rate	
EPN (A)	FIN(B)	NAME (C)	2. Component or Air Contaminant Name	Pounds per Hour (A)	TPY(B)
10FLR-005	10FLR005 and other	Adiponitrile Flare (ADN Operating Flare) Emissions from startup, shutdown, or maintenance	CO	1069.32	81.50
			NH3	0.01	0.01
			NOx	231.63	14.00
			SO2	0.63	0.07
			VOC	1042.13	65.17
10FLR-TMP	10FLRTMP	Temporary-Use Flare for Vent Headers During Flare 10FLR-005 Maintenance	CO	1.98	0.32
			NH3	0.05	0.01
			NOx	0.41	0.07
			SO2	0.01	0.01
			VOC	2.97	0.47
10FLR-ALT	10FLRALT	Alternative Flare for Vent Headers During Flare 10FLR-005 Maintenance	CO	5.56	1.96
			NH3	0.05	0.02
			NOx	0.89	0.29
			SO2	0.00	0.00
			VOC	6.36	2.18
10FLRALTF	10FLRALTF	Fugitives from Alternative Flare for Vent Headers During Flare 10FLR-005 Maintenance	NH3	0.02	0.01
			VOC	1.89	0.01
10CLT-040	10CLT040	Cooling Tower	NH3	3.83	16.75
			PM10	1.10	4.21
			VOC	3.83	16.75
10FUG	10FUG	ADN Fugitives	CO	0.17	0.53
			H2S	0.01	0.01
			NH3	2.48	8.07
			VOC	53.85	194.03
10FUG	10FUG	ADN Fugitives MSS Emissions	CO	0.01	0.01
			NH3	0.01	0.01
			VOC	0.04	0.15

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Permit Number:	7186	RN Number: 102663671	Date:	April 2016
Company Name:	INVISTA S.a r.l.			

AIR CONTAMINANT DATA			EMISSION POINT DISCHARGE PARAMETERS									
1. Emission Point						Source						
			4. UTM COORDINATES OF EMISSION PT.			5. HEIGHT ABOVE GROUND (FT)	6. Stack Exit Data			7. Fugitives		
EPN (A)	FIN(B)	NAME (C)	ZONE	EAST (meters)	NORTH (meters)		DIA. (ft)	VEL. (fps)	TEMP. (°F)	LENGTH (ft)	WIDTH (ft)	AXIS DEGREES (C)
10FLR-005	10FLR005 and other	Adiponitrile Flare (ADN Operating Flare) Emissions from startup, shutdown, or maintenance	14	699443	3173105	151	4.29	66*	1831*			
10FLR-TMP	10FLRTMP	Temporary-Use Flare for Vent Headers During Flare 10FLR-005 Maintenance	14	699352	3173008	25	0.83	66*	1831*			
10FLR-ALT	10FLRALT	Alternative Flare for Vent Headers During Flare 10FLR-005 Maintenance	14	699354	3173007	25	0.83	66*	1831*			
10FLRALTF	10FLRALTF	Fugitives from Alternative Flare for Vent Headers During Flare 10FLR-005 Maintenance	14	699352	3173002	3.3				98	35	-38.14
10CLT-040	10CLT040	Cooling Tower	14	699345	3173178	61.42	28	25.7	98			
10FUG	10FUG	ADN Fugitives	14	699180	3172709	48.06				870	700	-37.93
10FUG	10FUG	ADN Fugitives MSS Emissions	14	699180	3172709	48.06				870	700	-37.93

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Permit Number:	7186	RN Number: 102663671		Date:	April 2016
Company Name:	INVISTA S.a r.l.				

AIR CONTAMINANT DATA					
1. Emission Point				3. Air Contaminant Emission Rate	
EPN (A)	FIN(B)	NAME (C)	2. Component or Air Contaminant Name	Pounds per Hour (A)	TPY(B)
10FUG2	10FUG2	311 Area Fugitives	HCl	0.02	0.07
			NH3	0.03	0.06
			VOC	1.26	5.41
10FUGMSS2	10FUGMSS2	Ammonia Flare 10FLR004A with propane supplemental and pilot fuel	VOC	0.38	0.02
10MSS-001	10MSS001	Maintenance, Startup, and Shutdown Emissions in the ADN Area	CO	0.02	0.01
			Cl2	0.06	0.01
			H2O2	0.01	0.01
			HCl	0.08	0.01
			NH3	2.13	0.02
			VOC	164.93	3.23
10MSS-002	10MSS002	Maintenance, Startup, and Shutdown Emissions in the 311 Area	HCl	6.26	0.06
			NH3	2.20	0.05
			VOC	7.32	0.42
10FLT-063	10FLT063	Nickel Addition Bag Filter	PM10	0.01	0.01
10FLT-063A	10FLT063A	Nickel Vacuum System	PM10	0.05	0.01
10LBA-061B	10LBA061B	ADN Barge Loading	VOC	0.18	0.06
10LBA-061D	10LBA061D	NH3 Barge Unloading	NH3	0.69	0.05
10LDR-326A	10LDR326A	ADN Drum Loading	VOC	0.01	0.01
10LDR-326B	10LDR326B	2M3BN Drum Loading	VOC	0.01	0.01
10LRC-041A	10LRC041A	ADN Railcar Loading	VOC	0.02	0.02
10LRC-041B	10LRC041B	ADN Load/Unload	VOC	0.02	0.02
10LRC-041C	10LRC041C	ADN Railcar Loading	VOC	0.02	0.02
10LRC-041E	10LRC041E	MGN Railcar Loading	VOC	0.09	0.02
10LRC-041F	10LRC041F	2PN Railcar Degassing	VOC	9.42	0.18
10LTR-036	10LTR036	REF MGN Truck Loading	VOC	0.04	0.02
10LTR-056	10LTR056	#3 Tank Farm Truck Spot	VOC	4.57	0.15
10LTR-057	10LTR057	2PN Truck Unloading	VOC	0.04	0.01

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Permit Number:	7186	RN Number: 102663671	Date:	April 2016
Company Name:	INVISTA S.a r.l.			

AIR CONTAMINANT DATA			EMISSION POINT DISCHARGE PARAMETERS									
			Source									
1. Emission Point			4. UTM COORDINATES OF EMISSION PT.			5. HEIGHT ABOVE GROUND (FT)	6. Stack Exit Data			7. Fugitives		
EPN (A)	FIN(B)	NAME (C)	ZONE	EAST (meters)	NORTH (meters)		DIA. (ft)	VEL. (fps)	TEMP. (°F)	LENGTH (ft)	WIDTH (ft)	AXIS DEGREES (C)
10FUG2	10FUG2	311 Area Fugitives	14	700122	3173425	15.12				660	1450	-38.21
10FUGMSS2	10FUGMSS2	Ammonia Flare 10FLR004A with propane supplemental and pilot fuel	14	699180	3172709	3.3				337	247	-38.14
10MSS-001	10MSS001	Maintenance, Startup, and Shutdown Emissions in the ADN Area	14	699180	3172709	48.06				870	700	-37.93
10MSS-002	10MSS002	Maintenance, Startup, and Shutdown Emissions in the 311 Area	14	700122	3173425	15.12				660	1450	-38.21
10FLT-063	10FLT063	Nickel Addition Bag Filter	14	699455	3173253	120	0.003	0.003	104			
10FLT-063A	10FLT063A	Nickel Vacuum System	14	699453	3173250	120	0.003	0.003	104			
10LBA-061B	10LBA061B	ADN Barge Loading	14	699071	3172411	20	0.003	0.003	104			
10LBA-061D	10LBA061D	NH3 Barge Unloading	14	699117	3172352	20	0.003	0.003	104			
10LDR-326A	10LDR326A	ADN Drum Loading	14	699622	3173225	3.28	0.003	0.003	104			
10LDR-326B	10LDR326B	2M3BN Drum Loading	14	699503	3173126	3.28	0.003	0.003	104			
10LRC-041A	10LRC041A	ADN Railcar Loading	14	700014	3173839	20	0.003	0.003	104			
10LRC-041B	10LRC041B	ADN Load/Unload	14	699997	3173826	20	0.003	0.003	104			
10LRC-041C	10LRC041C	ADN Railcar Loading	14	699976	3173809	20	0.003	0.003	104			
10LRC-041E	10LRC041E	MGN Railcar Loading	14	699968	3173798	32	0.003	0.003	104			
10LRC-041F	10LRC041F	2PN Railcar Degassing	14	699902	3173753	40	0.003	0.003	104			
10LTR-036	10LTR036	REF MGN Truck Loading	14	699929	3173698	16	0.003	0.003	104			
10LTR-056	10LTR056	#3 Tank Farm Truck Spot	14	699685	3173256	10	0.003	0.003	104			
10LTR-057	10LTR057	2PN Truck Unloading	14	699977	3173853	3.28	0.003	0.003	104			

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Permit Number:	7186	RN Number: 102663671		Date:	April 2016
Company Name:	INVISTA S.a r.l.				

AIR CONTAMINANT DATA					
1. Emission Point				3. Air Contaminant Emission Rate	
EPN (A)	FIN(B)	NAME (C)	2. Component or Air Contaminant Name	Pounds per Hour (A)	TPY(B)
10LTR-061	10LTR061	Truck Loading	NH3	0.05	0.02
			VOC	3.42	0.70
10LTR-062	10LTR062	Misc. Load/Unload	VOC	0.07	0.01
10LTR-072	10LTR072	MDEA Truck Loading/Unloading	VOC	0.03	0.01
10LTR-073	10LTR073	Methanol Brine Truck Loading	VOC	0.32	0.01
10LTR-074	10LTR074	Anti-foulant Unloading	VOC	0.01	0.01
10LTR-087	10LTR087	Oil Unloading	VOC	0.01	0.01
10SCB-154	10TFX054 and 10TFX054A	HCl Scrubber	HCl	0.38	0.05
10TFX-010	10TFX010	Fresh Ligand Tank	VOC	0.01	0.01
10TFX-025A	10TFX025A	South WFE Feed Tank**	VOC	14.34	3.12
10TFX-025B	10TFX025B	North WFE Feed Tank**	VOC	14.34	3.12
10TFX-027	10TFX027	REF ADN Tank #1	VOC	0.21	0.04
10TFX-028	10TFX028	REF ADN Tank #2	VOC	0.21	0.04
10TFX-029	10TFX029	REF ADN Tank #3	VOC	0.21	0.04
10TFX-030	10TFX030	REF ADN Tank #4	VOC	0.21	0.04
10TFX-031	10TFX031	REF ADN Tank #5	VOC	0.21	0.04
10TFX-032	10TFX032	REF ADN Tank #6	VOC	0.21	0.04
10TFX-032B	10TFX032B	REF ADN Tank #7	VOC	0.10	0.12
10TFX-033	10TFX033	North Raffinate Sphere ***	VOC	17.39	0.70
10TFX-034A	10TFX034A	Middle Raffinate Sphere ***	VOC	17.39	0.70
10TFX-034B	10TFX034B	South Raffinate Sphere ***	VOC	17.39	0.70
10TFX-035A	10TFX035A	TG MGN Tank	VOC	1.49	0.56
10TFX-036	10TFX036	REF MGN Tank	VOC	0.04	0.12
10TFX-036A	10TFX036A	Promoter PN Sphere	VOC	3.45	1.52
10TFX-037	10TFX037	Crude DN/MGN Tank	VOC	0.07	0.02
10TFX-037A	10TFX037A	Crude MGN Sphere	VOC	0.31	0.11
10TFX-038	10TFX038	Ethylene Glycol Tank	VOC	0.15	0.01

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Permit Number:	7186	RN Number: 102663671	Date:	April 2016
Company Name:	INVISTA S.a r.l.			

AIR CONTAMINANT DATA			EMISSION POINT DISCHARGE PARAMETERS									
			Source									
1. Emission Point			4. UTM COORDINATES OF EMISSION PT.			5. HEIGHT ABOVE GROUND (FT)	6. Stack Exit Data			7. Fugitives		
EPN (A)	FIN(B)	NAME (C)	ZONE	EAST (meters)	NORTH (meters)		DIA. (ft)	VEL. (fps)	TEMP. (°F)	LENGTH (ft)	WIDTH (ft)	AXIS DEGREES (C)
10LTR-061	10LTR061	Truck Loading	14	699360	3173123	10	0.003	0.003	104			
10LTR-062	10LTR062	Misc. Load/Unload	14	699548	3173154	10	0.003	0.003	104			
10LTR-072	10LTR072	MDEA Truck Loading/Unloading	14	699488	3173005	10	0.003	0.003	76			
10LTR-073	10LTR073	Methanol Brine Truck Loading	14	699422	3173106	10	0.003	0.003	100			
10LTR-074	10LTR074	Anti-foulant Unloading	14	699672	3173223	6	0.003	0.003	76			
10LTR-087	10LTR087	Oil Unloading	14	699508	3173092	6	0.003	0.003	76			
10SCB-154	10TFX054 and 10TFX054A	HCl Scrubber	14	700138	3173800	29	0.003	0.003	104			
10TFX-010	10TFX010	Fresh Ligand Tank	14	699498	3173117	24	0.003	0.003	104			
10TFX-025A	10TFX025A	South WFE Feed Tank**	14	699673	3173248	24	0.003	0.003	104			
10TFX-025B	10TFX025B	North WFE Feed Tank**	14	699675	3173260	24	0.003	0.003	104			
10TFX-027	10TFX027	REF ADN Tank #1	14	700053	3173825	24	0.003	0.003	104			
10TFX-028	10TFX028	REF ADN Tank #2	14	700066	3173808	24	0.003	0.003	104			
10TFX-029	10TFX029	REF ADN Tank #3	14	700078	3173792	24	0.003	0.003	104			
10TFX-030	10TFX030	REF ADN Tank #4	14	700091	3173776	24	0.003	0.003	104			
10TFX-031	10TFX031	REF ADN Tank #5	14	700098	3173861	20	0.003	0.003	104			
10TFX-032	10TFX032	REF ADN Tank #6	14	700112	3173844	20	0.003	0.003	104			
10TFX-032B	10TFX032B	REF ADN Tank #7	14	700032	3173773	24	0.003	0.003	104			
10TFX-033	10TFX033	North Raffinate Sphere ***	14	700098	3173589	36	0.003	0.003	104			
10TFX-034A	10TFX034A	Middle Raffinate Sphere ***	14	700143	3173531	36	0.003	0.003	104			
10TFX-034B	10TFX034B	South Raffinate Sphere ***	14	700180	3173485	26	0.003	0.003	104			
10TFX-035A	10TFX035A	TG MGN Tank	14	699931	3173825	20	0.003	0.003	104			
10TFX-036	10TFX036	REF MGN Tank	14	699936	3173704	20	0.003	0.003	110			
10TFX-036A	10TFX036A	Promoter PN Sphere	14	699964	3173718	40	0.003	0.003	104			
10TFX-037	10TFX037	Crude DN/MGN Tank	14	699924	3173718	20	0.003	0.003	104			
10TFX-037A	10TFX037A	Crude MGN Sphere	14	699976	3173703	56	0.003	0.003	104			
10TFX-038	10TFX038	Ethylene Glycol Tank	14	699688	3173245	12	0.003	0.003	104			

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Permit Number:	7186	RN Number: 102663671		Date:	April 2016
Company Name:	INVISTA S.a r.l.				

AIR CONTAMINANT DATA					
1. Emission Point				3. Air Contaminant Emission Rate	
EPN (A)	FIN(B)	NAME (C)	2. Component or Air Contaminant Name	Pounds per Hour (A)	TPY(B)
10TFX-047	10TFX047	Methanol Tank	VOC	10.38	0.22
10TFX-049A	10TFX049A	Methanol Solution Mix Tank	VOC	1.32	0.03
10TFX-049B	10TFX049B	Methanol Solution Tank (20%)	VOC	1.26	0.01
10TFX-049C	10TFX049C	Methanol Solution Tank (70%)	VOC	0.37	0.01
10TFX-059	10TFX059	Ammonium Salt Tank	NH3	0.08	0.01
			VOC	0.02	0.01
10TFX-067	10TFX067	Produced Water Tank	NH3	0.03	0.02
			VOC	0.01	0.01
10TFX-080	10TFX080	Barge Dock REF ADN Tank	VOC	0.34	0.33
10TFX-085	10TFX085	MDEA - Amine Tank	VOC	0.01	0.01
10TFX-086	10TFX086	Anti-foulant Tank	VOC	0.50	0.01
10TFX-087	10TFX087	Oil Storage Skid	VOC	0.05	0.01
10VNT-001	10VNT001	Feed Gas Analyzer Vent	NH3	0.09	0.36
			VOC	0.01	0.01
10VNT-002	10VNT002	HCN Sample Blower Vent	CO	0.01	0.01
			NH3	0.19	0.01
			VOC	0.26	0.01
10VNT-003	10VNT003	BD Column Gas Chromatographs	VOC	0.01	0.01
10VNT-255	10TFX305 10TFX306	Pump Tank Scrubber and Closed Sump	CO	0.02	0.07
			VOC	0.14	0.53
10VNT-255	CLOSEDSUMP 10VNT255	Pump Tank Scrubber and Closed Sump (MSS)	CO	0.01	0.01
			VOC	66.80	0.68
11TFX-036	11TFX036	HCN/HMD AWST	NH3	3.62	1.72
			VOC	1.34	0.65
11TFX-047	11TFX047	HCN/HMD HUT	NH3	1.47	0.87
			VOC	0.55	0.33

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Permit Number:	7186	RN Number: 102663671	Date:	April 2016
Company Name:	INVISTA S.a r.l.			

AIR CONTAMINANT DATA			EMISSION POINT DISCHARGE PARAMETERS									
						Source						
1. Emission Point			4. UTM COORDINATES OF EMISSION PT.			5. HEIGHT ABOVE GROUND (FT)	6. Stack Exit Data			7. Fugitives		
EPN (A)	FIN(B)	NAME (C)	ZONE	EAST (meters)	NORTH (meters)		DIA. (ft)	VEL. (fps)	TEMP. (°F)	LENGTH (ft)	WIDTH (ft)	AXIS DEGREES (C)
10TFX-047	10TFX047	Methanol Tank	14	699418	3173109	25	0.003	0.003	104			
10TFX-049A	10TFX049A	Methanol Solution Mix Tank	14	699415	3173119	6	0.003	0.003	72			
10TFX-049B	10TFX049B	Methanol Solution Tank (20%)	14	699403	3173125	10	0.003	0.003	46			
10TFX-049C	10TFX049C	Methanol Solution Tank (70%)	14	699411	3173114	6	0.003	0.003	19			
10TFX-059	10TFX059	Ammonium Salt Tank	14	699375	3173123	24	0.003	0.003	104			
10TFX-067	10TFX067	Produced Water Tank	14	699334	3173017	20	0.003	0.003	104			
10TFX-080	10TFX080	Barge Dock REF ADN Tank	14	699237	3172441	48	0.003	0.003	100			
10TFX-085	10TFX085	MDEA - Amine Tank	14	699492	3173008	8	0.003	0.003	76			
10TFX-086	10TFX086	Anti-foulant Tank	14	699673	3173224	6	0.003	0.003	76			
10TFX-087	10TFX087	Oil Storage Skid	14	699504	3173095	4	0.003	0.003	76			
10VNT-001	10VNT001	Feed Gas Analyzer Vent	14	699394	3173199	130	0.083	0.33	212			
10VNT-002	10VNT002	HCN Sample Blower Vent	14	699443	3173168	150	1	106	amb			
10VNT-003	10VNT003	BD Column Gas Chromatographs	14	699494	3173213	40.25	0.0625	0.003	amb			
10VNT-255	10TFX305 10TFX306	Pump Tank Scrubber and Closed Sump	14	699448	3173161	153	0.833	0.78	76			
10VNT-255	CLOSEDSUMP 10VNT255	Pump Tank Scrubber and Closed Sump (MSS)	14	699448	3173161	153	0.833	0.003	104			
11TFX-036	11TFX036	HCN/HMD AWST	14	700010	3173756	110	0.003	0.003	77			
11TFX-047	11TFX047	HCN/HMD HUT	14	699988	3173774	25	0.003	0.003	77			

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Permit Number:	7186	RN Number: 102663671		Date:	April 2016
Company Name:	INVISTA S.a r.l.				

AIR CONTAMINANT DATA					
1. Emission Point				3. Air Contaminant Emission Rate	
EPN (A)	FIN(B)	NAME (C)	2. Component or Air Contaminant Name	Pounds per Hour (A)	TPY(B)
11TFX-048	11TFX048	Nitrile HUT	NH3	1.03	0.46
			VOC	0.41	0.19
11TFX-053	11TFX053	RPF Filtrate Tank #1	NH3	0.17	0.05
			VOC	0.01	0.01
11TFX-055	11TFX055	311 Area Wastewater Tank	NH3	0.21	0.06
			VOC	0.05	0.02
11SEP-055A	11SEP-055A	API Decanter	NH3	0.18	0.05
			VOC	0.05	0.02
11ODP-055B	11ODP-055B	Organics Dumpster	VOC	0.01	0.01
11TFX-064	11TFX064	NETZ Filter Feed Tank	NH3	0.39	0.28
			VOC	0.17	0.13
11TFX-070	11TFX070	NETZ Effluent Tank	NH3	0.47	0.31
			VOC	0.20	0.14
11TFX-076	11TFX076	Waste Collection Tank	NH3	0.10	0.07
			VOC	0.03	0.02
11TFX-077	11TFX077	Waste Lift Tank	NH3	0.01	0.01
			VOC	0.01	0.01
11TFX-153	11TFX153	Precoat Tank #1	NH3	0.08	0.01
			VOC	0.03	0.01

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Permit Number:	7186	RN Number: 102663671	Date:	April 2016
Company Name:	INVISTA S.a r.l.			

AIR CONTAMINANT DATA			EMISSION POINT DISCHARGE PARAMETERS									
						Source						
1. Emission Point			4. UTM COORDINATES OF EMISSION PT.			5. HEIGHT ABOVE GROUND (FT)	6. Stack Exit Data			7. Fugitives		
EPN (A)	FIN(B)	NAME (C)	ZONE	EAST (meters)	NORTH (meters)		DIA. (ft)	VEL. (fps)	TEMP. (°F)	LENGTH (ft)	WIDTH (ft)	AXIS DEGREES (C)
11TFX-048	11TFX048	Nitrile HUT	14	699997	3173781	25	0.003	0.003	77			
11TFX-053	11TFX053	RPF Filtrate Tank #1	14	700042	3173653	22.5	0.003	0.003	77			
11TFX-055	11TFX055	311 Area Wastewater Tank	14	700018	3173807	21	0.003	0.003	77			
11SEP-055A	11SEP-055A	API Decanter	14	700010	3173800	20	0.003	0.003	77			
11ODP-055B	11ODP-055B	Organics Dumpster	14	700017	3173793	10	0.003	0.003	77			
11TFX-064	11TFX064	NETZ Filter Feed Tank	14	700005	3173776	17.6	0.003	0.003	77			
11TFX-070	11TFX070	NETZ Effluent Tank	14	699991	3173758	8	0.003	0.003	77			
11TFX-076	11TFX076	Waste Collection Tank	14	699986	3173768	11.75	0.003	0.003	77			
11TFX-077	11TFX077	Waste Lift Tank	14	699996	3173764	7.3	0.003	0.003	77			
11TFX-153	11TFX153	Precoat Tank #1	14	699967	3173756	6.7	0.003	0.003	104			

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Permit Number:	7186	RN Number: 102663671		Date:	April 2016
Company Name:	INVISTA S.a r.l.				

AIR CONTAMINANT DATA					
1. Emission Point				3. Air Contaminant Emission Rate	
EPN (A)	FIN(B)	NAME (C)	2. Component or Air Contaminant Name	Pounds per Hour (A)	TPY(B)
10RPF-001	10RPF001	Rotary Precoat Filter (RPF) #1	NH3	1.93	3.44
			VOC	0.28	0.54
10RPF-002	10RPF002	RPF Conveyor/Bagger 1	NH3	0.01	0.01
			VOC	0.01	0.01
10RPF-005	10RPF005	RPF Diatomaceous Earth Loading	PM10	0.01	0.01

*For flares, exit velocity and temperature are specified based on the TCEQ Guidance Document RG-109 for Flares and Vapor Oxidizers, October 2000. However, the actual flare tip diameter is shown in this table not the effective diameter that the TCEQ guidance specifies for dispersion modeling.

**The combined fill rates for WFE Feed Tanks 10TFX025A and 10TFX025B will not exceed the maximum fill rate for either one of these tanks. Therefore, the maximum hourly emission rate specified for each of these tanks is also the maximum hourly emission rate for both of these tanks. The WFE Feed Tank vents will be routed to the ADN Op Flare (EPN 10FLR-005) within 12 months after approval of the amendment application submitted in March 2015. The emission rates shown for EPNs 10TFX-025A and 10TFX-025B will cease to apply after these tank vents are routed to the flare.

***Only one of the three raffinate spheres (10TFX033, 10TFX034A and 10TFX034B) will be filled at any time.

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Permit Number:	7186	RN Number: 102663671	Date:	April 2016
Company Name:	INVISTA S.a r.l.			

AIR CONTAMINANT DATA			EMISSION POINT DISCHARGE PARAMETERS									
						Source						
1. Emission Point			4. UTM COORDINATES OF EMISSION PT.			5. HEIGHT ABOVE GROUND (FT)	6. Stack Exit Data			7. Fugitives		
EPN (A)	FIN(B)	NAME (C)	ZONE	EAST (meters)	NORTH (meters)		DIA. (ft)	VEL. (fps)	TEMP. (°F)	LENGTH (ft)	WIDTH (ft)	AXIS DEGREES (C)
10RPF-001	10RPF001	Rotary Precoat Filter (RPF) #1	14	700056	3173675	72	1.917	32.75	58			
10RPF-002	10RPF002	RPF Conveyor/Bagger 1	14	700061	3173679	3.28	0.003	0.003	77			
10RPF-005	10RPF005	RPF Diatomaceous Earth Loading	14	700046	3173667	14.125	0.333	76	amb			

To: Mohr, Ashley[Mohr.Ashley@epa.gov]
Cc: Snyder, Erik[snyder.erik@epa.gov]; Kordzi, Stephanie[Kordzi.Stephanie@epa.gov]; Dianne Anderson[dianne.anderson@tceq.texas.gov]
From: Amanda Jones
Sent: Mon 4/11/2016 4:15:12 PM
Subject: TCEQ Protocol Response (Tradinghouse Power Company, Permit No. PSDTX1452)
Response to Modeling Protocol Comments 032316.pdf
Protocol Tradinghouse 091815.pdf
TCEQ Protocol Response - PSDTX1452 Tradinghouse Power Company LLC.docx

Ashley,

Attached in the TCEQ's response for the Tradinghouse Power Company Second Modeling Protocol (Permit No.: PSDTX1452) dated March 23, 2016. Please respond to verify receipt of this information.

Have a nice day, Amanda

Amanda Jones

Texas Commission on Environmental Quality

Air Permits Division

Air Dispersion Modeling Team

(512) 239-1229

Amanda.Jones@tceq.texas.gov

MODELING PROTOCOL
IN SUPPORT OF AN APPLICATION TO AUTHORIZE COMBINED CYCLE COMBUSTION TURBINE PROJECT AT THE TRADINGHOUSE STEAM ELECTRIC STATION MCLENNAN COUNTY, TEXAS

SUBMITTED TO:
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
OFFICE OF AIR
AIR PERMITS DIVISION
P. O. BOX 13087
AUSTIN, TEXAS 78711-3087

SUBMITTED BY:
TRADINGHOUSE POWER COMPANY LLC
1601 BRYAN STREET
DALLAS, TEXAS 75201

PREPARED BY:
ZEPHYR ENVIRONMENTAL CORPORATION
TEXAS REGISTERED ENGINEERING FIRM F-102
2600 VIA FORTUNA, SUITE 450
AUSTIN, TEXAS 78746-6544

SEPTEMBER 2015

zephyr

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ATTACHMENT 3 MONITOR COMPARISONS
ATTACHMENT 4 TCEQ TABLE 1(A)
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ATTACHMENT 6 OZONE ANALYSIS VOC-TO-NOX RATIOS
ATTACHMENT 7 ELECTRONIC FILES

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1.0 PROJECT IDENTIFICATION INFORMATION

This document presents the proposed Prevention of Significant Deterioration (PSD) and State New Source Review (NSR) air dispersion modeling protocol for evaluating the air quality impacts at the Tradinghouse Steam Electric Station (THSES) resulting from (1) the addition of duct fired heat recovery steam generators (HRSGs) and auxiliary equipment to currently authorized simple cycle combustion turbine generators (CTGs 1 and 2) so that these CTGs can operate in either simple cycle mode or combined cycle mode; and (2) an additional set of CTG/HRSGs (3 and 4) which may also be used in simple cycle mode or combined cycle mode. This modeling protocol is submitted in support of the *Application to Authorize Combined Cycle Combustion Turbine Project at the Tradinghouse Steam Electric Station; McLennan County, Texas; March 2015.*

Zephyr Environmental Corporation (Zephyr) has prepared this protocol following written and verbal methodologies and procedures of the Texas Commission on Environmental Quality (TCEQ) and United States Environmental Protection Agency (EPA).

To simplify the review of this protocol, it has been written to closely follow the order of the items listed in the Reporting Requirements (Appendix P) of the TCEQ's *Air Quality Modeling Guidelines, APDG 6232, April 2015 (AQMG).*

Applicant:	Tradinghouse Power Company LLC (Tradinghouse)
Facility:	Tradinghouse Steam Electric Station
Regulated Entity Number:	RN102566494
Permit Application Numbers:	110357, PSD-TX-1452
Nearest City:	Hallsburg
County in Which Plant Located:	McLennan County
Applicant's Modeler:	Zephyr Environmental Corporation

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2.0 PROJECT OVERVIEW

Tradinghouse Power Company LLC (Tradinghouse) was issued TCEQ Air Permit No. 110357 on February 7, 2014 to construct and operate two new natural gas-fired, simple cycle CTGs for electrical generation at the THSES. Tradinghouse has submitted a PSD/NSR air quality permit application to add duct-fired heat recovery steam generators, a single common steam turbine generator and auxiliary equipment to the simple cycle combustion turbines, so that the combustion turbines can operate in either simple cycle mode or combined cycle mode. In addition, Tradinghouse is seeking authorization to add an additional set of CTGs (3 and 4) which may also be used in simple or combined cycle mode, along with duct-fired heat recovery steam generators, a single common steam turbine generator and auxiliary equipment to support those units. Tradinghouse is also updating the emission rate calculations for simple cycle CTGs 1 and 2 to reflect the current gas analysis anticipated for the site. The proposed modification to CTGs 1 and 2 and the proposed construction of CTGs 3 and 4 is referred to as the "Project" in this air quality analysis (AQA).

The two combustion turbine models currently authorized for construction by Permit No. 110357 are: the General Electric (GE) 7FA.05, with a nominal base load electric power output of approximately 210 megawatts (MW) at ISO conditions and the Siemens SGT6-5000F(5)ee, with a nominal base load electric power output of approximately 231 MW at ISO conditions. The nominal electric power output from the steam turbine generator will be approximately 300 MW for the GE configuration and 350 MW for the Siemens configuration. Final selection of the turbine model will likely not to be made until after the permit amendment is issued. The same turbine models are being considered for CTGs 3 and 4.

An AQA will be conducted to demonstrate that associated emissions with the Project will not cause or contribute to an exceedance of the National Ambient Air Quality Standards (NAAQS), PSD increment consumption limits, or TCEQ property-line standards.

2.1 TYPE OF PERMIT REVIEW

The applicability of federal permitting to the pending permit application is discussed in Sections IX.D and IX.E of the application. Table 2-1 provides a summary of the Project's PSD emission significance, as applicable to the air quality analysis for this project.

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Table 2-1
PSD Significance Summary

Contaminant	PSD Emission Significant?
Nitrogen Oxides (NO_X)	Yes
Carbon Monoxide (CO)	Yes
Sulfur Dioxide (SO_2)	Yes
Particulate Matter (PM)	Yes
Particulate Matter, Diameter < 10 microns (PM_{10})	Yes
Particulate Matter, Diameter < 2.5 microns ($PM_{2.5}$)	Yes
Volatile Organic Compounds (VOC) as a precursor for Ozone (O_3)	Yes
Sulfuric Acid Mist (H_2SO_4)	Yes

2.2 CONSTITUENTS EVALUATED

The following air contaminants will be evaluated for the PSD modeling analysis: nitrogen dioxide (NO_2), CO, SO_2, PM_{10}, $PM_{2.5}$, H_2SO_4 and O_3. The following air contaminants will be evaluated for the State NSR modeling analysis: SO_2 and H_2SO_4. Additionally, the following pollutants will be evaluated for the State health effects analysis: ammonia (NH_3, CAS No. 7664-41-7) and ammonium sulfate [$(NH_4)_2SO_4$, CAS No. 7783-20-2].

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3.0 PLOT PLAN

A plot plan showing the names and locations of emission points relative to the THSES's property boundary is provided as Attachment 1 to this protocol.

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4.0 AREA MAPS

The following maps and figures illustrate the area surrounding the proposed project:

- An **area map** showing a 3,000-foot radius around the plant's property boundaries is provided as Attachment 2. There are no schools located within 3,000 feet of the THSES property boundary.
- The nearest **residential areas** are illustrated on the area map included as Attachment 2.
- The nearest **non-industrial receptor** corresponds to undeveloped land directly north of the proposed equipment. Additionally, Tradinghouse Creek Reservoir (a recreational waterway) encompasses the THSES to the west, south and east of the property boundaries.
- There are no **PSD Class I areas** within 100 kilometers. The nearest Class I area is Wichita Mountains Wilderness in Oklahoma which is approximately three hundred and eighty kilometers north-northwest of the facility. A figure illustrating the location of all nearby Class I areas will be provided in the air quality analysis (AQA).
- An area map illustrating the **urban and topographical features** within the Area of Significant Impact (AOI) will be provided in the AQA.
- A map showing the **nonattainment areas** near the project will be provided in the AQA.
- The locations of local **meteorological stations** will be provided in the AQA.
- The locations of the **ambient air monitoring sites** nearest the facility will be provided in the AQA.

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5.0 AIR QUALITY MONITORING DATA

Estimates for the current ambient air background concentrations at the proposed project site may be required for two distinct and separate purposes: (1) to demonstrate that the ambient air concentrations of PSD-significant pollutants are currently in compliance with the NAAQS and (2) for use in a full impact NAAQS modeling analysis. Tradinghouse proposes to use ambient air quality data from existing air quality monitoring stations to establish background concentrations for these contaminants.

5.1 AVAILABLE BACKGROUND CONCENTRATIONS

Based on a review of the TCEQ's *Air Quality Data* websites (https://www.tceq.texas.gov/cgi-bin/compliance/monops/select_year.pl and http://www17.tceq.texas.gov/tamis/index.cfm) and the EPA's *AirData* website (http://www.epa.gov/air/data/), Tradinghouse proposes using data collected at the following monitor stations to establish representative background concentrations to be used in the NAAQS compliance demonstrations:

- NO_2 – Waco Mazanec [Continuous Air Monitoring Station (CAMS) 1037, EPA ID 48-309-1037]
- CO – Waco Mazanec [CAMS 1037, EPA ID 48-309-1037]
- SO_2 – Waco Mazanec [CAMS 1037, EPA ID 48-309-1037]
- PM_{10} – Stage Coach (EPA ID 48-439-3010)
- $PM_{2.5}$ (total) – Arlington Municipal Airport (CAMS 61, EPA ID 48-439-3011)
- $PM_{2.5}$ Nitrates – Dallas Hinton (CAMS 60, EPA ID 48-113-0069)
- $PM_{2.5}$ Sulfates – Dallas Hinton (CAMS 60, EPA ID 48-113-0069)
- O_3 – Waco Mazanec [CAMS 1037, EPA ID 48-309-1037]

The appropriateness of using data from these monitoring stations to establish background concentrations is discussed in Section 5.2.

Guidance from the TCEQ's *AQMG* was followed in selecting the form of the monitored concentration for each pollutant and averaging period. The proposed background concentrations are summarized in Table 5-1.

These background concentration estimates were calculated based on hourly data obtained from the TCEQ. Following guidance received from the TCEQ Modeling Staff (for a previous analysis): (1) the calculations include hourly data from days that do not meet EPA's definition of completeness and (2) no rounding was conducted at any step of the calculations. Therefore, the calculated concentration values are more conservative than values that may be available elsewhere.

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Table 5-1
Proposed Background Concentrations

Contaminant	Monitor Station	County	Averaging Period	Concentration ($\mu g/m^3$)	Form
NO_2	Waco Mazanec	McLennan	1-Hour	47.2	3-Year Average of 98th Percentiles of the Daily 1-Hour Maximums 2012-2014
			Annual	4.51	1st High, 2014
CO	Waco Mazanec	McLennan	1-Hour	915	2nd High, 2014
			8-Hour	300	2nd High, 2014
SO_2	Waco Mazanec	McLennan	1-Hour	17.1	3-Year Average of 99th Percentiles of the Daily 1-Hour Maximums 2012-2014
			3-Hour	15.8	2nd High, 2014
			24-Hour	4.44	2nd High, 2014
			Annual	0.821	1st High, 2014
PM_{10}	Stage Coach	Tarrant	24-Hour	66.0	2nd High, 2012-2014
$PM_{2.5}$	Arlington Municipal Airport	Tarrant	24-Hour	21.1	3-Year Average of 98th Percentiles of the Daily Maximums, 2012-2014
			Annual	9.27	3-Year Average of 1st Highs 2012-2014
$PM_{2.5}$ Nitrates	Dallas Hinton	Dallas	24-Hour	8.17	1st High, 2012-2014
			Annual	1.19	3-Year Average of Daily Averages 2012-2014
$PM_{2.5}$ Sulfates	Dallas Hinton	Dallas	24-Hour	9.30	1st High, 2012-2014
			Annual	2.04	3-Year Average of Daily Averages 2012-2014
O_3	Waco Mazanec	McLennan	8-Hour	69.8 ppb	3-Year Average of 4th Highest Daily Maximum 8-Hour 2012-2014

The proposed monitor data meet the EPA requirements for completeness for all ambient air concentrations. Electronic copies of the ambient air concentration calculations are included in Attachment 7 of this submittal.

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5.2 REPRESENTATIVENESS OF THE SELECTED MONITOR STATIONS

Following guidance contained in TCEQ's *AQMG* and *Background Concentration Determination for Use in NAAQS Analyses* (September 2, 1998) and EPA's *Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD), EPA-450/4-87-007* (May 1987); Tradinghouse concludes, as described below, that the air quality monitoring data used to establish background concentrations is representative of the area around the THSES.

Each of the proposed monitoring stations are located outside of the "same general area" of the THSES. However, the Waco Mazanec monitoring station is located in McLennan County, 14 kilometers from the THSES and is just outside the "same general area." In accordance with TCEQ modeling guidance for demonstrating conservative representativeness of data collected at the McLennan monitor, the magnitudes of reported emissions within 10 km of the Waco Mazanec monitor and THSES were compared. In accordance with TCEQ modeling guidance for demonstrating conservative representativeness of data collected at the monitors located outside of McLennan County, county population and county air emissions data was compiled and compared with McLennan County. Additionally, the magnitudes of reported emissions within 10 km of these monitor sites and THSES were compared.

5.2.1 Topography

THSES and the three monitor locations share similar topography. The area surrounding each location (within several kilometers) is relatively flat.

5.2.2 Population Density

Population estimates were obtained from the United States Census Bureau for year 2014 (http://quickfacts.census.gov/qfd/index.html). The population data for McLennan, Tarrant, and Dallas counties is summarized in Table 5-2.

Table 5-2
Population Comparison Analysis

County	Monitored Pollutants of Interest In County	Population Estimate for year 2014
McLennan	NO_2, CO, SO_2, O_3	243,441
Tarrant	PM_{10}, $PM_{2.5}$	1,945,360
Dallas	NO_X (for $PM_{2.5}$ Nitrates), SO_2 (for $PM_{2.5}$ Sulfates)	2,518,638

This population data is discussed in Section 5.2.4.

5.2.3 County-Wide and Nearby Source Emissions

Air emission rate data for McLennan, Tarrant and Dallas counties were obtained from the EPA National Emissions Inventory (NEI) Database through the EPA *AirData* website (http://www.epa.gov/airdata/). The data provides estimates of the point source and non-

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point/mobile source emissions in each county. The total air emissions for each county are summarized in Table 5-3.

Table 5-3
Comparison of County-Wide Air Emissions

County	Location	County-wide Air Emission Estimates (tpy) (EPA 2011 NEI Data)					
		NOx	CO	PM_{10}	$PM_{2.5}$	SO_2	VOC
McLennan	THSES & Waco Mazanec	11,686	43,165	28,666	4,248	1,305	8,352
Tarrant	Stage Coach & Arlington Municipal Airport	44,678	198,712	35,075	6,343	1,689	42,563
Dallas	Dallas Hinton	51,073	285,313	56,019	9,372	2,278	48,693

Reported emissions from stationary sources located within 10 km of each site were obtained from the TCEQ point source emissions inventory (EI) database workbook (2013statesum.xlsx) for the year 2013. Reported emissions within 10 km of each site are summarized in Table 5-4. Detailed emission rate information is provided in Attachment 3.

Table 5-4
Comparison of Emissions from Stationary Sources Located within 10 Km

Location	CAMS	County	Air Emission Estimates for 2013 (tpy)				
			NOx	CO	PM_{10}	$PM_{2.5}$	SO_2
THSES	-	McLennan	2.3	12.2	5.6	1.1	0.4
Waco Mazanec	1037	McLennan	9.3	26.9	-	-	0.4
Stage Coach	-	Tarrant	-	-	29.3	-	-
Arlington Municipal Airport	61	Tarrant	-	-	-	2.8	-
Dallas Hinton	60	Dallas	-	-	-	-	-

This emissions data is discussed in Section 5.2.4.

5.2.4 Representativeness Analyses

The Waco Mazanec monitoring station is located within the same county as the THSES. Emissions of NO_X, CO and SO_2 from stationary sources located within 10 km of the Waco Mazanec monitoring station are equal to, or greater than, those found within 10 km of the THSES. Therefore, the Waco Mazanec monitoring station offers conservative estimates for background NO_2, CO and SO_2 at the THSES location.

O_3 emissions are formed through the emission of precursor compounds such as NO_X and VOC. These chemical transformations occur in the atmosphere gradually over time. Due to the

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required formation distances, comparison of nearby (i.e. within 10 km of the monitoring station) ozone precursor emissions (i.e. NO_X and VOC) is not appropriate. The Waco Mazanec is only 14 km from the THSES and is located within the same air shed as the THSES. Therefore, the Waco Mazanec monitoring station offers appropriate estimates for background O_3 at the THSES location.

Tarrant County has significantly greater population than McLennan County. Air emissions associated with population density (e.g. automobile traffic) near the Stage Coach and Arlington Municipal Airport monitors are greater than the emissions associated with population density in McLennan County. PM_{10} and $PM_{2.5}$ emissions within Tarrant County are significantly greater than those found in McLennan County. Additionally, reported PM_{10} and $PM_{2.5}$ emissions from stationary sources located within 10 km of the Stage Coach and Arlington Municipal Airport monitoring stations are greater than those found within 10 km of the THSES. Therefore, the Stage Coach and Arlington Municipal Airport monitoring stations offer conservative estimates for background PM_{10} and $PM_{2.5}$ at the THSES location.

Dallas County has significantly greater population than McLennan County. Secondary $PM_{2.5}$ emissions associated with population density (e.g. automobile traffic) near the Dallas Hinton monitor are greater than the emissions associated with population density in McLennan County. Secondary $PM_{2.5}$ emissions are formed through the emission of gaseous compounds such as SO_2 and NO_X. Portions of these gaseous emissions can form fine particulates in the atmosphere through chemical reactions or condensation. These chemical transformations occur in the atmosphere gradually over time (hours or days depending on atmospheric conditions and other variables). Therefore, secondary $PM_{2.5}$ impacts are expected to occur at some distance from the source of its gaseous emission precursors. Due to the required formation distances, comparison of nearby SO_2 and NO_X emissions (i.e. within 10 km) is not appropriate. County-wide emissions are proposed as an appropriate air shed comparison. As shown on Table 5-3, the SO_2 and NO_X air emissions within Dallas County are greater than those within McLennan County. Therefore, the Dallas Hinton monitoring station offers conservative estimates for $PM_{2.5}$ nitrates and $PM_{2.5}$ sulfates background concentrations.

Based on the discussion presented above concerning the topography, population density, county-wide emissions, and the stationary source emissions in the vicinity of monitor locations and source location, ambient air monitoring data from the Waco Mazanec, Stage Coach, Arlington Municipal Airport and Dallas Hinton monitoring stations are conservative, representative and appropriate for use as conservative background concentration estimates for the THSES location.

5.3 PSD AMBIENT MONITORING REQUIREMENT

The *New Source Review Workshop Manual-Prevention of Significant Deterioration and Nonattainment Area Permitting; USEPA, Draft October 1990* (page C.16) states that continuous ambient monitoring data may be required unless "either (1) the predicted ambient impact, i.e., the highest modeled concentration for the applicable averaging time, caused by the proposed

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significant emissions increase (or significant net emissions increase), or (2) the existing ambient pollutant concentrations, are less than the prescribed significant monitoring value" (i.e. SMC value).

On January 22, 2013, the United States Court of Appeals for the District of Columbia Circuit granted a request from the EPA to vacate and remand to the EPA the portions of two PSD $PM_{2.5}$ rules [40 CFR 51.166(k)(2) and 40 CFR 52.21(k)(2)] addressing select provisions of the $PM_{2.5}$ Significant Impact Levels (SILs) so that the EPA could voluntarily correct an error in these provisions. The EPA amended its regulations and removed the vacated $PM_{2.5}$ SILs effective December 9, 2013 – requiring all applicants to compile $PM_{2.5}$ monitoring data.

The proposed project will emit PSD-significant amounts of $PM_{2.5}$. As discussed above, data collected at the Arlington Municipal Airport monitoring station offer conservative estimates of the background $PM_{2.5}$ concentrations for the area. Therefore, Tradinghouse proposes to utilize existing data from this ambient air monitoring station in lieu of performing pre-construction $PM_{2.5}$ monitoring.

The proposed project will also emit PSD-significant amounts of NO_2, SO_2, CO, PM_{10} and O_3. Data collected at the Waco Mazanec and Stage Coach monitoring stations offer conservative estimates of the background concentrations for the area. Therefore, Tradinghouse proposes to utilize existing data from these ambient air monitoring stations in lieu of performing pre-construction monitoring for any pollutant with project-related modeling results greater than the SMC values.

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6.0 MODELING EMISSIONS INVENTORY

The proposed emissions, operating parameters and design parameters for the proposed project are defined and discussed in the air quality permit application. The application submitted to the TCEQ includes detailed information regarding the items addressed in this section.

6.1 ON-PROPERTY SOURCES

Proposed and existing THSES sources are identified in this section. The modeling will be conducted utilizing the conservative modeling assumptions described in Section 6.4.

6.1.1 Current Project Sources

In February 2014, NSR Permit No. 110357 was issued to authorize construction of two new natural gas-fired, simple cycle CTGs (1 and 2) for electrical generation. Originally, the two CTG units were permitted for peaking service, including daily startup and shutdown, and extended periods of operation or non-operation. However, at this time, Tradinghouse seeks to augment the capability of the two CTGs by installing duct-fired HRSGs and associated new stacks, a single common STG and auxiliary equipment so that the CTGs can function in combined cycle mode. Tradinghouse seeks to preserve the ability to operate in simple cycle mode. Tradinghouse also seeks to update the gas analysis used for estimating simple cycle emission rates for CTG1 and CTG2.

Tradinghouse is also requesting authorization to add an additional set of CTGs (3 and 4) which may also be used in simple or combined cycle mode along with duct-fired HRSGs, a single common STG and auxiliary equipment to support these units.

The power generating equipment and ancillary equipment to be constructed as part of this Project which are sources of air pollutant emissions are summarized below:

- two natural gas-fired duct burner systems serving the respective HRSGs for CTGs 1 and 2;
- two identical natural gas-fired CTGs (3 and 4) equipped with lean pre-mix, low NOx emissions combustion technology that can be used in simple cycle or combined cycle operations;
- two natural gas-fired duct burner systems serving the respective HRSGs for CTGs 3 and 4;
- two natural gas-fired auxiliary boilers;
- lube oil vents for the newly proposed CTGs 3 and 4;
- a lube oil vent for the newly proposed STG lube oil recirculation systems;
- aqueous or anhydrous ammonia piping and handling and metering equipment;

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- one diesel fuel-fired emergency generator engine and diesel storage tank;
- one diesel fuel-fired firewater pump engine and diesel storage tank; and
- Maintenance, Startup, and Shutdown (MSS) related fugitives.

A copy of the most recent TCEQ Table 1(a) submitted for this project is included as Attachment 4. This table includes the project sources and their exhaust parameters (in English units).

6.1.2 Contemporaneous Project Sources

For PSD-significant pollutants, sources associated with projects that were conducted within the Plant's contemporaneous period will be included in the preliminary impact determination analysis as "project" sources. The proposed increases in emissions from contemporaneous emission sources will be included in the preliminary impact determination analysis. Contemporaneous sources include:

- two identical simple cycle, natural gas-fired CTGs 1 and 2;
- lube oil vents for the CTG lube oil recirculation systems 1 and 2 ;
- one diesel fuel-fired emergency generator engine and diesel storage tank;
- one diesel fuel-fired firewater pump engine and diesel storage tank; and
- natural gas piping and handling and metering equipment;
- lube oil piping and handling equipment; and
- MSS related fugitives.

As stated previously, Tradinghouse is preserving the ability to operate the combustion turbines in simple cycle mode or in combined cycle mode. Each combustion turbine will have separate exhaust stacks for each mode.

6.1.3 Existing Sources

There are no other emission sources in operation at the THSES.

6.2 OFF-PROPERTY SOURCES

6.2.1 NAAQS Analysis Sources

The TCEQ Air Permits Allowable Database (APAD) provides an inventory of non-project sources and includes permitted, permit by rule (PBR) and exempt emission sources. The APAD retrieval inventories contain permit allowable emission rates and stack parameter information for

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off-property sources located within 50 kilometers of the requested location. An inventory of nearby NAAQS sources will be developed using the TCEQ APAD system retrievals and a review of the TCEQ air permit files.

Retrievals from the APAD will be obtained for NAAQS pollutants with preliminary impact determination results greater than the EPA's SILs. The TCEQ APAD does not contain a complete inventory of $PM_{2.5}$ emissions. Therefore, the APAD PM_{10} retrieval will be utilized in the development of the $PM_{2.5}$ NAAQS source inventory, when necessary.

Source identifiers within the APAD system are unique. Within this protocol, APAD source identifiers may also be referred to as "APAD IDs". If a source appears in multiple retrievals, the source identifier is the same. Additionally, the stack parameters are identical for a given source identifier. The individual APAD retrievals obtained from the TCEQ will be combined to create a single APAD source inventory. This single APAD source inventory will contain every NAAQS and PSD increment consuming source from all the provided retrievals along with each NAAQS and PSD increment consuming emission rate associated with each source.

Before using the TCEQ APAD retrieval information in the dispersion modeling analyses, the information will be examined for completeness and obvious errors. An initial review will be conducted to adjust the following parameters:

- Sources with release heights of less than 1 meter will be revised to a release height of 1 meter.
- Sources with release heights greater than 65 meters will be revised to release heights of 65 meters unless a Good Engineering Practice (GEP) stack height value greater than 65 meters can be verified.
- Sources with no velocity information will be modeled using a conservative velocity of 0.001 meter per second.
- Sources with no stack diameter information will be modeled using to a conservative diameter of 0.001 meter.
- Sources with no stack temperature information will be conservatively modeled using ambient hourly temperatures.
- Sources with area source parameters will be conservatively modeled as pseudo point sources.

All revisions to the TCEQ APAD inventories will be documented in the AQA.

After this initial review, a more detailed review will be conducted on the APAD retrieval information. Material obtained from the TCEQ permit file system will be reviewed to ensure that a complete inventory of recently permitted and pending off-property sources is utilized in the full impact NAAQS modeling analysis. The TCEQ's online Information Management System (IMS) NSR database will be used to identify recent permitting actions for off-property sources.

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Information obtained from the TCEQ public files for emission sources that are documented in the IMS will be compared against the APAD inventory listing for accuracy/consistency.

Minor sources of emissions that are located far from the project site are not expected to have a major impact at any location (i.e. modeling receptor) significantly impacted by the project. In the EPA modeling guidance memorandum (*Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard; Tyler Fox, Leader Air Quality Modeling Group, C439-01; March 1, 2011*), EPA recommends focusing on the area within 10 km of the project location when determining which nearby sources to include in the full impact modeling analysis. Additionally, EPA states that the inclusion of all sources within 50 km of the project location "is likely to produce an overly conservative result in most cases." The concentration gradient of modeling impacts from off-property sources are expected to diminish quickly with distance. Therefore, in-depth review of the APAD information will be focused on the sources that are located within 10 km of the project location. However, all the sources listed on the APAD retrieval will be reviewed and all APAD retrieval sources will be included in applicable full impact modeling analyses – including sources located farther than 10 km from the project location.

The following review will be conducted for sources located within 10 km of the project location:

- APAD source emission rates will be compared to information from material obtained from the TCEQ public files and updated, if necessary.
- Sources identified in the IMS as being authorized via PSD Permit, NSR Construction Permit, Standard Permit and PBR that are not currently included in the APAD inventory will be added to the modeling inventory of off-property sources using emission rates and exhaust parameter values obtained from the TCEQ public files.
- Sources identified in the IMS as pending TCEQ review for a PSD Permit or NSR Construction Permit will be added to the modeling inventory of off-property sources using the proposed emission rates and the exhaust parameter values obtained from the TCEQ public files.

Additionally, the following review will be conducted for APAD retrieval sources located farther than 10 km of the project location:

- For sources located within 50 km and within a preliminary impact determination AOI:
    - APAD source emission rates will be compared to PSD Permit and NSR Construction Permit information from material obtained from the TCEQ public files and updated, if necessary. For sources authorized via methods other than PSD Permit and NSR Construction Permit, APAD source emission rates will be compared to information obtained from material obtained from the TCEQ's GroupWise Remote Document Server, and updated if necessary.

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- Sources identified in the IMS as being authorized via PSD Permit, NSR Construction Permit, Standard Permit and PBR that are not currently included in the APAD inventory will be added to the modeling inventory of off-property sources using emission rates and exhaust parameter values obtained from the TCEQ public files.
- Sources identified in the IMS as pending TCEQ review for a PSD Permit or NSR Construction Permit will be added to the modeling inventory of off-property sources using the proposed emission rates and the exhaust parameter values obtained from the TCEQ public files.

- For sources located within 50 km and outside preliminary impact determination AOIs:
  - APAD source emission rates will be compared to information obtained from material obtained from the TCEQ's GroupWise Remote Document Server, and updated if necessary.
  - Sources identified in the IMS as being authorized via PSD Permit that are not currently included in the APAD inventory will be added to the modeling inventory of off-property sources using emission rates and exhaust parameter values obtained from the TCEQ public files.
  - Sources identified in the IMS as pending TCEQ review for a PSD Permit will be added to the modeling inventory of off-property sources using the proposed emission rates and the exhaust parameter values obtained from the TCEQ public files.

For off-property sources with no specific $PM_{2.5}$ emission estimates, it will be conservatively assumed that the $PM_{2.5}$ emissions are equal to the PM_{10} emissions. All revisions and additions to the TCEQ APAD inventories will be documented in the AQA.

6.2.2 PSD Increment Consumption Analysis Sources

An inventory of PSD increment-consuming sources will be obtained using the TCEQ APAD system and a detailed review of the TCEQ air permit files. The TCEQ APAD inventories will be examined for completeness following the methodology discussed in Section 6.2.1.

6.2.2.1 NO_2, SO_2 and PM_{10} Analyses

A conservative full-impact PSD increment consumption analysis will be conducted for applicable NO_2, SO_2 and PM_{10} emissions using the off-property source inventories developed for the full-impact NAAQS analysis. The development of this inventory is discussed in Section 6.2.1. The results from this analysis are extremely conservative since (1) emissions listed in the NAAQS inventory correspond to the current permitted allowable emissions instead of increases (and decreases) in emissions after the respective minor source baseline dates and (2) increment consumption is based on increases in actual emissions and not allowable emissions. If the

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predicted results from this initial analysis are greater than the increment consumption limits, a more detailed review of select sources will be conducted to estimate their increment consuming emissions.

6.2.2.2 $PM_{2.5}$ Analysis

The TCEQ APAD does not contain accurate estimates for $PM_{2.5}$ increment consuming emissions. $PM_{2.5}$ increment is consumed only by: (1) actual emission increases from new or modified major sources which begin construction after the major source baseline date and (2) actual emission increases from new or modified minor sources which begin operation after the minor source baseline date. The major source baseline date for $PM_{2.5}$ is October 20, 2010. The minor source baseline date is the date that the first $PM_{2.5}$-significant application is submitted in this area after the trigger date of October 20, 2011. A review of the TCEQ IMS database indicates that Tradinghouse submitted the first PSD application in McLennan County with increases in emissions after the $PM_{2.5}$ trigger date. Since the application was significant for $PM_{2.5}$, the minor source baseline date for this area is the application submittal date – March 16, 2015. Material obtained from the TCEQ permit file system will be reviewed to ensure that a complete and accurate inventory of off-property sources will be utilized in the full impact PSD increment consumption modeling analysis.

The off-property source inventory developed for the full-impact NAAQS analysis will be used as the basis for the $PM_{2.5}$ increment consumption inventory. The development of this inventory is discussed in Section 6.2.1. However, a detailed review will be conducted for all sources with authorizations dated near and after the $PM_{2.5}$ major source baseline date (October 20, 2010) to determine if recent permitting actions included any increases in $PM_{2.5}$ emissions.

The TCEQ's online IMS Title V Federal Operating Permits database will be used to identify the federal status of each facility (aka "source"). It will be assumed that facilities with Title V permits are "major sources."

For major sources, $PM_{2.5}$ increment is potentially consumed by projects which begin construction after the major source baseline date. Start of construction dates are not readily available from the TCEQ public records. Therefore, all permitting actions authorized 18 months prior to the major source baseline date (i.e. April 20, 2009) will be reviewed. This 18 month buffer corresponds to the maximum time that is allowed between project approval and start of construction prior to obtaining additional authorization. This review will be conservative since it assumes that all permitting actions approved 18 months prior to the major source review date start construction after the major source baseline date.

For major sources with permitting actions after April 20, 2009, information will be obtained from the TCEQ public files to determine if each permitting action included any increases in $PM_{2.5}$. Sources with no increases in $PM_{2.5}$ emissions will be excluded in the full PSD increment consumption source inventory. Sources with increases in $PM_{2.5}$ emissions will be included in the

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full PSD increment consumption source inventory. The permit allowable emission rate will be conservatively modeled for these sources.

For minor sources, $PM_{2.5}$ increment is potentially consumed by projects which begin operation after the minor source baseline date. Start of operation dates are not readily available from the TCEQ public records. Therefore, all NSR construction permitting actions and Standard Permits authorized 18 months prior to the minor source baseline date (i.e. September 16, 2013) will be reviewed. This 18 month period corresponds to the maximum time that is allowed between project approval and start of construction prior to obtaining additional authorization. This review will be conservative since it assumes that all NSR construction permitting actions approved 18 months prior to the minor source review date begin operation after the minor source baseline date. Additionally, all applicable PBR permitting actions registered on, or after, the minor source baseline date (March 16, 2015) will be reviewed. The minor source baseline date was utilized since select PBR actions can operate immediately upon registration submittal.

For minor sources with NSR construction permitting actions after September 16, 2013, Standard Permit actions after September 16, 2013, and PBR actions after March 16, 2015; information will be obtained from the TCEQ public files to determine if each permitting action included any increases in $PM_{2.5}$. Sources with no increases in $PM_{2.5}$ emissions will be excluded in the full PSD increment consumption source inventory. Sources with increases in $PM_{2.5}$ emissions will be included in the full PSD increment consumption source inventory. The permit allowable emission rate will be conservatively modeled for these sources.

For each major source and minor source, information from TCEQ public files will be obtained for each permitting action that was undergoing TCEQ review on the date of the IMS survey. Proposed allowable $PM_{2.5}$ emissions from proposed, new sources will be included in the full PSD increment consumption source inventory. TCEQ public file information will be used to determine a permitting action associated with existing sources undergoing TCEQ review includes any increases in $PM_{2.5}$. Initial modeling of these existing sources will include the total permit allowable emission rate. If necessary, additional review of TCEQ public file information will be utilized to estimate the increase in actual emissions for select sources (see Section 6.2.2.3).

6.2.2.3 Increment Modeling Tiers

The APAD increment retrieval sources can also be adjusted as suggested in the TCEQ's *AQMG*:

- *Increment Modeling Tier I.* Model all sources using their allowable emission rates, as adjusted in Step 4. This approach is conservative since the "difference" in increment is the entire allowable emission rate. Compare the predicted concentration to the appropriate increment (Appendix A, Appendix H). If the increment is not exceeded, the demonstration is complete. Otherwise, go to tier II.

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- *Increment Modeling Tier II.* Model selected sources with $Actual_{MD}$ (actual at modeling date) emission rates and all other sources with allowable emission rates. The selected sources are usually the applicant's, since actual emission rates may be difficult to obtain for off-property sources. This assumes that the "difference" in increment for the selected sources is the entire actual emission rate. If the increment is not exceeded, the demonstration is complete. Otherwise, go to tier III.
- *Increment Modeling Tier III.* Model selected sources that existed and were in operation at the baseline date with the difference between $Actual_{MD}$ and $Actual_{BD}$ (actual at baseline date). (Additional instructions omitted).

All revisions and additions to the TCEQ APAD inventories will be documented in the AQA.

6.3 SOURCE IDENTIFIERS

A table providing a THSES source cross-reference between the modeling identification numbers, the Emission Point Numbers (EPNs) listed on the Table 1(a) and the EPNs for existing sitewide sources will be provided in the AQA.

6.4 STACK PARAMETER JUSTIFICATION

6.4.1 Good Engineering Practice Stack Height

Each source will be modeled at its physical release height or at the BPIP-calculated good engineering practice height, whichever is lower.

6.4.2 Stack Parameters – THSES Sources

The physical exhaust parameters of each stack are provided in the permit application. The turbine units' exhaust parameters are also provided in the application for various load levels. The modeled turbine stack velocities are described in Sections 6.4.4 and 6.4.5.

6.4.3 Stack Parameters – Off-Property Sources

The physical exhaust parameters provided from the APAD retrievals or updated physical exhaust parameters obtained from TCEQ public record material will be modeled. Any revisions to the TCEQ APAD inventories will be documented in the AQA.

Exhaust parameters provided on Table 1(a) forms obtained from the TCEQ public files will be modeled for recently permitted or pending emissions sources that are not listed in the APAD retrievals. Ground-level pseudo point source parameters will be conservatively utilized for sources with no Table 1(a) forms or exhaust descriptions within the TCEQ public records.

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6.4.4 Operating Load Levels

Tradinghouse expects to operate the proposed THSES with the combustion turbines capable of operating continuously at full load and at reduced loads.

The short-term emissions included on the TCEQ Table 1(a) correspond to the maximum hourly emissions at full loads. The emission calculations included in the application include maximum hourly emissions, maximum daily emissions, estimated annual emissions, and exhaust parameters at various load rates. During normal operations, the turbine exhaust velocities and temperatures may vary.

Screen-level modeling of the various operating loads to determine "worst-case" CTG/HRSG and auxiliary boiler operating scenarios will not be conducted. Due to the numerous forms of the NAAQS and PSD increment consumption limits, "worst-case" CTG/HRSG operating scenarios vary depending upon the pollutant and averaging period. The operational scenarios provided by the turbine vendors corresponded to various operating conditions. Additionally, the operational scenarios provided by the turbine vendors (General Electric and Siemens) corresponded to slightly different conditions. To ensure that the most conservative (worst-case) off-property concentrations associated with both turbine models are determined, twelve conservative turbine modeling scenarios will be included for all short-term modeling runs – six for each of the proposed turbine models.

The six operational scenarios chosen for the General Electric 7FA.05 turbine scenario are as follows.

- GE Combined Cycle Scenario 1 – The maximum short-term emission rates for 100% load operations will be modeled using corresponding stack velocities. This corresponds to the turbine operating at base load, maximum duct burner firing and -1 ºF ambient conditions (Case 1-6 of the combined cycle emission rate calculations). The stack velocity and temperature associated with this operating scenario will be utilized in the short term-modeling of all pollutants.
- GE Combined Cycle Scenario 2 – The maximum short-term emission rates for 80% load operations will be modeled using corresponding stack velocities. This corresponds to the turbine operating with no duct burner firing and -1 ºF ambient conditions (Case 4-7 of the combined cycle emission rate calculations). The stack velocity and temperature associated with this operating scenario will be utilized in the short term-modeling for this modeling scenario.
- GE Combined Cycle Scenario 3 – The maximum short-term emission rates for 55% load operations will be modeled. This corresponds to a turbine operating with no duct burner firing and -1ºF ambient temperatures (Case 4-12 of the combined cycle emission rate calculations). The stack velocity and temperature associated with this operating scenario will be utilized in the short term-modeling for this modeling scenario.

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- GE Simple Cycle Scenario 1 – The maximum short-term emission rates for 100% load operations will be modeled using corresponding stack velocities. This corresponds to the turbine operating at base load and 0 ºF ambient conditions (Case 1 of the simple cycle emission rate calculations). The stack velocity and temperature associated with this operating scenario will be utilized in the short term-modeling of all pollutants.
- GE Simple Cycle Scenario 2 – The maximum short-term emission rates for 80% load operations will be modeled using corresponding stack velocities. This corresponds to the turbine operating at and 0 ºF ambient conditions (Case 3 of the simple cycle emission rate calculations). The stack velocity and temperature associated with this operating scenario will be utilized in the short term-modeling for this modeling scenario.
- GE Simple Cycle Scenario 3 – The maximum short-term emission rates for 50% load operations will be modeled. This corresponds to a turbine operating at 0 ºF ambient conditions (Case 6 of the simple cycle emission rate calculations). The most conservative stack velocity and temperature associated with low load operations (corresponding to 40% load, Case 7 of the simple cycle emission rate calculations) will be utilized in the short term-modeling for this modeling scenario.

The six operational scenarios chosen for the Siemens SGT6-5000F(5)ee turbine are as follows.

- Siemens Combined Cycle Scenario 1 – The maximum short-term emission rates for 100% load operations will be modeled using corresponding stack velocities. This corresponds to the turbine operates at base load, maximum duct burner firing and 59ºF ambient conditions (Case 1-4 of the combined cycle emission rate calculations). The stack velocity and temperature associated with this operating scenario will be utilized in the short term-modeling of all pollutants.
- Siemens Combined Cycle Scenario 2 – The maximum short-term emission rates for 80% load operations will be modeled using corresponding stack velocities. This corresponds to the turbine operating with no duct burner firing and 67.5ºF ambient conditions (Case 2-3 of the combined cycle emission rate calculations). The stack velocity and temperature associated with this operating scenario will be utilized for this modeling scenario.
- Siemens Combined Cycle Scenario 3 – The maximum short-term emission rates for 50% load operations will be modeled. This corresponds to a turbine operating with no duct burner firing and 67.5ºF ambient temperatures (Case 2-6 of the combined cycle emission rate calculations). The stack velocity and temperature associated with this operating scenario will be utilized for this modeling scenario.
- Siemens Simple Cycle Scenario 1 – The maximum short-term emission rates for 100% load operations will be modeled using corresponding stack velocities. This corresponds to the turbine operates at base load and 51.2ºF ambient conditions (Case 1 of the simple cycle emission rate calculations). The stack velocity and temperature associated with this operating scenario will be utilized in the short term-modeling of all pollutants.

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- Siemens Simple Cycle Scenario 2 – The maximum short-term emission rates for 80% load operations will be modeled using corresponding stack velocities. This corresponds to the turbine operating at 51.2ºF ambient conditions (Case 3 of the simple cycle emission rate calculations). The stack velocity and temperature associated with this operating scenario will be utilized for this modeling scenario.
- Siemens Simple Cycle Scenario 3 – The maximum short-term emission rates for 50% load operations will be modeled. This corresponds to a turbine operating at 51.2 ºF ambient temperatures (Case 6 of the simple cycle permit application emission rate calculations). The most conservative stack velocity and temperature associated with low load operations (corresponding to 40% load, Case 7 of the simple cycle emission calculations) will be utilized for this modeling scenario.

6.4.5 Turbine Unit Startup and Shutdown Scenario

Planned startup and shutdown of the proposed CTGs will be part of the routine operations at the facility. The Project will consist of an optimized design for reducing the time required to ramp up the CTG in combined cycle mode to a temperature where the dry low NO_X combustor and post-combustion control devices will be effective. The steam piping design includes bypass piping around the steam turbine for use during startup, which allows the HRSG to accommodate a more rapid combustion turbine startup and heat release, thereby reducing startup time. An auxiliary boiler will also supply auxiliary steam and will help facilitate shorter startups. It is expected that both CTGs will be started simultaneously.

In order to obtain accurate estimates for the off-property 1-hour NO_2 concentrations during turbine unit startup and shutdown operations in combined cycle mode, three separate operating scenarios will be modeled.

- Hot Startup, Quick Start Capacity – For purposes of estimating annual emissions for this project, a worst case assumption of 365 hot starts per year for each CTG was made. For the GE 7FA.05 CTG, a hot start is expected to last approximately 30 minutes in duration with a corresponding total NO_X emission rate of 56.23 lb/hr. For the Siemens SGT6-5000F(5)ee CTG, a hot start is expected to last approximately 30 minutes in duration with a corresponding total NO_X emission rate of 58.58 lb/hr. The total hourly emission rate corresponding to the expected startup/shutdown emissions plus emissions from normal operation for the balance of the startup hour (base load emissions @ 59ºF ambient temperature without duct firing) will be modeled.

  The 1-hour NO_X emissions associated with these planned startup emissions will be conservatively modeled every hour of the year. These emissions will be modeled at the exhaust velocities and temperature expected for this operation.

- Cold Startup, Quick Start Capacity – For purposes of estimating annual emissions for this project, a worst case assumption of 12 cold starts per year for each CTG was made.

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The maximum NO_X hourly startup emissions represented in the application for the GE 7FA.05 CTG (118 lb/event) and the Siemens SGT6-5000F(5)ee CTG (52.6 lb/event). For the GE 7FA.05 CTG, a hot start is expected to last approximately 60 minutes in duration with a corresponding total NO_X emission rate of 118 lb/hr. For the Siemens SGT6-5000F(5)ee CTG, a hot start is expected to last approximately 36 minutes in duration with a corresponding total NO_X emission rate of 59.6 lb/hr. The total hourly emission rate corresponding to the expected startup/shutdown emissions plus emissions from normal operation for the balance of the startup hour (base load emissions @ 59ºF ambient temperature without duct firing) will be modeled. Each CTG would undergo quick cold starts simultaneously. Therefore, quick cold starts could occur 12 days per year.

The EPA's *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard; March 1, 2011* states that the intermittent nature of the actual emissions associated with startup/shutdown in many cases, when coupled with the probabilistic form of the 1-hr NO_2 standard, could result in modeled impacts being significantly higher than actual impacts would realistically be expected to be for these emission scenarios. The potential overestimation in these cases results from the implicit assumption that worst-case emissions will coincide with worst-case meteorological conditions based on the specific hours on specific days of each of the years associated with the modeled design value based on the form of the hourly standard. EPA stated in the guidance that the probabilistic form of the standard is explicitly intended to provide a more stable metric for characterizing ambient air quality levels by mitigating the impact that outliers in the distribution might have on the design value. Given the implications of the probabilistic form of the 1-hour NO_2 NAAQS, the EPA stated they were concerned that assuming continuous operations for intermittent emissions would effectively impose an additional level of stringency beyond that intended by the level of the standard itself. EPA stated in the guidance that compliance demonstrations for the 1-hour NO_2 NAAQS should be based on emission scenarios that can logically be assumed to be relatively continuous or which occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations. The EPA guidance recommended an approach to model impacts from intermittent emissions based on an average hourly rate, rather than the maximum hourly emission rate. The example given in the guidance was if a proposed permit includes a limit of 500 hours/year or less of intermittent operation, a modeling analysis could be based on assuming continuous operation at the average hourly rate, i.e., the maximum hourly rate times 500/8760. This approach would account for potential worst-case meteorological conditions associated with intermittent operation emissions by assuming continuous operation, while use of the average hourly emission represents a simple approach to account for the probability of turbine startup/shutdown actually occurring in a given hour.

The 1-hour NO_2 emissions associated with quick cold starts matches the criteria of an intermittent source. These intermittent emissions will be modeled per EPA guidelines, multiplying the maximum proposed hourly emission rate by the ratio of the proposed

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hours per year and total hours per year. These emissions will be modeled at the exhaust velocities and temperatures expected for this operation

- Cold Startup, Conventional Start Capacity – The maximum NO_X hourly startup emissions represented in the application for the GE 7FA.05 CTG (232.8 lb/hr) and the Siemens SGT6-5000F(5)ee CTG (148.8 lb/hr) is intended to account for startups when the quick start capability of the system cannot be achieved due to operating conditions. A conventional cold start is expected to last approximately 4 hours in duration. It is estimated that this would occur no more than 3 times per year for each CTG. Each CTG would undergo conventional cold starts simultaneously. Therefore, conventional cold starts could occur three days per year.

  The 1-hour NO_X emissions associated with conventional cold starts matches the criteria of an intermittent source. These intermittent emissions will be modeled per EPA guidelines, multiplying the maximum proposed hourly emission rate by the ratio of the proposed hours per year and total hours per year. These emissions will be modeled at the exhaust velocities and temperatures expected for this operation.

In order to obtain accurate estimates for the off-property 1-hour NO_2 concentrations during turbine unit startup and shutdown operations in simple cycle mode, one worst-case operating scenario will be modeled.

- For purposes of estimating annual emissions for this project, a worst case assumption of 175 startups per year for each simple cycle CTG was made. For the GE 7FA.05 CTG and Siemens SGT6-5000F(5)ee CTG, a simple cycle startup is expected to last less than 60 minutes in duration. Both turbine models have with a maximum NO_X startup emission rate of 100.2 lb/hr during simple cycle mode.

  The 1-hour NO_X emissions associated with these planned simple cycle startup emissions will be conservatively modeled every hour of the year. These emissions will be modeled at the exhaust velocities and temperature expected for this operation

6.4.6 Emergency Equipment Emissions

Two diesel fuel-fired emergency electrical generator engines (EPNs TH-EDGV and TH-EDG2V) and two diesel fuel-fired fire water pump engines (EPNs TH-FWPV and TH-FWP2V) are included in the proposed application. Emissions associated with the emergency readiness testing of these engines will be modeled. These testing emissions will be conservatively modeled with the CTG/HRSG units operating under normal conditions.

The testing of these engines will not be conducted during turbine startup/shutdown periods. Tradinghouse will test the emergency equipment according to the manufacturer recommended testing schedules. At this time, since a specific engine manufacturer has not been selected and a specific schedule cannot be specified. A typical testing schedule for emergency engines is

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testing each engine once per month for a period of approximately 60-minutes. Only one engine would be tested in any given hour. The modeling will include a maximum of 60-minutes of testing emissions for the following modeled averaging periods: 1-hour, 3-hour, 8-hour and 24-hour.

The EPA's *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard; March 1, 2011* states that compliance demonstrations for the 1-hour NO_2 and SO_2 NAAQS be based on emission scenarios that can logically be assumed to be relatively continuous or which occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations. As such, the 1-hour NO_2 and 1-hour SO_2 emissions associated with these intermittent sources will be modeled per EPA guidelines, multiplying the maximum hourly emission rate by the ratio of the proposed hours per year and total available hours per year. Although expected operations correspond to each engine being tested a total of twelve hours per year, the application includes a conservative annual emissions estimate corresponding to 100 hours per year. Therefore, the modeling of 1-hour NO_2 and 1-hour SO_2 emissions associated with these intermittent sources will be conservatively modeled using these higher annual emission assumptions. These emergency testing emissions will be modeled concurrent with the normal emissions associated with the turbines operating at base, medium and reduced loads.

The emissions associated with emergency equipment operating during an actual emergency will not be modeled because the proposed authorizations do not include such emissions.

6.4.7 Maintenance Emissions

The short-term emissions associated with Inherently Low Emitting (ILE) maintenance activities will be conservatively modeled as occurring at any time during normal plant operations. It will conservatively be assumed that all ILE maintenance activities can occur any given hour of the day or night.

All ILE maintenance activities are represented as combined sources on the Table 1(a) (EPNs TH-1&2MSSF and TH-3&4MSSF). These activities will be modeled using the individual emissions corresponding to the four maintenance activities that are included in the combined MSS sources:

- filter change out,
- catalyst handling,
- continuous emissions monitoring system (CEMS) calibration, and
- ammonia equipment maintenance.

Filter changes occur at the turbine inlet air filter housing. This maintenance activity (modeling IDs MSSFILT) will be modeled as a fugitive pseudo point source at the height of the center of the air inlet filter housing. Catalyst handling occurs at or near the SCR housing during plant maintenance (total shutdown) periods. Emissions exhaust to the atmosphere through a vacuum

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truck exhaust stack. This maintenance activity (modeling ID MSSCAT) will be modeled as a fugitive pseudo point source at the height of the vacuum truck exhaust stack. CEMS calibrations occur at the CEMS equipment within the CTG stacks. This maintenance activity (modeling IDs MSSCEMS) will be modeled using the CTG stack parameters corresponding to 100% load. Small equipment maintenance is proposed for equipment in ammonia service. This maintenance activity (modeling ID MSSEQUIP) will be modeled as a fugitive pseudo point source one meter above ground level.

6.4.8 Fugitive Source Parameters

Piping fugitives (EPNs TH-1&2NH3F and TH-3&4NH3F) correspond to piping fugitives associated with the ammonia distribution system. The piping is generally located at or near ground level. In order to accurately represent the potential discharge points, these piping fugitives were modeled as two large area sources (modeling IDs NH3FUG1A and NH3FUG2A) and four smaller area sources (modeling IDs NH3FUG1B, NH3FUG1C, NH3FUG1D and NH3FUG2B). The total TH-1&2NH3F ammonia emissions were allotted to four modeling sources based on an assumed distribution of the proposed piping equipment. The total TH-3&4NH3F ammonia emissions were allotted to two modeling sources based on an assumed distribution of the proposed piping equipment.

6.4.9 Maximum Short-term Emissions

As discussed in Section 6.4.4, the short-term emissions included on the TCEQ Table 1(a) correspond to the maximum hourly emissions at all loads. Maximum hourly emission rates will be modeled for 1-hour averaging periods. For sources with non-continuous operation, the maximum 3-hour, 8-hour and 24-hour emissions will be modeled for those averaging periods.

Additionally, the source specific short-term emission rates described in Sections 6.4.5 and 6.4.6 will be utilized.

6.4.10 Long-term Emissions

Annual emission rate estimates for the GE 7FA.05 and Siemens SGT6-5000F(5)ee turbines were conservatively calculated in the permit amendment application assuming: (1) year round operation under combined cycle mode and (2) maximum allowed annual operations under simple cycle mode with the remainder of the year under combined cycle mode. Additionally, the proposed combined cycle and simple cycle annual emission rates vary between the currently authorized CTGs 1 and 2 and the newly proposed CTGs 3 and 4.

In order to obtain conservative yet realistic modeling results, six modeling scenarios will be utilized for the annual analysis of each of the proposed turbine models.

- Annual Scenario 1 – Annual average startup/shutdown emissions (when applicable) will be modeled using the corresponding stack velocities. Within the same modeling run, the

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turbine will also be modeled using the annual average emissions associated with 100% combined cycle load operations for the remaining number of hours per year available (considering the startup/shutdown operations).

- Annual Scenario 2 – Annual average startup/shutdown emissions (when applicable) will be modeled using the corresponding stack velocities. Within the same modeling run, the turbine will also be modeled using the annual average emissions associated with 80% combined cycle load operations for the remaining number of hours per year available (considering the startup/shutdown operations).
- Annual Scenario 3 – Annual average startup/shutdown emissions (when applicable) will be modeled using the corresponding stack velocity. Within the same modeling run, the turbine will also be modeled using the annual average emissions associated with reduced combined cycle load operations (i.e. 55% load for GE and 50% load for Siemens) for the remaining number of hours per year available (considering the startup/shutdown operations).
- Annual Scenario 4 – Annual average startup/shutdown emissions (when applicable) will be modeled using the corresponding stack velocities. Within the same modeling run, the turbine will also be modeled using the annual average emissions associated with simple cycle load operations for the number of simple cycle hours currently allowed by permit (for CTGs 1 and 2) and newly proposed (for CTGs 3 and 4). Within the same modeling run, the turbine will also be modeled using the annual average emissions associated with 100% combined cycle load operations for the remaining number of hours per year available (considering the startup/shutdown and simple cycle mode operations).
- Annual Scenario 5 – Annual average startup/shutdown emissions (when applicable) will be modeled using the corresponding stack velocity. Within the same modeling run, the turbine will also modeled using the annual average emissions associated with simple cycle load operations for the number of simple cycle hours currently allowed by permit (for CTGs 1 and 2) and newly proposed (for CTGs 3 and 4). Within the same modeling run, the turbine will also be modeled using the annual average emissions associated with 80% combined cycle load operations for the remaining number of hours per year available (considering the startup/shutdown and simple cycle mode operations).
- Annual Scenario 6 – Annual average startup/shutdown emissions (when applicable) will be modeled using the corresponding stack velocity. Within the same modeling run, the turbine will also be modeled using the annual average emissions associated with simple cycle load operations for the number of simple cycle hours currently allowed by permit (for CTGs 1 and 2) and newly proposed (for CTGs 3 and 4). Within the same modeling run, the turbine will also be modeled using the annual average emissions associated with reduced combined cycle load operations (i.e. 55% load for GE and 50% load for Siemens) for the remaining number of hours per year available (considering the startup/shutdown and simple cycle mode operations).

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6.4.11 NO_X to NO_2 Conversion

Following guidance included in the EPA's memorandum entitled *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour National Ambient Air Quality Standard, Tyler Fox, March 1, 2011*; the Tier 2 default NO_X to NO_2 conversion factor of 80 percent will be applied to hourly emissions prior to NAAQS modeling. The Appendix W default NO_X to NO_2 conversion factor of 75 percent will be applied to annual emissions prior to NAAQS and PSD increment consumption modeling.

Following guidance in the *draft AQMG*, a NO_X to NO_2 conversion factor of 90 percent will be applied to hourly emissions prior to screen ozone analysis modeling

6.4.12 Front-Half, Back-Half Particulate Matter Emissions

Front-half and back-half particulate matter emissions estimates will be modeled for the PM_{10} and $PM_{2.5}$ analyses.

6.4.13 $PM_{2.5}$ Emissions

$PM_{2.5}$ is either directly emitted from a source (i.e., primary emissions) or formed through chemical reactions with pollutants already in the atmosphere (i.e., secondary formation). The EPA has not developed or recommended a near-field air dispersion model that includes the chemistry algorithms necessary to estimate secondary $PM_{2.5}$ impacts in an ambient air analysis. The EPA has provided secondary formation $PM_{2.5}$ modeling guidance in *Guidance for $PM_{2.5}$ Permit Modeling; Stephen D. Page, Director; May 20, 2014*. Guidance obtained from this document and the TCEQ's *AQMG* were utilized to account for contributions from direct $PM_{2.5}$ emissions and from secondarily formed $PM_{2.5}$ resulting from the project sources $PM_{2.5}$ precursor emissions.

Secondary $PM_{2.5}$ emissions are formed through the emission of gaseous compounds such as SO_2 and NO_X. Portions of these gaseous emissions can form fine particulates in the atmosphere through chemical reactions or condensation. These chemical transformations occur in the atmosphere gradually over time (hours or days depending on atmospheric conditions and other variables). Therefore, secondary $PM_{2.5}$ impacts are expected to occur at some distance from the source of its gaseous emission precursors. Secondary $PM_{2.5}$ impacts associated with the proposed project sources are anticipated to occur outside of the Area of Significant Impacts defined by the primary $PM_{2.5}$ emissions.

The proposed direct $PM_{2.5}$ emissions associated with this project are greater than the 10 tpy significant emission rate (SER). Therefore, the direct $PM_{2.5}$ emissions were modeled following guidance for a PSD NAAQS analysis. The proposed SO_2 and NO_X emissions associated with this project are each greater than their respective 40 tpy SER. Therefore, a qualitative analysis was conducted using sulfate $PM_{2.5}$ and nitrate $PM_{2.5}$ monitoring data from representative ambient air monitoring stations.

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As discussed in Section 5.0, the Dallas Hinton monitor in Dallas County offers estimates of speciated $PM_{2.5}$ that are representative of the project site. The use of actual emissions from Dallas County provides a conservative (i.e. small) estimate of the total emissions within the monitor's air shed for this qualitative analysis. The most recent county wide emissions data available corresponds to calendar year 2011. Therefore, calendar year 2011 emissions data were used in this qualitative analysis.

Total $PM_{2.5}$, $PM_{2.5}$ nitrates and $PM_{2.5}$ sulfates concentrations from the Dallas Hinton monitor are summarized in the table included as Attachment 5. The maximum 24-hour concentrations and annual average concentrations were utilized for this analysis. The maximum percentage of $PM_{2.5}$ nitrates to total $PM_{2.5}$ and the maximum percentage of $PM_{2.5}$ sulfates to total $PM_{2.5}$ were determined for the 24-hour and annual averaging periods. These percentages are then compared to the reported NO_X and SO_2 emissions in the air shed of the monitor. The use of actual emissions from Dallas County provides a conservative (i.e. small) estimate of the total emissions within the monitor's air shed for this qualitative analysis. The proposed NO_X and SO_2 emissions associated with the THSES project are provided for comparison with the air shed emissions. $PM_{2.5}$ nitrates and $PM_{2.5}$ sulfates concentrations corresponding to the air shed emissions are a small percentage of the total $PM_{2.5}$ concentrations. The project emissions are six percent of the air shed emissions. Since the THSES $PM_{2.5}$ precursor emissions are small compared to those within the air shed of the representative monitor and secondary $PM_{2.5}$ emissions at the representative monitor are a small portion of the total $PM_{2.5}$ concentration, secondary $PM_{2.5}$ formation due to the proposed $PM_{2.5}$ precursor emissions is not expected to be significant at any location near the THSES.

As previously stated, the secondary $PM_{2.5}$ concentrations are not expected to occur near the THSES and they are not expected to increase the predicted concentration results associated with the modeling of direct $PM_{2.5}$ emissions. At distances where secondary $PM_{2.5}$ would be expected to form: (1) contributions from the project's direct $PM_{2.5}$ emissions would be negligible and (2) the estimated $PM_{2.5}$ concentration would be far below $PM_{2.5}$ significant impact value.

6.5 SCALING FACTORS

Scaling factors are not expected to be utilized in the modeling analysis.

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7.0 MODELS PROPOSED AND MODELING TECHNIQUES

The American Meteorological Society / Environmental Protection Agency Regulatory Model (AERMOD), Version 15181, will be used to perform the dispersion modeling in this air quality impacts analysis. AERMOD is the latest generation of atmospheric dispersion models suitable for industrial sources and is the model preferred by the EPA for such applications. To facilitate the running of AERMOD, the Providence/ORIS, LLC's "BEE-Line BEEST for Windows" graphic user interface (Version 11.01) will be used.

The following model options will be used in the application of the AERMOD modeling:

A. Regulatory default option will be enabled.

B. A low roughness parameter will be used based on the results of the analysis described in Section 8.0 of this protocol.

C. Elevated terrain will be used for modeling the area around the facility.

D. The proposed emissions will be modeled at their actual stack heights. None of the proposed THSES stacks exceed the calculated GEP height or 65 meters, whichever is greater.

E. The profile base elevation will be set to the Waco Regional Airport meteorological station base elevation of 154.8 meters.

Modeling receptors will be placed to a distance that clearly identifies the area of impact. The receptor grid spacing is discussed in Section 10 of this protocol.

7.1 MODELING APPROACH – GENERAL DISCUSSION

The modeling analysis will be conducted in five parts to demonstrate compliance with applicable NAAQS, PSD, State property-line regulations, and State effects evaluation analysis. A general description of these analyses is included within this section. Details regarding the specific modeling methods that will be used for the proposed project are included in Sections 7.2 and 7.3.

7.1.1 NAAQS Analysis

NAAQS have been established for NO_2, CO, SO_2, PM_{10}, $PM_{2.5}$ and O_3. Compliance with the NAAQS must be demonstrated for sources with PSD-significant emissions. As discussed in Section 2.1, PSD applies for proposed emissions of NO_2, CO, SO_2, PM_{10}, $PM_{2.5}$, O_3 and H_2SO_4.

A NAAQS has not been established for H_2SO_4. For this non-criteria pollutant, a demonstration of compliance with the State property line standards will be used in place of a NAAQS analysis.

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A preliminary impacts determination will first be conducted using project-related emissions to determine if a detailed NAAQS analysis is required. This process is described in greater detail in Section 7.2.1.

It is noted that the EPA revoked the 24-hour and annual SO_2 NAAQS effective August 23, 2011 (40 CFR Part 50, 53 and 58; Federal Register Vol. 75, No. 119; June 22, 2010). However, these SO_2 NAAQS will remain in effect for one year following the effective date of the initial designations under 107(d)(1) for the new 1-hour SO_2 NAAQS. The EPA's process of designating 1-hour SO_2 nonattainment areas has not been completed. Therefore, SO_2 NAAQS analyses will be conducted for the 24-hour and annual averaging periods.

7.1.2 PSD Increment Consumption Analysis

PSD increment consumption limits currently exist for NO_2, SO_2, PM_{10} and $PM_{2.5}$. Compliance with the PSD increment consumption limits must be demonstrated for sources with PSD-significant emissions. As discussed in Section 2.1, PSD applies to the proposed emissions of NO_2, SO_2, PM_{10} and $PM_{2.5}$.

A preliminary impacts determination will first be conducted using project-related emissions to determine if a detailed PSD increment consumption analysis is required. This process is described in greater detail in Sections 7.2.1 and 7.3.2.

7.1.3 State Property Line Analysis

TCEQ Regulation §112.3 sets the net ground-level concentration limits of SO_2 in McLennan County at 0.4 ppmv (1,021 µg/m^3) for a 30-minute average. TCEQ Regulation §112.41 sets the net ground-level concentration limits of H_2SO_4 at 50 µg/m^3 for a one-hour average and 15 µg/m^3 for a 24-hour average.

This modeling is described in Section 7.3.3.

7.1.4 State Health Effects Analysis

Non-criteria compounds are evaluated for the State health effects analysis. A state health effects analysis applies to the proposed NH_3 and $(NH_4)_2SO_4$ emissions.

This modeling is described in Section 7.3.4.

7.1.5 Ozone Analysis

An O_3 impacts analysis may be required for projects with the potential to emit 100 tpy or more of NO_x and/or VOC emissions. Guidance from the TCEQ's *Draft Air Quality Modeling Guidelines, APD 6232, June 2014* (*draft AQMG*) document will be utilized to demonstrate compliance with the 8-hour standard. This process is described in greater detail in Section 7.4.

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7.2 MODELING APPROACH – PRELIMINARY IMPACT DETERMINATION

A preliminary impact determination will be conducted to commence the AQA. The purpose of the preliminary analysis is to determine whether proposed emissions from the project sources have a "significant" impact on the existing air quality. The various preliminary modeling analyses are described in the sections below.

7.2.1 SIL Justification Analysis

On January 22, 2013, the United States Court of Appeals for the District of Columbia Circuit granted a request from the EPA to vacate and remand to the EPA the portions of two PSD $PM_{2.5}$ rules [40 CFR 51.166(k)(2) and 40 CFR 52.21(k)(2)] addressing select provisions of the $PM_{2.5}$ SILs so that the EPA could voluntarily correct an error in these provisions. The EPA amended its regulations and removed the vacated $PM_{2.5}$ SILs effective December 9, 2013.

The Federal rule that defines when a major source or major modification is considered to cause or contribute to a violation of a NAAQS [40 CFR 51.165(b)(2)] was not vacated in the January 22, 2013 decision or December 9, 2013 amendment. In the EPA's *Circuit Court Decision on $PM_{2.5}$ Significant Impact Levels and Significant Monitoring Concentrations, Questions and Answers, March 4, 2013* document, the EPA states that applicants can continue to demonstrate that proposed $PM_{2.5}$ emissions do not contribute to existing violations of the NAAQS by demonstrating that the proposed source's $PM_{2.5}$ impacts do not "significantly" contribute to existing $PM_{2.5}$ NAAQS violations. In support of this requirement, the difference between the $PM_{2.5}$ NAAQS and the representative modeling background concentrations are summarized in Table 7-1.

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Table 7-1
NAAQS SIL Justification

POLLUTANT	AVERAGING PERIOD	NAAQS ($\mu g/m^3$)	MONITORING CONCENTRATION ($\mu g/m^3$)	DIFFERENCE ($\mu g/m^3$)	SIGNIFICANT IMPACT LEVEL (SIL) ($\mu g/m^3$)
$PM_{2.5}$	24-Hour	35	21.1	13.9	1.2
	Annual	12	9.27	2.73	0.3

The differences between the NAAQS and the current ambient air monitor concentrations are far greater than the EPA SIL values for all pollutants and averaging periods. The EPA states that it would be sufficient in most cases for permitting authorities to conclude that a proposed source with a predicted impact below the EPA SIL value will not cause or contribute to a violation of the NAAQS. Based on this EPA guidance, the proposed THSES emissions will not contribute significantly to existing ambient air concentrations at locations where the project-related impacts are less than the EPA SILs. Therefore, the EPA SILs were utilized to define the scope of the full impact modeling analyses.

Guidance from TCEQ's *AQMG* (Appendix A) regarding $PM_{2.5}$ SIL justification for use in PSD increment consumption analyses was followed. The PSD increment consumption limit was conserved with a conservative estimate for the amount of increment consumed between the major source baseline year and the most recent year of available data from the representative monitoring station. The analysis is conservative since the monitoring data includes impacts from non-increment consuming sources in addition to increment consuming sources. The results of this comparison are provided in Table 7-2. Note that monitoring data indicated a decrease in annual $PM_{2.5}$ concentrations since the major source baseline year. An annual value of zero was conservatively utilized in the justification analysis for the annual $PM_{2.5}$ SIL.

Table 7-2
PSD Increment SIL Justification for $PM_{2.5}$

POLLUTANT	AVERAGING PERIOD	PSD INCREMENT CONSUMPTION LIMIT ($\mu g/m^3$)	INCREMENT CONSUMED 2010 TO 2014* (µg/m3)	DIFFERENCE ($\mu g/m^3$)	SIGNIFICANT IMPACT LEVEL (SIL) ($\mu g/m^3$)
$PM_{2.5}$	24-Hour	9	4.21	4.78	1.2
	Annual	4	0	4	0.3

* Conservative estimates based on highest monitored values (H1H).

The differences between the $PM_{2.5}$ PSD increment consumption limits and the current ambient air monitor $PM_{2.5}$ concentrations are far greater than the EPA $PM_{2.5}$ SIL values for both averaging periods. The TCEQ states that it would be sufficient in most cases to conclude that a proposed source with a predicted impact below the EPA $PM_{2.5}$ SIL values will not cause or contribute to a violation of the PSD increment consumption limits. Based on this TCEQ guidance, the proposed THSES $PM_{2.5}$ emissions will not contribute significantly to existing ambient air concentrations at locations where the project-related impacts are less than the EPA

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SILs. Therefore, the EPA SILs will be utilized to define the scope of the full $PM_{2.5}$ increment consumption analyses.

7.2.2 Area of Significant Impact (AOI) Analysis

For PSD analyses, a preliminary impact determination is conducted to determine if the predicted off-property concentrations associated with the proposed increase in PSD-significant emissions are greater than the EPA's SILs. No further modeling is required to demonstrate compliance if the maximum predicted concentration is below the SIL. If the maximum predicted concentration is equal to or greater than the SIL, all on-site sources must be included in a full impact modeling analysis. Contributions from off-site sources that may impact the AOI are accounted for using ambient air monitoring data or by direct inclusion in the full impact modeling analysis. The AOI is defined as all locations (modeling receptors) with predicted concentrations that are equal to, or greater than, the SILs. An ambient background concentration is added to the full impact modeling results to complete the NAAQS demonstration.

Preliminary modeling will be conducted for allowable NO_2, CO, PM_{10}, $PM_{2.5}$ and SO_2 emissions to determine whether a full impact modeling analysis is required for each pollutant and averaging period. The modeling results will be used to determine whether the predicted concentrations are greater than the SIL for each pollutant and time period. If the maximum predicted concentration is equal or greater than the SIL, the modeling results for that pollutant, averaging period and meteorological data set will be imported into electronic spreadsheets for further review.

The modeling output includes an ASCII formatted data file containing the maximum predicted concentration at each model receptor and for each modeling scenario (group). Using electronic spreadsheets, the maximum predicted highest 1st-high (H1H) concentrations for the 5-modeled years of meteorological data will be determined for each receptor and modeling scenario for the annual NO_2, 1-hour CO, 8-hour CO, 24-hour PM_{10}, annual PM_{10} (increment), 24-hour $PM_{2.5}$ (increment), annual $PM_{2.5}$ (increment), 3-hour SO_2, 24-hour SO_2 and annual SO_2 concentrations. A similar analysis will be conducted for the predicted 5-year average 1-hour NO_2, 1-hour SO_2, 24-hour $PM_{2.5}$ (NAAQS) and annual $PM_{2.5}$ (NAAQS) concentrations. Both H1H and 5-year average $PM_{2.5}$ analyses are conducted to match the (different) forms of the PSD increment consumption limit and NAAQS. These spreadsheet analyses will be used to determine whether an individual receptor has "significant" concentrations at any time during the modeled (5-year) period. If so, the receptor will be included in the full impact modeling analysis.

7.2.3 PSD Pre-application Analysis

For PSD analyses, a preliminary impact determination is conducted to determine if the predicted off-property NO_2, CO, SO_2 and PM_{10} concentrations associated with the proposed increase in PSD-significant emissions are greater than the EPA's SMCs. If the maximum predicted concentration is less than the SMC, the demonstration is complete. If the maximum

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concentration is greater than the SMC, representative monitoring background concentrations are collected to establish the existing air quality for the area.

A pre-application analysis will not be conducted for $PM_{2.5}$. Representative monitoring background $PM_{2.5}$ concentrations will be collected to establish the existing air quality for the area.

7.3 MODELING APPROACH – FULL IMPACT ANALYSIS

Full impact modeling analyses will be conducted for comparison with the NAAQS and PSD increment consumption limits for pollutants and averaging periods with preliminary impacts equal to or greater than the SIL. These modeling analyses are described in the sections below.

7.3.1 NAAQS Analysis

A full impact modeling analysis will be performed for applicable NO_2, CO, SO_2, PM_{10}, and $PM_{2.5}$ emissions to predict ambient concentrations for comparison to the NAAQS. This analysis will include emissions from the THSES Project sources, as well as emissions from existing and proposed sources affecting the project's impact area, as listed in the TCEQ APAD inventory system and provided in the TCEQ permit file system (see Section 6.2.1).

The full impact NAAQS analysis will utilize receptor grids following the TCEQ guidelines. Only receptors with predicted concentrations equal to or greater than the SIL in the preliminary impact determination modeling will be used. Background concentrations will then be added to the full impact modeling results.

7.3.2 PSD Increment Consumption Analysis

A full impact analysis will be performed for applicable NO_2, SO_2, PM_{10} and $PM_{2.5}$ emissions for comparison to the PSD increment consumption limits. This analysis will include PSD increment-consuming emissions from THSES sources, existing PSD increment-consuming emission sources affecting the project's impact area and proposed PSD increment-consuming emission sources affecting the project's impact area, as listed in the TCEQ APAD inventory system and provided in the TCEQ permit file system (see Section 6.2.2).

For PSD increment consumption analyses, the results of the full impact NAAQS analysis are initially compared against the applicable PSD increment consumption limits. If the predicted full impact NAAQS concentration (excluding background concentration) is equal to or less than the applicable increment limit, the demonstration is complete. If not, then a preliminary impact determination is conducted to determine the AOI to be utilized in the full impact PSD increment consumption modeling analysis. The maximum predicted concentrations (H1H) are used for all applicable pollutants including those with statistically-based NAAQS.

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The full impact increment consumption analysis will utilize receptor grids following the TCEQ guidelines. Only receptors with predicted concentrations equal to or greater than the SIL in the preliminary impact determination modeling will be used.

7.3.3 State Property-Line Analysis

Sitewide modeling will be conducted for SO_2 and H_2SO_4 emissions for comparison to the TCEQ State property-line standards.

7.3.4 State Health Effects Analysis

Sitewide modeling will be conducted for the proposed NH_3 and $(NH_4)_2SO_4$ emissions for comparison with the TCEQ ESL guidance values.

7.4 MODELING APPROACH – OZONE ANALYSIS

Guidance from the TCEQ's *draft AQMG* will be followed in conducting an ozone analysis. The screening method included in the *draft AQMG* has been suggested by Mr. Erik Snyder (EPA Region 6 Meteorologist) as a conservative method for estimating ozone contributions from proposed sources located in NO_X-limited areas. Mr. Snyder has stated that the EPA believes that all of Texas, with the possible exception of far west Texas, has ample anthropogenic and naturally occurring VOC so that almost all areas in Texas are NO_X-limited (i.e., ozone production in the vast majority of Texas…is dependent upon the availability of NO_X and not VOC) [Mr. Erik Snyder in conversations with ETC Texas Pipeline, Ltd. regarding the modeling protocol for permit PSD-TX-1264].

As suggested in the *draft AQMG*, a determination was made whether the project county was VOC-limited or NOX-limited. The calculation of the VOC-to-NO_x ratio is provided on the table included as Attachment 6. The VOC-to-NO_x ratio for McLennan County is greater than 2:1. Therefore, the project area is determined to be NO_X-limited.

A determination was then made whether the proposed project site will be VOC-limited or NOX-limited. The calculation of the VOC-to-NO_x ratio is provided on the table included as Attachment 6. The VOC-to-NO_x ratio for the proposed site is less than 2:1. Therefore, the project area is determined to be VOC-limited.

Tradinghouse proposes the use of representative monitoring data to estimate the ozone background concentration at the THSES. As discussed previously, the county is NO_X-limited and the proposed project site is VOC-limited. Therefore, guidance contained in Step 4b of the draft AQMG Appendix Q will be followed in demonstrating that the proposed source would not cause or contribute to a violation of the 2008 8-hour ozone standard of 75 ppb.

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8.0 SELECTION OF DISPERSION OPTION

A determination of the albedo, Bowen ratio, and surface roughness length of the modeling domain must be made before an atmospheric dispersion model can be run. The TCEQ has determined the albedo values and Bowen ratios for each county in Texas. In order to maintain consistency in the modeling of all proposed projects in Texas, the TCEQ has created pre-processed meteorological data sets for the three general roughness lengths that cover each county in Texas. The modeling method preferred by the TCEQ is to choose one of these three roughness lengths based on a review of the modeling domain.

TCEQ modeling staff has provided *Air Dispersion Modeling Team Initiative to Update Meteorological Data, Update – October 2013* as a reference in determining the appropriate roughness length for meteorological data set selection. Following this guidance, the EPA's AERSURFACE tool was utilized to determine the surface roughness length for this project. A surface roughness of 0.046 meters was obtained for the THSES location. This is within the 0.001 to 0.1 range stated in the referenced TCEQ AERMOD Training document for Category 1 for the TCEQ's "low surface roughness" meteorological dataset. Therefore, the "low surface roughness" meteorological data set will be utilized in the modeling analysis. All AERSURFACE files will be included in electronic form in the AQA submitted to the TCEQ.

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9.0 BUILDING WAKE EFFECTS

Building downwash effects will be included in the modeling based on guidance provided in the *User's Guide to the Building Profile Input Program* (EPA, October 1993). The EPA currently requires that all building downwash be determined using the EPA Building Profile Input Program (BPIPPRM) subroutine. Providence/ORIS, LLC's "BEE-Line BEEST for Windows" will be used for calculating downwash parameters for this analysis. This program includes downwash software which uses the latest BPIPPRM subroutine (version 04274) in its calculations.

Information regarding THSES structures will be entered into the BPIP-based software program. The downwash parameters will be calculated for each point source by the software program and inserted into the AERMOD input files in the appropriate locations and formats.

Downwash summary tables created by the BPIP subroutines will be included as part of the electronic files included in the AQA submitted to the TCEQ.

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10.0 RECEPTOR GRIDS

The receptor grids that will be used in the preliminary impact determination and full impact analyses will follow the guidelines provided by the TCEQ in their *AQMG*. The NAD83 datum will be used for the receptor UTM coordinates. Providence/ORIS, LLC's "BEE-Line BEEST for Windows" will be used to calculate the appropriate domain boundaries. The EPA AERMAP program will be used to calculate (interpolate) the terrain elevations and local terrain maximums using 1-arc-second (~30 meter) United States Geological Survey (USGS) National Elevation Dataset (NED) data.

10.1 PRELIMINARY IMPACT DETERMINATION RECEPTOR GRIDS

The receptor coverage utilized for the preliminary impacts determination will consist of the following:

- 1,000-meter spaced receptors to a distance of 30 kilometers from the project-related emission sources for pollutants with Radii of Impact (ROI) distances that are much less than 30 kilometers,
- 1,000-meter spaced receptors to a distance of 50 kilometers from the project-related emission sources for pollutants with ROI distances approaching or greater than 30 kilometers,
- 500-meter spaced receptors to a distance of 5 kilometers from the project-related emission sources,
- 100-meter spaced receptors to a distance of 1 kilometer from the project-related emission sources,
- 25-meter spaced receptors to a distance of 200 meters from any project-related emission sources, and
- 25-meter spaced receptors along the THSES fenceline.

These receptor grids will be designed to capture the maximum off-property ground-level concentrations for all pollutants, operating scenarios and review types.

10.2 FULL IMPACT MODELING RECEPTOR GRIDS

Only receptors with predicted concentrations greater than or equal to the respective SILs will be included in the full impact NAAQS and PSD increment consumption analyses. Full impact modeling receptor grids will be developed using the preliminary impact determination modeling output.

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11.0 METEOROLOGICAL DATA

Current TCEQ guidance will be followed concerning meteorological data for AERMOD modeling for sources located in McLennan County. Pre-processed meteorological data will be obtained from the TCEQ. Pre-processed meteorological data consists of surface data from the Waco Regional Airport meteorological station and upper air data from the Fort Worth National Weather Service station. The TCEQ processed the data using AERMET version 12345, and incorporated the AERMINUTE data along with the low wind speed threshold of 0.5 m/s. More details regarding the pre-processed meteorological data are available on the TCEQ website (http://www.tceq.texas.gov/permitting/air/modeling/aermod-datasets.html). The most recent five years of meteorological data available from the TCEQ on the date of the AQA will be utilized. For PSD modeling, five years of representative National Weather Service (NWS) meteorological data will be used (2008, 2009, 2010, 2011 and 2012). For State NSR modeling, a single year of representative NWS meteorological data will be used (2012).

The TCEQ-developed “low” surface roughness value will be utilized, as discussed in Section 8.

The base elevation for the Waco Regional Airport station is 154.8 meters.

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12.0 MODELING RESULTS

Guidance from the EPA's *Guidance on Air Quality Models* (40 CFR 51, Appendix W) will be followed in selecting the predicted concentrations used to determine compliance with the NAAQS and PSD increment consumption limits. Potentially applicable standards, limits and screening levels are summarized in the following sections of this protocol.

12.1 PRELIMINARY IMPACT DETERMINATION

12.1.1 Area of Significant Impact (AOI) Analysis

As described in Section 7.2.2, this modeling will be conducted for proposed allowable emissions to determine whether full impact modeling is required and, if so, to determine the AOI. The form of the predicted ground-level concentrations and SILs are summarized in Table 12-1.

Table 12-1
AOI Analysis

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED CONCENTRATIONS AT EACH RECEPTOR	SIGNIFICANT IMPACT LEVEL (SIL) ($\mu g/m^3$)
NO_2	1-Hour	5-Year Average of 1st High	7.5
	Annual	1st High (of 5 Years)	1
CO	1-Hour	1st High (of 5 Years)	2,000
	8-Hour	1st High (of 5 Years)	500
SO_2	1-Hour	5-Year Average of 1st High	7.8
	3-Hour	1st High (of 5 Years)	25
	24-Hour	1st High (of 5 Years)	5
	Annual	1st High (of 5 Years)	1
PM_{10}	24-Hour	1st High (of 5 Years)	5
PM_{10} (Increment)	Annual	1st High (of 5 Years)	1
$PM_{2.5}$ (Increment)	24-Hour	1st High (of 5 Years)	1.2
	Annual	1st High (of 5 Years)	0.3
$PM_{2.5}$ (NAAQS)	24-Hour	5-Year Average of 1st High	1.2
	Annual	5-Year Average of 1st High	0.3

12.1.2 PSD Pre-application Analysis

As described in Section 7.2.3, this modeling will be conducted for the proposed allowable emissions to determine whether the project is exempt from the pre-construction ambient monitoring data gathering requirements. The form of the predicted ground-level concentrations and respective SMC's are summarized in Table 12-2.

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Table 12-2
PSD Pre-construction Monitoring Requirement Analysis

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED CONCENTRATIONS AT EACH RECEPTOR	SIGNIFICANT MONITORING CONCENTRATION (SMC) ($\mu g/m^3$)
NO_2	Annual	1st High (of 5 Years)	14
CO	8-Hour	1st High (of 5 Years)	575
SO_2	24-Hour	1st High (of 5 Years)	13
PM_{10}	24-Hour	1st High (of 5 Years)	10
$PM_{2.5}$	24-Hour	1st High (of 5 Years)	0

As discussed in Section 5.3, the January 22, 2013 Court decision does allow the exemption of a $PM_{2.5}$ pre-construction monitoring analysis. Tradinghouse proposes the use of existing ambient air monitoring data from a representative monitor to meet the $PM_{2.5}$ pre-construction monitoring data requirement.

A summary of the existing ambient air monitoring data is provided in Section 5.1.

12.2 FULL IMPACT ANALYSIS

12.2.1 NAAQS Analysis

This modeling will be conducted for applicable NO_2, CO, SO_2, PM_{10} and $PM_{2.5}$ emissions. The form of the predicted ground-level concentrations from the NAAQS modeling, the form of the background concentrations and the NAAQS are summarized in Table 12-3.

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Table 12-3
NAAQS Analysis – Form of Modeling Results and Background Concentration

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED CONCENTRATIONS AT EACH RECEPTOR ($\mu g/m^3$)	BACKGROUND CONCENTRATION ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	1-Hour	5-Year Average of 98th Percentiles of the Daily 1-Hour Maximums	3-Year Average of 98th Percentiles of the Daily 1-Hour Maximums 2012-2014	188
	Annual	1st High (of 5 Years)	1st High, 2014	100
CO	1-Hour	2nd High (of 5 Years)	2nd High, 2014	40,000
	8-Hour	2nd High (of 5 Years)	2nd High, 2014	10,000
SO_2	1-Hour	5-Year Average of 99th Percentiles of the Daily 1-Hour Maximums	3-Year Average of 99th Percentiles of the Daily 1-Hour Maximums, 2012-2014	196
	3-Hour	2nd High (of 5 Years)	2nd High, 2014	1,300
	24-Hour	2nd High (of 5 Years)	2nd High, 2014	365
	Annual	1st High (of 5 Years)	1st High, 2014	80
PM_{10}	24-Hour	6th High (of Single 5-Year Period)	2nd High, 2012-2014	150
$PM_{2.5}$	24-Hour	5-Year Average of 98th Percentiles of the Daily Maximums	3-Year Average of 98th Percentiles of the Daily Maximums, 2012-2014	35
	Annual	5-Year Average of 1st Highs	3-Year Average of 1st Highs 2012-2014	12

12.2.2 PSD Increment Consumption Analysis Results

This modeling will be conducted for proposed increases of applicable increment-consuming NO_2, SO_2, PM_{10} and $PM_{2.5}$ emissions for comparison to the PSD increment consumption limits. The form of the predicted ground-level concentrations from the PSD increment consumption modeling and PSD increment consumption limits are summarized in Table 12-4.

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Table 12-4
PSD Increment Consumption Analysis

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED CONCENTRATIONS AT EACH RECEPTOR	PSD INCREMENT CONSUMPTION LIMIT ($\mu g/m^3$)
NO_2	Annual	1st High (of 5 Years)	25
SO_2	3-Hour	2nd High (of 5 Years)	512
	24-Hour	2nd High (of 5 Years)	91
	Annual	1st High (of 5 Years)	20
PM_{10}	24-Hour	2nd High (of 5 Years)	30
	Annual	1st High (of 5 Years)	17
$PM_{2.5}$	24-Hour	2nd High (of 5 Years)	9
	Annual	1st High (of 5 Years)	4

12.2.3 State Property-Line Analysis Results

This modeling will be conducted for sitewide allowable emissions of SO_2 and H_2SO_4. The form of the predicted ground-level concentrations and property-line standards are summarized in Table 12-5.

Table 12-5
State Property-Line Analysis Results

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED CONCENTRATIONS AT EACH RECEPTOR	STATE PROPERTY LINE STANDARD ($\mu g/m^3$)
SO_2	30-Minutes	1st High (of 1 Year)	1,021
H_2SO_4	1-Hour	1st High (of 1 Year)	50
	24-Hour	1st High (of 1 Year)	15

12.2.4 State Health Effects Analysis Results

This modeling will be conducted for sitewide allowable emissions of NH_3 and $(NH4)_2SO_4$ emissions. The form of the predicted ground-level concentrations and TCEQ ESL guideline values are summarized in Table 12-6.

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Table 12-6
State Health Effects Analysis Results

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED CONCENTRATIONS AT EACH RECEPTOR	TCEQ ESL ($\mu g/m^3$)
NH_3	1-Hour	1st High (of 1 Year)	170
	Annual	1st High (of 1 Year)	17
$(NH_4)_2SO_4$	1-Hour	1st High (of 1 Year)	50
	Annual	1st High (of 1 Year)	5

12.3 OZONE NAAQS ANALYSIS

This modeling will be conducted for sitewide allowable emissions of NO_X to estimate the ozone concentrations associated with the project. The form of the predicted ground-level concentration is documented in Table 12-7.

Table 12-7
PSD Ozone Analysis – NO_2

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED NO_2 CONCENTRATION		
		Form	($\mu g/m^3$)	(ppb)
NO_2	8-Hour	1st High (of 5 Years)	---	---

The ozone produced by the proposed project will then be estimated using a conservative molecular NO_X to ozone ratio of 1:3. The produced ozone estimate will then be summed with the background ozone concentration and the total compared with the NAAQS as illustrated in Table 12-8.

Table 12-8
PSD Ozone Analysis – Ozone Estimate

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED CONCENTRATION (ppb)	BACKGROUND CONCENTRATION (ppb)	TOTAL (ppb)	NAAQS (ppb)
Ozone	8-Hour	---	69.8	---	75

12.4 ADDITIONAL IMPACT ANALYSIS

An analysis of the impairment to visibility, soils and vegetations that would occur as a result of the project and general commercial, residential, industrial and other growth associated with the project will be included in the AQA.

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13.0 MODELING INPUT AND OUTPUT FILES

As required by the *AQMG*, electronic copies of the following items will be provided in the AQA submitted to the TCEQ:

- All input and output modeling files
- All files produced by a software entry program
- All automatic downwash program input and output files
- All meteorological data files
- All boundary property files
- All spreadsheet files used for comparison of predicted concentrations with standards or guidelines

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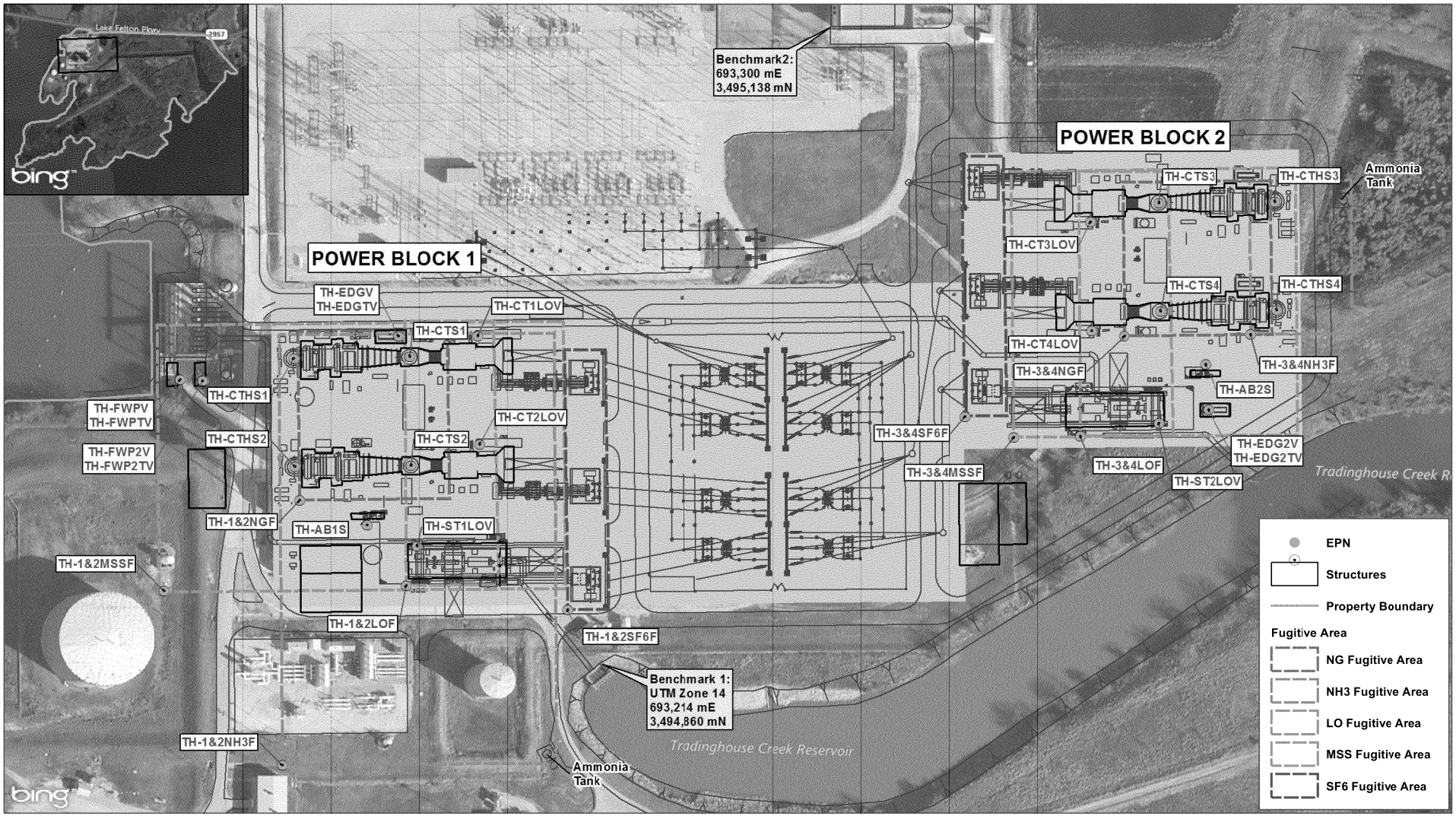
ATTACHMENT 1
PLOT PLAN

ED_001261_00097545



Map Sources:
ESRI- Bing Hybrid Basemap
GCS NAD 1983- UTM Zone 14

N

Meters: 0 50 100

Feet: 0 200 400

zephyr

PLOT PLAN - TRADINGHOUSE S.E.S.

Tradinghouse Power Company LLC
McLennan County, Texas

H:\Luminant\012377 Tradinghouse Combined-Cycle Permits\GIS\ArcMap\Plot Plans\PlotPlan_REVIEW_030315.mxd

Drafted By: J. Knowles	Reviewed By: L. Moon	Project No.: 012377	Date: 9/18/2015

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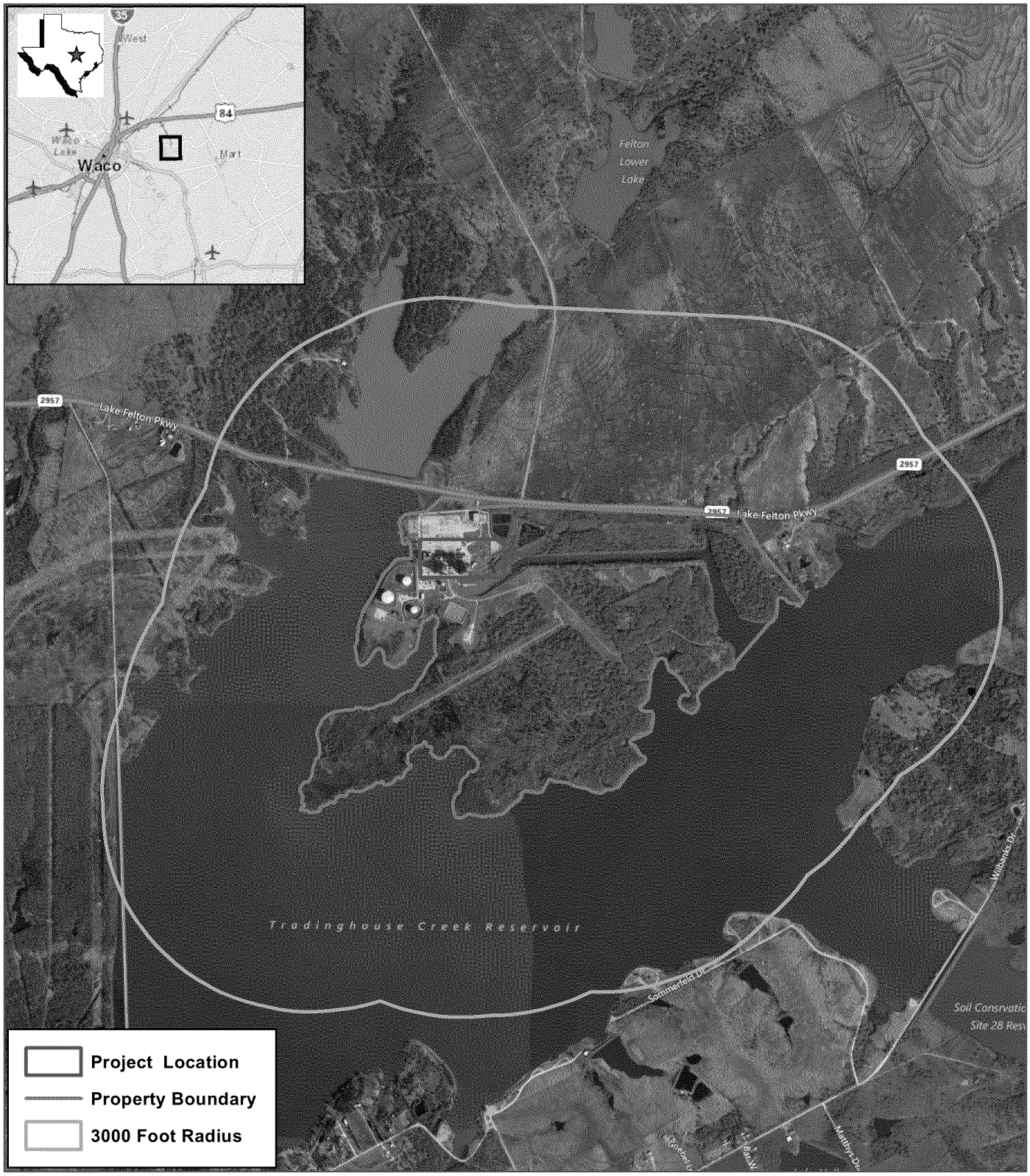
ATTACHMENT 2
AREA MAP

ED_001261_00097545



Datum: GCS NAD 1983 Source: ESRI-BING Hybrid Basemap

N

0 0.5 1 Kilometers

0 0.5 1 Miles

zephyr

AREA MAP

TRADINGHOUSE S.E.S.

Tradinghouse Power Company LLC
McLennan County, Texas

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Drafted By:	Reviewed By:	Project No.:	Date:
J. Knowles	L. Moon	012377	10/13/2014

ATTACHMENT 3
MONITOR COMPARISONS

ED_001261_00097545

Tradinghouse Power Company LLC, Tradinghouse Steam Electric Station
Emissions from Stationary Sources Located within 10 Km

Emissions from Stationary Sources Located within 10 km of Tradinghouse Steam Electric Station (Source 2013 TCEQ EI)

ACCOUNT	RN	COMPANY	SITE	CO TPY	NOx TPY	PM10 TPY	PM2.5 TPY	SO2 TPY
MB0116C	RN102566494	LUMINANT GENERATION CO LLC	TRADINGHOUSE STEAM ELECTRIC STATION	0	0	0	0	0
MB0179B	RN100218536	WASTE MANAGEMENT OF NORTH TEXAS	LACY LAKEVIEW RECYCLING AND DISPOSAL FACILITY	12.2	2.3	5.6	1.1	0.4
			Total Emissions	**12.2**	**2.3**	**5.6**	**1.1**	**0.4**

Emissions from Stationary Sources Located within 10 km of Waco Mazanec Monitor (Source 2013 TCEQ EI)

ACCOUNT	RN	COMPANY	SITE	CO TPY	NOx TPY	PM10 TPY	PM2.5 TPY	SO2 TPY
MB0112K	RN100519636	MOTIVA ENTERPRISES LLC	WACO TERMINAL	4.3	1.7	0	0	0
MB0179B	RN100218536	WASTE MANAGEMENT OF NORTH TEXAS	LACY LAKEVIEW RECYCLING AND DISPOSAL FACILITY	12.2	2.3	5.6	1.1	0.4
MB0245N	RN102287828	FLINT HILLS RESOURCES CORPUS CHRISTI LL	WACO TERMINAL	10.5	5.2	0	0	0
MBA001A	RN104635032	CLARKE PRODUCTS INC	CLARKE PRODUCTS WACO FACILITY	0	0	8.9	6.5	0
			Total Emissions	**26.9**	**9.3**	**14.4**	**7.6**	**0.4**

Emissions from Stationary Sources Located within 10 km of Stage Coach Monitor (Source 2013 TCEQ EI)

ACCOUNT	RN	COMPANY	SITE	CO TPY	NOx TPY	PM10 TPY	PM2.5 TPY	SO2 TPY
TA0079D	RN101224038	US DEPARTMENT OF THE NAVY	NAVAL AIR STATION	4.2	9.8	1.0	0.8	0.9
TA0156K	RN100212356	LOCKHEED MARTIN CORPORATION	US AIR FORCE PLANT 4	2.3	5.1	13.6	13.6	1.9
TA0328F	RN100757509	PARKER HANNIFIN CORP	STRATOFLEX DIVISION	1.4	1.6	0.03	0.03	0.01
TA3161T	RN101991925	WASTE MANAGEMENT OF NORTH TEXAS	WESTSIDE LANDFILL RECYLING & TRANSFER STATION	166.4	31.6	9.3	8.8	2.8
TAA004D	RN100809847	MARCO DISPLAY SPECIALISTS GP LC	MARCO PLANT	0	0	0.02	0	0
TAA023W	RN105064356	ENERGY TRANSFER FUEL LP	CANTWELL COMPRESSOR STATION	1.5	10.6	0.8	0.8	0.02
TAA031E	RN105072607	ENERGY TRANSFER FUEL LP	DAB BOSIER COMPRESSOR STATION	3.8	17.5	1.4	1.4	0.03
TAA044R	RN105560973	BARNETT GATHERING LP	JOHNSON RANCH COMPRESSOR STATION	8.2	34.7	2.9	2.9	0.2
TAA049W	RN106138456	DEVON ENERGY PRODUCTION COMPANY LP	VEALE RANCH 13H	4.4	2.3	0.1	0.1	0.003
TAA057E	RN103209458	SPM FLOW CONTROL INC	SPM FLOW CONTROL	0.8	1.0	0.1	0.1	0.02
TAA063K	RN106722036	CHESAPEAKE OPERATING INC	KOSE TAR PAD	5.0	0.8	0.1	0.1	0.003
			Total Emissions	**198.0**	**115.1**	**29.3**	**28.5**	**5.8**

Emissions from Stationary Sources Located within 10 km of Arlington Municipal Airport Monitor (Source 2013 TCEQ EI)

ACCOUNT	RN	COMPANY	SITE	CO TPY	NOx TPY	PM10 TPY	PM2.5 TPY	SO2 TPY
TA0157I	RN102505963	GENERAL MOTORS CORP	ARLINGTON ASSEMBLY PLANT	29.4	47.8	3.7	2.3	0.2
TA0282E	RN100211291	PRINTPACK INC	PRINTPACK	3.9	4.2	0.4	0.4	0.03
TA2554D	RN100221829	SEALED AIR CORPORATION	SEALED AIR	1.0	1.2	0.09	0.1	0.01
TAA061I	RN100701192	OIL STATES INDUSTRIES INC	OIL STATES INDUSTRIES SPECIAL PRODUCTS DIVISION	0	0	0.002	0	0
DB0915M	RN100215185	TRIUMPH AEROSTRUCTURES LLC	MARSHALL STREET FACILITY	1.3	1.1	0.1	0.1	0.01
			Total Emissions	**35.6**	**54.2**	**4.3**	**2.8**	**0.2**

ATTACHMENT 4
TCEQ TABLE 1(A)

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TCEQ

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	**03-12-2015**	Permit No.:	**110357**	Regulated Entity No.:	**RN102566494**
Area Name:	**TRADINGHOUSE STEAM ELECTRIC STATION**			Customer Reference No.:	**CN603264441**

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate #	
EPN (A)	FIN (B)	NAME (C)		Pounds per Hour (A)	TPY (B)
TH-CTS1	TH-CT1	Unit 1 (GE 7FA.05) Simple Cycle Stack	NO_X	74.98	45.82
			NO_X (MSS)	100.18	---
			NO_X (Peak Firing)	120.00	---
			CO	36.59	46.24
			CO (MSS)	714.0	---
			SO_2	32.36	3.94
			VOC	3.53	5.06
			VOC (MSS)	79.44	---
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	14.25	6.55
			H_2SO_4 [(a)]	4.95	0.60
TH-CTHS1	TH-CT1	Unit 1 (GE 7FA.05 and Duct Burner) Combined Cycle Stack	NO_X	20.35	89.44
			NO_X (MSS)	232.80	---
			CO	12.39	107.93
			CO (MSS)	3,032.4	---
			SO_2	37.88	30.50
			VOC	7.09	36.73
			VOC (MSS)	267.60	---
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	30.66	62.88
			H_2SO_4 [(a)]	14.50	11.67
			NH_3	26.36	110.89
			NH_3 (MSS)	50.00	---

NOx lb/hr represents a maximum hourly emission rate over a three-hour average.

[(a)] PM / PM_{10} / $PM_{2.5}$ from both front-half and back-half.

[(b)] PM / PM_{10} / $PM_{2.5}$ values include $(NH_4)_2SO_4$ emissions.

EPN = Emission Point Number
FIN = Facility Identification Number

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TCEQ

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	**03-12-2015**	Permit No.:	**110357**	Regulated Entity No.:	**RN102566494**
Area Name:	**TRADINGHOUSE STEAM ELECTRIC STATION**			Customer Reference No.:	**CN603264441**

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate #	
EPN (A)	FIN (B)	NAME (C)		Pounds per Hour (A)	TPY (B)
TH-CTS1	TH-CT1	Unit 1 (Siemens SGT6-5000F(5)ee) Simple Cycle Stack	NO_X	82.24	46.93
			NO_X (MSS)	100.23	---
			NO_X (Ramping)	120.00	---
			CO	28.73	74.58
			CO (MSS)	1,824.4	---
			CO (Ramping)	815.0	---
			SO_2	35.33	3.95
			VOC	3.19	8.64
			VOC (MSS)	214.18	---
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	15.41	6.47
			H_2SO_4 [(a)]	5.41	0.60
TH-CTHS1	TH-CT1	Unit 1 (Siemens SGT6-5000F(5)ee and Duct Burner) Combined Cycle Stack	NO_X	21.12	103.13
			NO_X (MSS)	148.80	---
			CO	12.86	199.40
			CO (MSS)	3,612.00	---
			SO_2	40.66	35.62
			VOC	7.36	45.20
			VOC (MSS)	418.80	---
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	35.47	81.88
			H_2SO_4 [(a)]	15.56	13.63
			NH_3	27.37	122.75
			NH_3 (MSS)	50.00	---

NOx lb/hr represents a maximum hourly emission rate over a three-hour average.

[(a)] PM / PM_{10} / $PM_{2.5}$ from both front-half and back-half.

[(b)] PM / PM_{10} / $PM_{2.5}$ values include $(NH_4)_2SO_4$ emissions.

EPN = Emission Point Number
FIN = Facility Identification Number

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TCEQ

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	**03-12-2015**	Permit No.:	**110357**	Regulated Entity No.:	**RN102566494**
Area Name:	**TRADINGHOUSE STEAM ELECTRIC STATION**			Customer Reference No.:	**CN603264441**

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate #	
EPN (A)	FIN (B)	NAME (C)		Pounds per Hour (A)	TPY (B)
TH-CTS2	TH-CT2	Unit 2 (GE 7FA.05) Simple Cycle Stack	NO_X	74.98	45.82
			NO_X (MSS)	100.18	---
			NO_X (Peak Firing)	120	---
			CO	36.59	46.24
			CO (MSS)	714.00	---
			SO_2	32.36	3.94
			VOC	3.53	5.06
			VOC (MSS)	79.44	---
			$PM / PM_{10} / PM_{2.5}$ [(a) (b)]	14.25	6.55
			H_2SO_4 [(a)]	4.95	0.60
TH-CTHS2	TH-CT2	Unit 2 (GE 7FA.05 and Duct Burner) Combined Cycle Stack	NO_X	20.35	89.44
			NO_X (MSS)	232.80	---
			CO	12.39	107.93
			CO (MSS)	3,032.4	---
			SO_2	37.88	30.50
			VOC	7.09	36.73
			VOC (MSS)	267.60	---
			$PM / PM_{10} / PM_{2.5}$ [(a) (b)]	30.66	62.88
			H_2SO_4 [(a)]	14.50	11.67
			NH_3	26.36	110.89
			NH_3 (MSS)	50.00	---

NOx lb/hr represents a maximum hourly emission rate over a three-hour average.

[(a)] $PM / PM_{10} / PM_{2.5}$ from both front-half and back-half.

[(b)] $PM / PM_{10} / PM_{2.5}$ values include $(NH_4)_2SO_4$ emissions.

EPN = Emission Point Number
FIN = Facility Identification Number

ED_001261_00097545

TCEQ

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	03-12-2015	Permit No.:	110357	Regulated Entity No.:	RN102566494
Area Name:	TRADINGHOUSE STEAM ELECTRIC STATION			Customer Reference No.:	CN603264441

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate #	
EPN (A)	FIN (B)	NAME (C)		Pounds per Hour (A)	TPY (B)
TH-CTS2	TH-CT2	Unit 2 (Siemens SGT6-5000F(5)ee) Simple Cycle Stack	NO_X	82.24	46.93
			NO_X (MSS)	100.23	---
			NO_X (Ramping)	120.00	---
			CO	28.73	74.58
			CO (MSS)	1824.36	---
			CO (Ramping)	815.00	---
			SO_2	35.33	3.95
			VOC	3.19	8.64
			VOC (MSS)	214.18	---
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	15.41	6.47
			H_2SO_4 [(a)]	5.41	0.60
TH-CTHS2	TH-CT2	Unit 2 (Siemens SGT6-5000F(5)ee and Duct Burner) Combined Cycle Stack	NO_X	21.12	103.13
			NO_X (MSS)	148.80	---
			CO	12.86	199.40
			CO (MSS)	3,612.00	---
			SO_2	40.66	35.62
			VOC	7.36	45.20
			VOC (MSS)	418.80	---
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	35.47	81.88
			H_2SO_4 [(a)]	15.56	13.63
			NH_3	27.37	122.75
			NH_3 (MSS)	50.00	---

NOx lb/hr represents a maximum hourly emission rate over a three-hour average.

[(a)] PM / PM_{10} / $PM_{2.5}$ from both front-half and back-half.

[(b)] PM / PM_{10} / $PM_{2.5}$ values include $(NH_4)_2SO_4$ emissions.

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TCEQ

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	03-12-2015	Permit No.:	110357	Regulated Entity No.:	RN102566494
Area Name:	TRADINGHOUSE STEAM ELECTRIC STATION			Customer Reference No.:	CN603264441

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate #	
EPN (A)	FIN (B)	NAME (C)		Pounds per Hour (A)	TPY (B)
TH-CTS3	TH-CT3	Unit 3 (GE 7FA.05) Simple Cycle Stack	NO_X	74.98	---
			NO_X (MSS)	100.18	---
			NO_X (Peak Firing)	120.00	---
			CO	36.59	---
			CO (MSS)	714.0	---
			SO_2	32.36	---
			VOC	3.53	---
			VOC (MSS)	79.44	---
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	14.25	---
			H_2SO_4 [(a)]	4.95	---
TH-CTHS3	TH-CT3	Unit 3 (GE 7FA.05 and Duct Burner) Combined Cycle Stack	NO_X	20.35	---
			NO_X (MSS)	232.80	---
			CO	12.39	---
			CO (MSS)	3,032.4	---
			SO_2	37.88	---
			VOC	7.09	---
			VOC (MSS)	267.60	---
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	30.66	---
			H_2SO_4 [(a)]	14.50	---
			NH_3	26.36	---
			NH_3 (MSS)	50.00	---
TH-CTS3	TH-CT3	Unit 3 (GE 7FA.05) Simple Cycle Stack and	NO_X	---	153.31
TH-CTHS3		Unit 3 (GE 7FA.05 and Duct Burner) Combined Cycle Stack	CO	---	144.66
			SO_2	---	30.50
			VOC	---	36.73
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	---	62.88
			H_2SO_4 [(a)]	---	11.67
			NH_3	---	110.89

NOx lb/hr represents a maximum hourly emission rate over a three-hour average.

[(a)] PM / PM_{10} / $PM_{2.5}$ from both front-half and back-half.

[(b)] PM / PM_{10} / $PM_{2.5}$ values include $(NH_4)_2SO_4$ emissions.

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TCEQ

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	03-12-2015	Permit No.:	110357	Regulated Entity No.:	RN102566494
Area Name:	TRADINGHOUSE STEAM ELECTRIC STATION			Customer Reference No.:	CN603264441

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate #	
EPN (A)	FIN (B)	NAME (C)		Pounds per Hour (A)	TPY (B)
TH-CTS3	TH-CT3	Unit 3 (Siemens SGT6-5000F(5)ee) Simple Cycle Stack	NO_X	82.24	---
			NO_X (MSS)	100.23	---
			NO_X (Ramping)	120.00	---
			CO	28.73	---
			CO (MSS)	1,824.4	---
			CO (Ramping)	815.0	---
			SO_2	35.33	---
			VOC	3.19	---
			VOC (MSS)	214.18	---
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	15.41	---
			H_2SO_4 [(a)]	5.41	---
TH-CTHS3	TH-CT3	Unit 3 (Siemens SGT6-5000F(5)ee and Duct Burner) Combined Cycle Stack	NO_X	21.12	---
			NO_X (MSS)	148.80	---
			CO	12.86	---
			CO (MSS)	3,612.00	---
			SO_2	40.66	---
			VOC	7.36	---
			VOC (MSS)	418.80	---
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	35.47	---
			H_2SO_4 [(a)]	15.56	---
			NH_3	27.37	---
			NH_3 (MSS)	50.00	---
TH-CTS3	TH-CT3	Unit 3 (Siemens SGT6-5000F(5)ee) Simple Cycle Stack and	NO_X	---	171.22
TH-CTHS3		Unit 3 (Siemens SGT6-5000F(5)ee and Duct Burner) Combined Cycle Stack	CO	---	234.46
			SO_2	---	35.62
			VOC	---	45.20
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	---	81.88
			H_2SO_4 [(a)]	---	13.63
			NH_3	---	122.75

NOx lb/hr represents a maximum hourly emission rate over a three-hour average.

[(a)] PM / PM_{10} / $PM_{2.5}$ from both front-half and back-half.

[(b)] PM / PM_{10} / $PM_{2.5}$ values include $(NH_4)_2SO_4$ emissions.

EPN = Emission Point Number
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TCEQ

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	03-12-2015	Permit No.:	110357	Regulated Entity No.:	RN102566494
Area Name:	TRADINGHOUSE STEAM ELECTRIC STATION			Customer Reference No.:	CN603264441

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate #	
EPN (A)	FIN (B)	NAME (C)		Pounds per Hour (A)	TPY (B)
TH-CTS4	TH-CT4	Unit 4 (GE 7FA.05) Simple Cycle Stack	NO_X	74.98	---
			NO_X (MSS)	100.18	---
			NO_X (Peak Firing)	120.00	---
			CO	36.59	---
			CO (MSS)	714.0	---
			SO_2	32.36	---
			VOC	3.53	---
			VOC (MSS)	79.44	---
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	14.25	---
			H_2SO_4 [(a)]	4.95	---
TH-CTHS4	TH-CT4	Unit 4 (GE 7FA.05 and Duct Burner) Combined Cycle Stack	NO_X	20.35	---
			NO_X (MSS)	232.80	---
			CO	12.39	---
			CO (MSS)	3,032.4	---
			SO_2	37.88	---
			VOC	7.09	---
			VOC (MSS)	267.60	---
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	30.66	---
			H_2SO_4 [(a)]	14.50	---
			NH_3	26.36	---
			NH_3 (MSS)	50.00	---
TH-CTS4	TH-CT4	Unit 4 (GE 7FA.05) Simple Cycle Stack and	NO_X	---	153.31
TH-CTHS4		Unit 4 (GE 7FA.05 and Duct Burner) Combined Cycle Stack	CO	---	144.66
			SO_2	---	30.50
			VOC	---	36.73
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	---	62.88
			H_2SO_4 [(a)]	---	11.67
			NH_3	---	110.89

NOx lb/hr represents a maximum hourly emission rate over a three-hour average.

[(a)] PM / PM_{10} / $PM_{2.5}$ from both front-half and back-half.

[(b)] PM / PM_{10} / $PM_{2.5}$ values include $(NH_4)_2SO_4$ emissions.

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	03-12-2015	Permit No.:	110357	Regulated Entity No.:	RN102566494
Area Name:	TRADINGHOUSE STEAM ELECTRIC STATION			Customer Reference No.:	CN603264441

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate #	
EPN (A)	FIN (B)	NAME (C)		Pounds per Hour (A)	TPY (B)
TH-CTS4	TH-CT4	Unit 4 (Siemens SGT6-5000F(5)ee) Simple Cycle Stack	NO_X	82.24	---
			NO_X (MSS)	100.23	---
			NO_X (Ramping)	120.00	---
			CO	28.73	---
			CO (MSS)	1,824.4	---
			CO (Ramping)	815.0	---
			SO_2	35.33	---
			VOC	3.19	---
			VOC (MSS)	214.18	---
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	15.41	---
			H_2SO_4 [(a)]	5.41	---
TH-CTHS4	TH-CT4	Unit 4 (Semens SGT6-5000F(5)ee and Duct Burner) Combined Cycle Stack	NO_X	21.12	---
			NO_X (MSS)	148.80	---
			CO	12.86	---
			CO (MSS)	3,612.00	---
			SO_2	40.66	---
			VOC	7.36	---
			VOC (MSS)	418.80	---
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	35.47	---
			H_2SO_4 [(a)]	15.56	---
			NH_3	27.37	---
			NH_3 (MSS)	50.00	---
TH-CTS4	TH-CT4	Unit 4 (Siemens SGT6-5000F(5)ee) Simple Cycle Stack and	NO_X	---	171.22
TH-CTHS4		Unit 4 (Semens SGT6-5000F(5)ee and Duct Burner) Combined Cycle Stack	CO	---	234.46
			SO_2	---	35.62
			VOC	---	45.20
			PM / PM_{10} / $PM_{2.5}$ [(a) (b)]	---	81.88
			H_2SO_4 [(a)]	---	13.63
			NH_3	---	122.75

NOx lb/hr represents a maximum hourly emission rate over a three-hour average.

[(a)] PM / PM_{10} / $PM_{2.5}$ from both front-half and back-half.

[(b)] PM / PM_{10} / $PM_{2.5}$ values include $(NH_4)_2SO_4$ emissions.

EPN = Emission Point Number
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TCEQ

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	03-12-2015	Permit No.:	110357	Regulated Entity No.:	RN102566494
Area Name:	TRADINGHOUSE STEAM ELECTRIC STATION			Customer Reference No.:	CN603264441

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate #	
EPN (A)	FIN (B)	NAME (C)		Pounds per Hour (A)	TPY (B)
TH-AB1S	TH-AB1	Auxiliary Boiler 1 Stack	NO_X	0.73	3.21
			CO	2.71	11.86
			SO_2	1.04	0.91
			VOC	0.40	1.75
			$PM / PM_{10} / PM_{2.5}$	0.55	2.41
TH-ST1LOV	TH-ST1	Steam Turbine 1 Lube Oil Vent	VOC	<0.01	0.013
			$PM / PM_{10} / PM_{2.5}$	<0.01	0.013
TH-1&2NGF	TH-1&2NGF	Units 1 & 2 Natural Gas Fugitives	VOC	0.01	0.04
TH-1&2LOF	TH-1&2LOF	Units 1 & 2 Lube Oil Fugitives	VOC	0.5	2.18
		(Unchanged from current Permit 110357 Allowable)			
TH-1&2NH3F	TH-1&2NH3F	Units 1 & 2 Ammonia Fugitives	NH_3	0.12	0.51
TH-EDGTV	TH-EDGT	Emergency Generator Tank Vent	VOC	0.02	<0.01
TH-FWPTV	TH-FWPT	Diesel Firewater Pump Tank Vent	VOC	0.02	<0.01
TH-1&2MSSF	TH-1&2MSSF	MSS Emissions Units 1&2	NO_X	<0.01	<0.01
		(For existing and proposed sources at the site)	CO	<0.01	<0.01
			PM	0.05	<0.01
			PM_{10}	0.05	<0.01
			$PM_{2.5}$	0.05	<0.01
			VOC	0.12	<0.01
			NH_3	<0.01	<0.01
TH-AB2S	TH-AB2	Auxiliary Boiler 2 Stack	NO_X	0.73	3.21
			CO	2.71	11.86
			SO_2	1.04	0.91
			VOC	0.40	1.75
			$PM / PM_{10} / PM_{2.5}$	0.55	2.41

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FIN = Facility Identification Number

ED_001261_00097545

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	03-12-2015	Permit No.:	110357	Regulated Entity No.:	RN102566494
Area Name:	TRADINGHOUSE STEAM ELECTRIC STATION			Customer Reference No.:	CN603264441

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate #	
EPN (A)	FIN (B)	NAME (C)		Pounds per Hour (A)	TPY (B)
TH-CT3LOV	TH-CT3	Unit 3 Lube Oil Vent	VOC	<0.01	0.013
			PM / PM_{10} / $PM_{2.5}$	<0.01	0.013
TH-CT4LOV	TH-CT4	Unit 4 Lube Oil Vent	VOC	<0.01	0.013
			PM / PM_{10} / $PM_{2.5}$	<0.01	0.013
TH-ST2LOV	TH-ST2	Steam Turbine 2 Lube Oil Vent	VOC	<0.01	0.013
			PM / PM_{10} / $PM_{2.5}$	<0.01	0.013
TH-3&4NGF	TH-3&4NGF	Units 3 & 4 Natural Gas Fugitives	VOC	0.008	0.04
TH-3&4LOF	TH-3&4LOF	Units 3 & 4 Lube Oil Fugitives	VOC	0.50	2.18
TH-3&4NH3F	TH-3&4NH3F	Units 3 & 4 Ammonia Fugitives	NH_3	0.12	0.51
TH-EDG2V	TH-EDG2	Emergency Generator 2 Stack	NO_X	16.54	0.83
			CO	9.56	0.48
			SO_2	0.015	<0.01
			VOC	0.89	0.04
			PM / PM_{10} / $PM_{2.5}$	0.54	0.03
TH-FWP2V	TH-FWP2	Diesel Firewater Pump 2 Stack	NO_X	1.74	0.09
			CO	1.88	0.09
			SO_2	<0.01	<0.01
			VOC	0.12	<0.01
			PM / PM_{10} / $PM_{2.5}$	0.09	<0.01
TH-EDG2TV	TH-EDG2T	Emergency Generator 2 Tank Vent	VOC	0.02	<0.01
TH-FWP2TV	TH-FWP2T	Diesel Firewater Pump 2 Tank Vent	VOC	0.02	<0.01

EPN = Emission Point Number
FIN = Facility Identification Number

ED_001261_00097545

TCEQ

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	03-12-2015	Permit No.:	110357	Regulated Entity No.:	RN102566494
Area Name:	TRADINGHOUSE STEAM ELECTRIC STATION			Customer Reference No.:	CN603264441

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AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate #	
EPN (A)	FIN (B)	NAME (C)		Pounds per Hour (A)	TPY (B)
TH-3&4MSSF	TH-3&4MSSF	MSS Emissions Units 3&4	NO_X	<0.01	<0.01
			CO	<0.01	<0.01
			PM	0.05	<0.01
			PM_{10}	0.05	<0.01
			$PM_{2.5}$	0.05	<0.01
			VOC	0.12	<0.01
			NH_3	<0.01	<0.01
TH-CTHS1	TH-CT1	Unit 1 (GE 7FA.05 and Duct Burner) Combined Cycle Stack	CO_2	---	1,283,747.4
			CH_4	---	23.8
			N_2O	---	2.4
			CO_2e	---	1,285,052.3
TH-CTHS1	TH-CT2	Unit 1 (Semens SGT6-5000F(5)ee and Duct Burner) Combined Cycle Stack	CO_2	---	1,498,890.4
			CH_4	---	27.8
			N_2O	---	2.8
			CO_2e	---	1,500,413.9
TH-CTHS2	TH-CT2	Unit 2 (GE 7FA.05 and Duct Burner) Combined Cycle Stack	CO_2	---	1,283,747.4
			CH_4	---	23.8
			N_2O	---	2.4
			CO_2e	---	1,285,052.3
TH-CTHS2	TH-CT2	Unit 2 (Semens SGT6-5000F(5)ee and Duct Burner) Combined Cycle Stack	CO_2	---	1,498,890.4
			CH_4	---	27.8
			N_2O	---	2.8
			CO_2e	---	1,500,413.9
TH-CTS3	TH-CT3	Unit 3 (GE 7FA.05) Simple Cycle Stack	CO_2	---	1,283,747.4
TH-CTHS3	TH-CT3	Unit 3 (GE 7FA.05 and Duct Burner) Combined Cycle Stack	CH_4	---	23.8
			N_2O	---	2.4
			CO_2e	---	1,285,052.3

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TCEQ

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	03-12-2015	Permit No.:	110357	Regulated Entity No.:	RN102566494
Area Name:	TRADINGHOUSE STEAM ELECTRIC STATION			Customer Reference No.:	CN603264441

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AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate #	
EPN (A)	FIN (B)	NAME (C)		Pounds per Hour (A)	TPY (B)
TH-CTS3	TH-CT3	Unit 3 (Siemens SGT6-5000F(5)ee) Simple Cycle Stack	CO_2	---	1,498,890.4
TH-CTHS3	TH-CT3	Unit 3 (Semens SGT6-5000F(5)ee and Duct Burner) Combined Cycle Stack	CH_4	---	27.8
			N_2O	---	2.8
			CO_2e	---	1,500,413.9
TH-CTS4	TH-CT4	Unit 4 (GE 7FA.05) Simple Cycle Stack	CO_2	---	1,283,747.4
TH-CTHS4	TH-CT4	Unit 4 (GE 7FA.05 and Duct Burner) Combined Cycle Stack	CH_4	---	23.8
			N_2O	---	2.4
			CO_2e	---	1,285,052.3
TH-CTS4	TH-CT4	Unit 4 (Siemens SGT6-5000F(5)ee) Simple Cycle Stack	CO_2	---	1,498,890.4
TH-CTHS4	TH-CT4	Unit 4 (Semens SGT6-5000F(5)ee and Duct Burner) Combined Cycle Stack	CH_4	---	27.8
			N_2O	---	2.8
			CO_2e	---	1,500,413.9
TH-AB1S	TH-AB1	Auxiliary Boiler 1 Stack	CO_2	---	37,527.3
			CH_4	---	0.7
			N_2O	---	0.07
			CO_2e	---	37,566.1
TH-AB2S	TH-AB2	Auxiliary Boiler 2 Stack	CO_2	---	37,527.3
			CH_4	---	0.7
			N_2O	---	0.07
			CO_2e	---	37,566.1
TH-1&2NGF	TH-1&2NGF	Units 1 & 2 Natural Gas Fugitives	CO_2	---	0.1
			CH_4	---	1.3
			CO_2e	---	33.4
TH-3&4NGF	TH-3&4NGF	Units 3 & 4 Natural Gas Fugitives	CO_2	---	0.1
			CH_4	---	1.3
			CO_2e	---	33.4

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FIN = Facility Identification Number

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	03-12-2015	Permit No.:	110357	Regulated Entity No.:	RN102566494
Area Name:	TRADINGHOUSE STEAM ELECTRIC STATION			Customer Reference No.:	CN603264441

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate #	
EPN (A)	FIN (B)	NAME (C)		Pounds per Hour (A)	TPY (B)
TH-1&2MSSF	TH-1&2MSSF	MSS Emissions Units 1&2	CO_2	---	0.008
			CH_4	---	0.10
			CO_2e	---	2.6
TH-3&4MSSF	TH-3&4MSSF	MSS Emissions Units 3&4	CO_2	---	0.008
			CH_4	---	0.10
			CO_2e	---	2.6
TH-EDG2V	TH-EDG2	Emergency Generator 2 Stack	CO_2	---	77.0
			CH_4	---	0.0031
			N_2O	---	0.0006
			CO_2e	---	77.3
TH-FWP2V	TH-FWP2	Diesel Firewater Pump 2 Stack	CO_2	---	16.2
			CH_4	---	0.0007
			N_2O	---	0.0001
			CO_2e	---	16.2
TH-1&2SF6F	TH-1&2SF6F	Units 1&2 SF6 Fugitives	SF_6	---	0.001
			CO_2e	---	23.4

TH-3&4SF6F	TH-3&4SF6F	Units 3&4 SF6 Fugitives	SF_6	---	0.001
			CO_2e	---	23.4

EPN = Emission Point Number
FIN = Facility Identification Number

ED_001261_00097545

TCEQ

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	03-12-2015	Permit No.:	110357	Regulated Entity No.:	RN102566494
Area Name:	TRADINGHOUSE STEAM ELECTRIC STATION			Customer Reference No.:	CN603264441

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA			EMISSION POINT DISCHARGE PARAMETERS											
1. Emission Point			4. UTM Coordinates of Emission Point (NAD83)			Source								
						5. Building Height (ft)	6. Height Above Ground (ft)	7. Stack Exit Data [c], [d]			8. Fugitives		
EPN (A)	FIN (B)	NAME (C)	Zone	East (Meters)	North (Meters)			Diameter (ft) (A)	Velocity (fps) (B)	Temperature (°F) (C)	Length (ft) (A)	Width (ft) (B)	Axis Degrees (C)
TH-CTS1	TH-CT1	Unit 1 (GE 7FA.05) Simple Cycle Stack	14	693,124	3,494,988		136	20	150	1054			
TH-CTHS1	TH-CT1	Unit 1 (GE 7FA.05 and Duct Burner) Combined Cycle Stack	14	693,074	3,494,985		160	19	76.6	170			
TH-CTS1	TH-CT1	Unit 1 (Siemens SGT6-5000F(5)ee) Simple Cycle Stack	14	693,124	3,494,988		136	24	124	1099			
TH-CTHS1	TH-CT1	Unit 1 (Siemens SGT6-5000F(5)ee and Duct Burner) Combined Cycle Stack	14	693,074	3,494,985		160	19	76.7	185			
TH-CTS2	TH-CT2	Unit 2 (GE 7FA.05) Simple Cycle Stack	14	693,127	3,494,941		136	20	150	1054			
TH-CTHS2	TH-CT2	Unit 2 (GE 7FA.05 and Duct Burner) Combined Cycle Stack	14	693,077	3,494,938		160	19	76.6	170			
TH-CTS2	TH-CT2	Unit 2 (Siemens SGT6-5000F(5)ee) Simple Cycle Stack	14	693,127	3,494,941		136	24	124	1099			
TH-CTHS2	TH-CT2	Unit 2 (Siemens SGT6-5000F(5)ee and Duct Burner) Combined Cycle Stack	14	693,077	3,494,938		160	19	76.7	185			
TH-CTS3	TH-CT3	Unit 3 (GE 7FA.05) Simple Cycle Stack	14	693,444	3,495,071		136	20	150	1054			
TH-CTHS3	TH-CT3	Unit 3 (GE 7FA.05 and Duct Burner) Combined Cycle Stack	14	693,493	3,495,074		160	19	76.6	170			
TH-CTS3	TH-CT3	Unit 3 (Siemens SGT6-5000F(5)ee) Simple Cycle Stack	14	693,444	3,495,071		136	24	124	1099			
TH-CTHS3	TH-CT3	Unit 3 (Siemens SGT6-5000F(5)ee and Duct Burner) Combined Cycle Stack	14	693,493	3,495,074		160	19	76.7	185			
TH-CTS4	TH-CT4	Unit 4 (GE 7FA.05) Simple Cycle Stack	14	693,447	3,495,025		136	20	150	1054			
TH-CTHS4	TH-CT4	Unit 4 (GE 7FA.05 and Duct Burner) Combined Cycle Stack	14	693,497	3,495,028		160	19	76.6	170			
TH-CTS4	TH-CT4	Unit 4 (Siemens SGT6-5000F(5)ee) Simple Cycle Stack	14	693,447	3,495,025		136	24	124	1099			
TH-CTHS4	TH-CT4	Unit 4 (Siemens SGT6-5000F(5)ee and Duct Burner) Combined Cycle Stack	14	693,497	3,495,028		160	19	76.7	185			
TH-AB1S	TH-AB1	Auxiliary Boiler 1 Stack	14	693,110	3,494,915		47	3	59.8	400			
TH-ST1LOV	TH-ST1	Steam Turbine 1 Lube Oil Vent	14	693,132	3,494,907		20	0.00328	0.00328	115			
TH-1&2NGF	TH-1&2NGF	Units 1 & 2 Natural Gas Fugitives	14	693,080	3,494,924		3.28				240	213	0
TH-1&2LOF	TH-1&2LOF	Units 1 & 2 Lube Oil Fugitives	14	693,128	3,494,889		3.28				375	132	0
TH-1&2NH3F	TH-1&2NH3F	Units 1 & 2 Ammonia Fugitives	14	693,079	3,494,809		3.28				610	390	0
TH-EDGTV	TH-EDGT	Emergency Generator Tank Vent	14	693,119	3,494,997		15	0.00328	0.00328	Ambient			
TH-FWPTV	TH-FWPT	Diesel Firewater Pump Tank Vent	14	693,022	3,494,978		15	0.00328	0.00328	Ambient			
TH-1&2MSSF	TH-1&2MSSF	MSS Emissions Units 1&2	14	693,024	3,494,882		3.28				575	379	90
TH-CT3LOV	TH-CT3	Unit 3 Lube Oil Vent	14	693,415	3,495,061		20	0.00328	0.00328	115			
TH-CT4LOV	TH-CT4	Unit 4 Lube Oil Vent	14	693,418	3,495,015		20	0.00328	0.00328	115			
TH-3&4NGF	TH-3&4NGF	Units 3 & 4 Natural Gas Fugitives	14	693,432	3,495,013		3.28				218	210	0
TH-3&4LOF	TH-3&4LOF	Units 3 & 4 Lube Oil Fugitives	14	693,415	3,494,969		3.28				375	127	0
TH-AB2S	TH-AB2	Auxiliary Boiler 2 Stack	14	693,467	3,495,003		47	3	59.8	400			
TH-ST2LOV	TH-ST2	Steam Turbine 2 Lube Oil Vent	14	693,448	3,494,976		20	0.00328	0.00328	115			
TH-EDG2V	TH-EDG2	Emergency Generator 2 Stack	14	693,470	3,494,983		15	0.67	360	859			
TH-EDG2TV	TH-EDG2T	Emergency Generator 2 Tank Vent	14	693,470	3,494,983		15	0.00328	0.00328	Ambient			
TH-FWP2V	TH-FWP2	Diesel Firewater Pump 2 Stack	14	693,032	3,494,973		15	0.50	135	961			
TH-FWP2TV	TH-FWP2T	Diesel Firewater Pump 2 Tank Vent	14	693,032	3,494,973		15	0.00328	0.00328	Ambient			
TH-3&4NH3F	TH-3&4NH3F	Units 3 & 4 Ammonia Fugitives	14	693,486	3,495,017		3.28				218	144	0
TH-3&4MSSF	TH-3&4MSSF	MSS Emissions Units 3&4	14	693,386	3,494,967		3.28				402	377	90
TH-1&2SF6F	TH-1&2SF6F	Units 1&2 SF6 Fugitives	14	693,198	3,494,883		3.28				368	59	0
TH-3&4SF6F	TH-3&4SF6F	Units 3&4 SF6 Fugitives	14	693,365	3,494,975		3.28				369	59	0

[c] GE combined cycle velocity and temperature corresponds to base load. Exhaust velocities range from 46 fps at reduced load to 76.6 fps at base load.
Siemens combined cycle velocity and temperature corresponds to base load. Exhaust velocities range from 51 fps at reduced load to 78.1 fps at base load.

[d] GE simple cycle velocity and temperature corresponds to base load. Exhaust velocities range from 92 fps at reduced load to 150 fps at base load.
Siemens combined cycle velocity and temperature corresponds to base load. Exhaust velocities range from 68 fps at reduced load to 124 fps at base load.

EPN = Emission Point Number
FIN = Facility Identification Number

ATTACHMENT 5
SECONDARY PM2.5 ESTIMATE

SECONDARY PM2.5 ANALYSIS
TRADINGHOUSE STEAM ELECTRIC STATION
HALLSBURG, TEXAS

Year	Maximum 24-Hour Concentration (µg/m3) Dallas Hinton			Percent of Total PM2.5	
	PM2.5	Sulfate PM2.5	Nitrate PM2.5	Sulfate PM2.5	Nitrate PM2.5
2012	21.7	4.98	4.20	22.9%	19.4%
2013	29.5	9.30	4.74	31.5%	16.1%
2014	37.7	8.17	8.17	21.7%	21.7%

Daily Emissions (lb/day)	SO2	NOX
Dallas County	12,483	279,853
Proposed Project	791	3,047
Proposed Project / Dallas County	6.3%	1.1%

Year	Annual Concentration (µg/m3) Dallas Hinton			Percent of Total PM2.5	
	PM2.5	Sulfate PM2.5	Nitrate PM2.5	Sulfate PM2.5	Nitrate PM2.5
2012	10.31	1.939	0.8188	18.8%	7.9%
2013	9.73	1.797	0.8338	18.5%	8.6%
2014	11.98	2.037	1.1872	17.0%	9.9%

Annual Emissions (TPY)	SO2	NOX
Dallas County	2,278	51,073
Proposed Project	144	556
Proposed Project / Dallas County	6.3%	1.1%

ATTACHMENT 6
OZONE ANALYSIS VOC-TO-NOX RATIOS

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VOC-to-NOX Ratio
Using Countywide Emissions

County	Annual Emissions*		Molar Ratio**
	VOC (TPY)	NOX (TPY)	
McLennan	8,352	11,686	2.1

* EPA 2011 National Emissions Inventory Database, Version 2 (03/04/15)
** (VOC / NO2) x 2.875

VOC-to-NOX Ratio
Using THSES Sitewide Emissions

Turbine Vendor / Scenario	Annual Emissions		Molar Ratio**
	VOC (TPY)	NOX (TPY)	
GE	153	493	0.89
Siemens	187	556	0.97

** (VOC / NO2) x 2.875

ATTACHMENT 7
ELECTRONIC FILES

ED_001261_00097545

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consulting ♦ training ♦ data systems

March 23, 2016

Mr. Paul Coon
Luminant Power
1601 Bryan Street
Dallas, Texas 75201

via Email

RE: Responses to Modeling Protocol Comments
Permit Nos. 110357, PSD-TX-1452
Tradinghouse Power Company LLC
Tradinghouse Steam Electric Station (THSES)
Regulated Entity Number RN102566494

Dear Mr. Coon:

Zephyr Environmental Corporation (Zephyr) has prepared the enclosed responses to the Texas Commission on Environmental Quality (TCEQ) Air Dispersion Modeling Team comments regarding the September 2015 Modeling Protocol received in Mr. Matthew Kovar's October 20, 2015 email message. These items were discussed and clarified with Mr. Kovar, Mr. Marc Sturdivant, and Mr. Jeremy Halland in a February 3, 2016 telephone conference. Based on the protocol comments, responses are required for the items corresponding to Section 5.2, 6.4.10 and 6.4.13 of the protocol. Responses to these comments follow. Responses are also being provided for the comments corresponding to Sections 7.2.1 and 7.4 of the protocol. All other comments will be addressed within the Air Quality Analysis (AQA). Additionally, a revised protocol Section 5.1 is included with this submittal as discussed below.

If you have any further questions on this issue, please contact me at (512) 579-3820 or at dcastro@zephyrenv.com.

Sincerely,
Zephyr Environmental Corporation

David L. Castro
Project Engineering Associate

Enclosure

cc: Mr. Jeremy Halland, Luminant Power, w/enclosure
Mr. Larry Moon, P.E.; Zephyr Environmental Corporation, w/enclosure

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Responses to TCEQ Comments

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5.1 Available Background Concentrations – No TCEQ comments were provided for modeling protocol Section 5.1. The following discussion addresses recent revisions that have been made to this section.

The September 2015 modeling protocol included background concentration estimates based on 2012 through 2014 monitor data. Monitor data for 2015 is now available for all criteria pollutants. 2015 monitor data is not yet available for speciated $PM_{2.5}$. The criteria pollutant background concentrations have been updated using 2013 through 2015 monitor data in the revised modeling protocol Section 5.1 included with this submittal.

Tradinghouse is proposing the use of Waco Mazanec monitoring station data for background $PM_{2.5}$ concentrations. The Arlington Municipal Airport was originally proposed for background $PM_{2.5}$ concentrations. Previously, the Waco Mazanec monitor could not be proposed for use because the 2012 $PM_{2.5}$ data did not meet the EPA definition of completeness. The 2013 through 2015 Waco Mazanec $PM_{2.5}$ data does meets the EPA requirements. The Waco Mazanec monitoring station is located within the same county and is just 13 km from the THSES. The representativeness of the Waco Mazanec $PM_{2.5}$ monitoring station is discussed further in the revised Section 5.2 included with this submittal.

5.2 Representativeness of the Selected Monitoring Stations *- The proposed Dallas Hinton monitor is not appropriate to use for the analysis of secondary $PM_{2.5}$ emissions. The emissions of $PM_{2.5}$ precursors in Dallas County are much higher than the emissions in the air shed where the project site is located; therefore, the monitor would not be representative of the $PM_{2.5}$ speciation in the area where the project site is located. Please identify another monitor that is located in an area more representative of the project site and provide documentation and justification in a revised protocol.*

Response: We agree that emissions of $PM_{2.5}$ precursors from Dallas County are much higher than emissions of $PM_{2.5}$ precursors within the THSES area. Therefore, the Dallas Hinton monitor offers conservative estimates for the $PM_{2.5}$ precursors at the THSES. Tradinghouse proposes to demonstrate that, using these conservative $PM_{2.5}$ precursor estimates, the expected secondary $PM_{2.5}$ formation associated with the project is not expected to be significant at any location.

As discussed in our February 3rd telephone conference call, Tradinghouse reviewed and considered all ambient air monitors in Texas that sample speciated $PM_{2.5}$ (nitrates and sulfates) for use in this analysis. Guidance from Appendix D of the TCEQ's Air Quality Modeling Guidelines, PPDG 6232, April 2015 (AQMG) was applied at each monitoring location to determine the potential representativeness of each monitor for this project. The locations for several potential monitors do not meet the county population requirements or the county $PM_{2.5}$ precursor emissions requirements of the TCEQ guidance. The Dallas Hinton monitoring location meets and exceeds the TCEQ representativeness requirements and provides conservative $PM_{2.5}$ precursors estimates. Additional details regarding the review of statewide secondary $PM_{2.5}$ monitors for the

monitor selection have been included in the revised modeling protocol Section 5.2 included with this submittal.

6.4.10 Long-term Emissions *- The proposed model scenarios 4, 5, and 6 include startup/shutdown operations, simple cycle operations, and combined cycle operations at various load levels. Section 6.4.4 of the protocol includes a discussion on several load levels for simple cycle operations. However, the protocol does not specify which simple cycle load levels will be evaluated for scenarios 4, 5, and 6. Please provide a revised protocol that discusses how the load levels for simple cycle operations will be evaluated in the annual averaging time analysis.*

In addition, for each of the six scenarios, please explain in more detail how the startup/shutdown operations will be evaluated. Section 6.4.5 of the protocol lists several scenarios for startup/shutdown operations.

Response: The short-term analyses described in Section 6.4.4 included the modeling of each turbine units using the short-term emissions associated with three simple cycle load levels and three combined cycle load levels (for each turbine vendor). The short-term analyses described in Section 6.4.5 included the modeling of each turbine units using the short-term emissions associated with three turbine startup/shutdown operations (for each turbine vendor). The maximum modeling result from any of the modeled short-term scenarios will be reported.

Section 6.4.10 of the protocol describes the annual modeling analyses. In order to obtain accurate annual modeling results, annual emissions corresponding to each turbine's startup/shutdown, simple cycle operations and combined cycle operations will be modeled separately using appropriate exhaust parameters. However, these separate annual impacts will be combined within AERMOD by including each applicable annual source within the same modeling source group.

The annual startup/shutdown emissions will be conservatively modeled using a single long-term source group and the worst-case exhaust parameters from the three short-term startup/shutdown modeling scenarios. The annual simple cycle emissions will be conservatively modeled using a single long-term source group and the worst-case exhaust parameters from the three short-term simple cycle modeling scenarios.

To obtain accurate annual modeling results, the annual combined cycle emissions will be modeled using six annual modeling scenarios. Three of these annual combined cycle scenarios correspond to there being no simple cycle operations during the entire year. The annual emissions associated with the combined cycle turbines operating at base load the entire year, 80% load the entire year, and reduced load the entire year will each be modeled with the corresponding annual startup/shutdown emissions (as described above). Three additional annual combined cycle scenarios correspond to the proposed simple cycle operations along with the proposed combined cycle operation within the same year. The annual emissions associated with the combined cycle turbines operating at base load the entire year, 80% load the entire year, and

reduced load the entire year will each be modeled with the corresponding annual startup/shutdown emissions (as described above) and the simple cycle annual emissions (as described above).

The modeling protocol Section 6.4.10 included with this submittal has been revised to include the clarification offered within this response.

6.4.13 $PM_{2.5}$ Emissions *- As noted in section 5.2, the proposed Dallas Hinton monitor is not appropriate to use for the analysis of secondary $PM_{2.5}$ emissions. Please provide a revised analysis in a revised protocol utilizing monitor data more representative of the air shed where the project site is located.*

Response: As noted in the Section 5.2 response above, Tradinghouse reviewed and considered all ambient air monitors in Texas that sample speciated $PM_{2.5}$ (nitrates and sulfates) for use in this analysis. Tradinghouse believes that the Dallas Hinton monitoring location meets and exceeds the TCEQ representativeness requirements and provides conservative $PM_{2.5}$ precursors estimates for the THSES location.

7.2.1 SIL Justification Analysis *- The applicant should review the procedures for justifying the SILs for PSD Increment in Appendix A of the TCEQ's Air Quality Modeling Guidelines (APDG 6232). The proposed monitor may not be appropriate given the distance from the project site; the monitor used in the justification should account for increment consuming sources in the vicinity of the project site. If justification for the $PM_{2.5}$ SILs is not provided for the Increment analysis, the applicant will need to search and identify all major sources of $PM_{2.5}$ that have increment consuming emissions (related to the $PM_{2.5}$ major source baseline date [October 20, 2010]), as well as minor sources that have increment consuming emissions (related to the minor source baseline date for McLennan County [March 16, 2015]). Be sure to document how this information was obtained in the AQA.*

In addition, the justification for the use of the SILs is not appropriate for limiting the PSD Increment analysis to the significant receptors. The PSD Increment analysis could be limited to the significant receptors provided that the magnitude and location of the increment affecting emissions are evaluated relative to the proposed project. If nearby increment affecting emissions are small and distant relative to the project site, then a case could be made for limiting the analysis to the significant receptors.

Response: Based on newly available 2015 monitoring data, Tradinghouse proposes the use of the Waco Mazanec monitoring station for $PM_{2.5}$ background concentrations. As discussed in Section 5.2 of the revised protocol, the Waco Mazanec monitoring station is located within the same air shed and is only 13 km from the THSES. Tradinghouse believes that $PM_{2.5}$ background data from this monitor is appropriated for use in both a $PM_{2.5}$ NAAQS SIL justification analysis and a $PM_{2.5}$ PSD increment SIL justification analysis. Therefore, the EPA $PM_{2.5}$ SIL values will be used to define the scope of the full impact PSD increment consumption modeling analysis.

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As stated in Section 6.2.2.2 of the modeling protocol, Tradinghouse will identify all major sources that have increases in $PM_{2.5}$ emissions on the major source baseline date and all minor sources that have increases in $PM_{2.5}$ emissions on the minor source baseline date for inclusion in the full impact PSD increment consumption modeling analysis.

7.4 Modeling Approach – Ozone Analysis *- The protocol notes that reported emissions data for McLennan County indicate the project area is NOx-limited. The method for determining if the project area is NOx-limited or VOC-limited should be based on ambient concentrations in the area and not from county emissions inventories.*

Please note the new eight-hour ozone standard of 70 parts per billion (ppb) will be in effect 60 days after publication of the final rule in the federal register.

In addition, be sure that the AQA describes the proposed modeling approach rather than just referencing the TCEQ guidance.

Response: Tradinghouse acknowledges that the applicable ozone standard is 70 ppb and is a three-year average of the 4th highest daily maximum 8-hour value.

Tradinghouse has recently revised the proposed THSES ozone analysis approach. The revised approach is discussed in detail in the revised modeling protocol Section 7.4 included with this submittal.

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5.0 AIR QUALITY MONITORING DATA

Estimates for the current ambient air background concentrations at the proposed project site may be required for two distinct and separate purposes: (1) to demonstrate that the ambient air concentrations of PSD-significant pollutants are currently in compliance with the NAAQS and (2) for use in a full impact NAAQS modeling analysis. Tradinghouse proposes to use ambient air quality data from existing air quality monitoring stations to establish background concentrations for these contaminants.

5.1 AVAILABLE BACKGROUND CONCENTRATIONS

Based on a review of the TCEQ's *Air Quality Data* websites (https://www.tceq.texas.gov/cgi-bin/compliance/monops/select_year.pl and http://www17.tceq.texas.gov/tamis/index.cfm) and the EPA's *AirData* website (http://www.epa.gov/air/data/), Tradinghouse proposes using data collected at the following monitor stations to establish representative background concentrations to be used in the NAAQS compliance demonstrations:

- NO_2 – Waco Mazanec [Continuous Air Monitoring Station (CAMS) 1037, EPA ID 48-309-1037]
- CO – Waco Mazanec [CAMS 1037, EPA ID 48-309-1037]
- SO_2 – Waco Mazanec [CAMS 1037, EPA ID 48-309-1037]
- PM_{10} – Stage Coach (EPA ID 48-439-3010)
- $PM_{2.5}$ (total) – Waco Mazanec [CAMS 1037, EPA ID 48-309-1037]
- $PM_{2.5}$ Nitrates – Dallas Hinton (CAMS 60, EPA ID 48-113-0069)
- $PM_{2.5}$ Sulfates – Dallas Hinton (CAMS 60, EPA ID 48-113-0069)
- O_3 – Waco Mazanec [CAMS 1037, EPA ID 48-309-1037]

The appropriateness of using data from these monitoring stations to establish background concentrations is discussed in Section 5.2.

Guidance from the TCEQ's *AQMG* was followed in selecting the form of the monitored concentration for each pollutant and averaging period. The proposed background concentrations are summarized in Table 5-1.

These background concentration estimates were calculated based on hourly data obtained from the TCEQ. Following guidance received from the TCEQ Modeling Staff (for a previous analysis): (1) the calculations include hourly data from days that do not meet EPA's definition of completeness and (2) no rounding was conducted at any step of the calculations. Therefore, the calculated concentration values are more conservative than values that may be available elsewhere.

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Table 5-1
Proposed Background Concentrations

Contaminant	Monitor Station	County	Averaging Period	Concentration ($\mu g/m^3$)	Form
NO_2	Waco Mazanec	McLennan	1-Hour	44.7	3-Year Average of 98th Percentiles of the Daily 1-Hour Maximums 2013-2015
			Annual	5.30	1st High, 2015
CO	Waco Mazanec	McLennan	1-Hour	458	2nd High, 2015
			8-Hour	415	2nd High, 2015
SO_2	Waco Mazanec	McLennan	1-Hour	17.4	3-Year Average of 99th Percentiles of the Daily 1-Hour Maximums 2013-2015
			3-Hour	14.0	2nd High, 2015
			24-Hour	4.25	2nd High, 2015
			Annual	0.933	1st High, 2015
PM_{10}	Stage Coach	Tarrant	24-Hour	63.0	2nd High, 2013-2015
$PM_{2.5}$	Waco Mazanec	McLennan	24-Hour	20.6	3-Year Average of 98th Percentiles of the Daily Maximums, 2013-2015
			Annual	7.93	3-Year Average of 1st Highs 2013-2015
$PM_{2.5}$ Nitrates	Dallas Hinton	Dallas	24-Hour	8.17	1st High, 2012-2014*
			Annual	1.19	3-Year Average of Daily Averages 2012-2014*
$PM_{2.5}$ Sulfates	Dallas Hinton	Dallas	24-Hour	9.30	1st High, 2012-2014*
			Annual	2.04	3-Year Average of Daily Averages 2012-2014*
O_3	Waco Mazanec	McLennan	8-Hour	67 ppb	3-Year Average of 4th Highest Daily Maximum 8-Hour 2013-2015

* 2015 data not yet available

Except for SO_2 and $PM_{2.5}$, the proposed monitor data meet the EPA requirements for completeness for all ambient air concentrations.

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The Waco Mazanec monitor SO_2 data includes one calendar quarter that does not meet the EPA completeness guidelines for the 1-hour concentration. Therefore, the EPA substitution test described in Appendix T to 40 CFR Part 50 was conducted. The Waco Mazanec monitor station $PM_{2.5}$ data includes one calendar quarter that does not meet the EPA completeness guidelines for the 24-hour and annual concentrations. Therefore, the EPA substitution test described in Appendix N to 40 CFR Part 50 was conducted. For these pollutants, calendar quarters that do not meet the EPA completeness guidelines were identified. For each identified quarter, the highest reported daily maximum value from the three-year period was determined. All daily maximum values from all days in the quarter of interest were considered, even those from days with less than 75 percent data capture. For each calendar quarter that did not meet the EPA completeness guidelines, the daily maximum value for that quarter was then substituted for all days with less than 75 percent data capture – making that adjusted quarter 100% complete. The 3-year "test design value" was then compared to the applicable standard.

The SO_2 and $PM_{2.5}$ "test design values" are less than the NAAQS. Therefore, the primary standard design values are deemed to have passed the diagnostic test and are valid. The Waco Mazanec monitor can be used to represent background 1-hour SO_2, 24-hour $PM_{2.5}$ and annual $PM_{2.5}$ concentrations for the NAAQS analyses. As stated in Appendices T and N to 40 CFR Part 50, the applicable 3-year design value is based on the actual reported data and not the "test design value" obtained using the substitution test.

Electronic copies of the ambient air concentration calculations are included in Attachment 7 of this submittal.

5.2 REPRESENTATIVENESS OF THE SELECTED MONITOR STATIONS

Following guidance contained in TCEQ's *AQMG* and *Background Concentration Determination for Use in NAAQS Analyses* (September 2, 1998) and EPA's *Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD), EPA-450/4-87-007* (May 1987); Tradinghouse concludes, as described below, that the air quality monitoring data used to establish background concentrations is representative of the area around the THSES.

Each of the proposed monitoring stations are located outside of the "same general area" of the THSES. However, the Waco Mazanec monitoring station is located in McLennan County, 14 kilometers from the THSES and is just outside the "same general area." In accordance with TCEQ modeling guidance for demonstrating conservative representativeness of data collected at the McLennan monitor, the magnitudes of reported emissions within 10 km of the Waco Mazanec monitor and THSES were compared. In accordance with TCEQ modeling guidance for demonstrating conservative representativeness of data collected at the monitors located outside of McLennan County, county population and county air emissions data was compiled and compared with McLennan County. Additionally, the magnitudes of reported emissions within 10 km of these monitor sites and THSES were compared.

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5.2.1 Topography

THSES and the three monitor locations share similar topography. The area surrounding each location (within several kilometers) is relatively flat.

5.2.2 Population Density

Population estimates were obtained from the United States Census Bureau for year 2014 (http://quickfacts.census.gov/qfd/index.html). The population data for McLennan, Tarrant, and Dallas counties is summarized in Table 5-2.

Table 5-2
Population Comparison Analysis

County	Monitored Pollutants of Interest In County	Population Estimate for year 2014
McLennan	NO_2, CO, SO_2, $PM_{2.5}$, O_3	243,441
Tarrant	PM_{10}	1,945,360
Dallas	NO_X (for $PM_{2.5}$ Nitrates), SO_2 (for $PM_{2.5}$ Sulfates)	2,518,638

This population data is discussed in Section 5.2.4.

5.2.3 County-Wide and Nearby Source Emissions

Air emission rate data for McLennan, Tarrant and Dallas counties were obtained from the EPA National Emissions Inventory (NEI) Database through the EPA *AirData* website (http://www.epa.gov/airdata/). The data provides estimates of the point source and non-point/mobile source emissions in each county. The total air emissions for each county are summarized in Table 5-3.

Table 5-3
Comparison of County-Wide Air Emissions

County	Location	County-wide Air Emission Estimates (tpy) (EPA 2011 NEI Data)					
		NOx	CO	PM_{10}	$PM_{2.5}$	SO_2	VOC
McLennan	THSES & Waco Mazanec	11,686	43,165	28,666	4,248	1,305	8,352
Tarrant	Stage Coach	44,678	198,712	35,075	6,343	1,689	42,563
Dallas	Dallas Hinton	51,073	285,313	56,019	9,372	2,278	48,693

Reported emissions from stationary sources located within 10 km of each site were obtained from the TCEQ point source emissions inventory (EI) database workbook (2013statesum.xlsx) for the year 2013. Reported emissions within 10 km of each site are summarized in Table 5-4. Detailed emission rate information is provided in Attachment 3.

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Table 5-4
Comparison of Emissions from Stationary Sources Located within 10 Km

Location	CAMS	County	Air Emission Estimates for 2013 (tpy)				
			NOx	CO	PM_{10}	$PM_{2.5}$	SO_2
THSES	-	McLennan	2.3	12.2	5.6	1.1	0.4
Waco Mazanec	1037	McLennan	9.3	26.9	-	7.6	0.4
Stage Coach	-	Tarrant	-	-	29.3	-	-
Dallas Hinton	60	Dallas	-	-	-	-	-

This emissions data is discussed in Section 5.2.4.

5.2.4 Representativeness Analyses

The Waco Mazanec monitoring station is located within the same county as the THSES. Emissions of NO_X, CO, SO_2 and $PM_{2.5}$ from stationary sources located within 10 km of the Waco Mazanec monitoring station are equal to, or greater than, those found within 10 km of the THSES. Therefore, the Waco Mazanec monitoring station offers conservative estimates for background NO_2, CO, SO_2 and $PM_{2.5}$ at the THSES location.

O_3 is formed through photochemical reactions involving the emission of precursor compounds such as NO_X and VOC. These chemical transformations occur in the atmosphere gradually over time. Due to the required formation distances, comparison of nearby (i.e. within 10 km of the monitoring station) ozone precursor emissions (i.e. NO_X and VOC) is not appropriate. The Waco Mazanec monitoring station is approximately 13 km from the THSES and is located within the same air shed as the THSES. Therefore, the Waco Mazanec monitoring station offers appropriate estimates for background O_3 at the THSES location.

Tarrant County has significantly greater population than McLennan County. Air emissions associated with population density (e.g. automobile traffic) near the Stage Coach monitor are greater than the emissions associated with population density in McLennan County. PM_{10} emissions within Tarrant County are significantly greater than those found in McLennan County. Additionally, reported PM_{10} emissions from stationary sources located within 10 km of the Stage Coach monitoring station are greater than those found within 10 km of the THSES. Therefore, the Stage Coach monitoring station offer conservative estimates for background PM_{10} at the THSES location.

Tradinghouse reviewed and considered all ambient air monitors in Texas that sample speciated $PM_{2.5}$ (nitrates and sulfates) for use in this analysis. Guidance from Appendix D of the TCEQ's Air Quality Modeling Guidelines, PPDG 6232, April 2015 (AQMG) was applied at each monitor location to determine the potential representativeness of each monitor for this project. A table summarizing these monitoring stations, the population of the counties that each monitor is located in and the countywide emissions of $PM_{2.5}$ and $PM_{2.5}$ precursors (NO_X and SO_2) is provided as

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Attachment 8. A discussion regarding the potential representativeness of these monitors are as follows:

- The nearest monitor with $PM_{2.5}$ nitrates and $PM_{2.5}$ sulfates data is the Midlothian OFW monitor in Ellis County. However, the population of Ellis County is much lower than that of McLennan County. Secondary $PM_{2.5}$ emissions associated with population density (e.g. automobile traffic) from this monitor will not be similar to those expected in McLennan County. For this reason, TCEQ modeling staff did not allow this monitor's use as a representative speciated $PM_{2.5}$ monitor for a recent AQA conducted for a nearby power generating facility by the applicant.
- The population of Harrison County where the Karnack monitoring station is located is even less than that of Ellis County. Additionally, the $PM_{2.5}$ emissions within Harrison County are less than those in McLennan County. This monitor is not representative of the THSES location for these reasons.
- The population of Harris County where the Houston Aldine and Houston Deer Park #2 monitoring stations are located is much greater than that in McLennan County. Additionally, the countywide precursor emissions are much greater than that of McLennan County. The population and emissions associated with the proposed Dallas Hinton monitor are more representative of the THSES location.
- The countywide precursor emissions in El Paso county where the El Paso Chamizal monitoring station is located are less than those in McLennan County. This monitor is not representative of the THSES location for this reason.
- The population and emissions in Nueces County were the Dona Park monitoring station are similar to that of McLennan County. However, this monitor is located in a costal are near an industrial shipping channel. The topography and types of emission sources near this monitor are not representative of the THSES location for this reason.
- The Dallas Hinton and Convention Center monitors are located in Dallas County. The population and precursor emission in Dallas County are greater than those in McLennan County. Both monitors provide representative and conservative estimates for the precursor emissions at the THSES location. The Dallas Hinton monitor was approved for use in representing secondary $PM_{2.5}$ emissions for the Eagle Mountain Steam Electric Station AQA and the DeCordova Steam Electric Station AQA that were submitted by the applicant. Tradinghouse proposes the use of the Dallas Hinton monitoring station for conservative estimates of $PM_{2.5}$ nitrates and $PM_{2.5}$ sulfates background concentrations.

Dallas County has significantly greater population than McLennan County. Secondary $PM_{2.5}$ emissions associated with population density (e.g. automobile traffic) near the Dallas Hinton monitor are greater than the emissions associated with population density in McLennan County. Secondary $PM_{2.5}$ emissions are formed through the emission of gaseous compounds such as SO_2 and NO_X. Portions of these gaseous emissions can form fine particulates in the atmosphere through chemical reactions or condensation. These chemical transformations occur in the atmosphere gradually over time (hours or days depending on atmospheric conditions and other

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variables). Therefore, secondary $PM_{2.5}$ impacts are expected to occur at some distance from the source of its gaseous emission precursors. Due to the required formation distances, comparison of nearby SO_2 and NO_X emissions (i.e. within 10 km) is not appropriate. County-wide emissions are proposed as an appropriate air shed comparison. As shown on Table 5-3, the SO_2 and NO_X air emissions within Dallas County are greater than those within McLennan County. Therefore, the Dallas Hinton monitoring station offers conservative estimates for $PM_{2.5}$ nitrates and $PM_{2.5}$ sulfates background concentrations.

Based on the discussion presented above concerning the topography, population density, county-wide emissions, and the stationary source emissions in the vicinity of monitor locations and source location, ambient air monitoring data from the Waco Mazanec, Stage Coach and Dallas Hinton monitoring stations are conservative, representative and appropriate for use as conservative background concentration estimates for the THSES location.

5.3 PSD AMBIENT MONITORING REQUIREMENT

The *New Source Review Workshop Manual-Prevention of Significant Deterioration and Nonattainment Area Permitting; USEPA, Draft October 1990* (page C.16) states that continuous ambient monitoring data may be required unless "either (1) the predicted ambient impact, i.e., the highest modeled concentration for the applicable averaging time, caused by the proposed significant emissions increase (or significant net emissions increase), or (2) the existing ambient pollutant concentrations, are less than the prescribed significant monitoring value" (i.e. SMC value).

On January 22, 2013, the United States Court of Appeals for the District of Columbia Circuit granted a request from the EPA to vacate and remand to the EPA the portions of two PSD $PM_{2.5}$ rules [40 CFR 51.166(k)(2) and 40 CFR 52.21(k)(2)] addressing select provisions of the $PM_{2.5}$ Significant Impact Levels (SILs) so that the EPA could voluntarily correct an error in these provisions. The EPA amended its regulations and removed the vacated $PM_{2.5}$ SILs effective December 9, 2013 – requiring all applicants to compile $PM_{2.5}$ monitoring data.

The proposed project will emit PSD-significant amounts of $PM_{2.5}$. As discussed above, data collected at the Waco Mazanec monitoring station offer conservative estimates of the background $PM_{2.5}$ concentrations for the area. Therefore, Tradinghouse proposes to utilize existing data from this ambient air monitoring station in lieu of performing pre-construction $PM_{2.5}$ monitoring.

The proposed project will also emit PSD-significant amounts of NO_2, SO_2, CO, PM_{10} and O_3. Data collected at the Waco Mazanec and Stage Coach monitoring stations offer conservative estimates of the background concentrations for the area. Therefore, Tradinghouse proposes to utilize existing data from these ambient air monitoring stations in lieu of performing pre-construction monitoring for any pollutant with project-related modeling results greater than the SMC values.

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6.4.10 Long-term Emissions

Annual emission rate estimates for the GE 7FA.05 and Siemens SGT6-5000F(5)ee turbines were conservatively calculated in the permit amendment application assuming: (1) year round operation under combined cycle mode and (2) maximum allowed annual operations under simple cycle mode with the remainder of the year under combined cycle mode. Additionally, the proposed combined cycle and simple cycle annual emission rates vary between the currently authorized CTGs 1 and 2 and the newly proposed CTGs 3 and 4.

In order to obtain conservative yet realistic modeling results, six modeling scenarios will be utilized for the annual analysis of each of the proposed turbine models.

- Annual Scenario 1 – Annual average startup/shutdown emissions (when applicable) will be modeled using the worst-case stack parameters from the three short-term startup/shutdown modeling scenarios. Within the same modeling run, the turbine will also be modeled using the annual average emissions associated with 100% combined cycle load operations for the remaining number of hours per year available (considering the startup/shutdown operations). These annual combined cycle emissions will be modeled using the stack parameters corresponding to 100% load operations.
- Annual Scenario 2 – Annual average startup/shutdown emissions (when applicable) will be modeled using the worst-case stack parameters from the three short-term startup/shutdown modeling scenarios. Within the same modeling run, the turbine will also be modeled using the annual average emissions associated with 80% combined cycle load operations for the remaining number of hours per year available (considering the startup/shutdown operations). These annual combined cycle emissions will be modeled using the stack parameters corresponding to 80% load operations.
- Annual Scenario 3 – Annual average startup/shutdown emissions (when applicable) will be modeled using the worst-case stack parameters from the three short-term startup/shutdown modeling scenarios. Within the same modeling run, the turbine will also be modeled using the annual average emissions associated with reduced combined cycle load operations (i.e. 55% load for GE and 50% load for Siemens) for the remaining number of hours per year available (considering the startup/shutdown operations). These annual combined cycle emissions will be modeled using the stack parameters corresponding to reduced load operations.
- Annual Scenario 4 – Annual average startup/shutdown emissions (when applicable) will be modeled using the worst-case stack parameters from the three short-term startup/shutdown modeling scenarios. Within the same modeling run, the turbine will also be modeled using the annual average emissions associated with simple cycle load operations for the number of simple cycle hours currently allowed by permit (for CTGs 1 and 2) and newly proposed (for CTGs 3 and 4). The annual simple cycle emissions will be modeled using the worst-case stack parameters from the three short-term simple cycle modeling scenarios. Within the same modeling run, the turbine will also be modeled using the annual average emissions associated with 100% combined cycle load operations for

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the remaining number of hours per year available (considering the startup/shutdown and simple cycle mode operations). These annual combined cycle emissions will be modeled using the stack parameters corresponding to 100% load operations.

- Annual Scenario 5 – Annual average startup/shutdown emissions (when applicable) will be modeled using the worst-case stack parameters from the three short-term startup/shutdown modeling scenarios. Within the same modeling run, the turbine will also modeled using the annual average emissions associated with simple cycle load operations for the number of simple cycle hours currently allowed by permit (for CTGs 1 and 2) and newly proposed (for CTGs 3 and 4). The annual simple cycle emissions will be modeled using the worst-case stack parameters from the three short-term simple cycle modeling scenarios. Within the same modeling run, the turbine will also be modeled using the annual average emissions associated with 80% combined cycle load operations for the remaining number of hours per year available (considering the startup/shutdown and simple cycle mode operations). These annual combined cycle emissions will be modeled using the stack parameters corresponding to 80% load operations.
- Annual Scenario 6 – Annual average startup/shutdown emissions (when applicable) will be modeled using the worst-case stack parameters from the three short-term startup/shutdown modeling scenarios. Within the same modeling run, the turbine will also be modeled using the annual average emissions associated with simple cycle load operations for the number of simple cycle hours currently allowed by permit (for CTGs 1 and 2) and newly proposed (for CTGs 3 and 4). The annual simple cycle emissions will be modeled using the worst-case stack parameters from the three short-term simple cycle modeling scenarios. Within the same modeling run, the turbine will also be modeled using the annual average emissions associated with reduced combined cycle load operations (i.e. 55% load for GE and 50% load for Siemens) for the remaining number of hours per year available (considering the startup/shutdown and simple cycle mode operations). These annual combined cycle emissions will be modeled using the stack parameters corresponding to reduced load operations.

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7.2.1 SIL Justification Analysis

On January 22, 2013, the United States Court of Appeals for the District of Columbia Circuit granted a request from the EPA to vacate and remand to the EPA the portions of two PSD $PM_{2.5}$ rules [40 CFR 51.166(k)(2) and 40 CFR 52.21(k)(2)] addressing select provisions of the $PM_{2.5}$ SILs so that the EPA could voluntarily correct an error in these provisions. The EPA amended its regulations and removed the vacated $PM_{2.5}$ SILs effective December 9, 2013.

The Federal rule that defines when a major source or major modification is considered to cause or contribute to a violation of a NAAQS [40 CFR 51.165(b)(2)] was not vacated in the January 22, 2013 decision or December 9, 2013 amendment. In the EPA's *Circuit Court Decision on $PM_{2.5}$ Significant Impact Levels and Significant Monitoring Concentrations, Questions and Answers, March 4, 2013* document, the EPA states that applicants can continue to demonstrate that proposed $PM_{2.5}$ emissions do not contribute to existing violations of the NAAQS by demonstrating that the proposed source's $PM_{2.5}$ impacts do not "significantly" contribute to existing $PM_{2.5}$ NAAQS violations. In support of this requirement, the difference between the $PM_{2.5}$ NAAQS and the representative modeling background concentrations are summarized in Table 7-1.

Table 7-1
NAAQS SIL Justification

POLLUTANT	AVERAGING PERIOD	NAAQS (µg/m³)	MONITORING CONCENTRATION (µg/m³)	DIFFERENCE (µg/m³)	SIGNIFICANT IMPACT LEVEL (SIL) (µg/m³)
$PM_{2.5}$	24-Hour	35	20.6	14.4	1.2
	Annual	12	7.93	4.07	0.3

The differences between the NAAQS and the current ambient air monitor concentrations are far greater than the EPA SIL values for all pollutants and averaging periods. The EPA states that it would be sufficient in most cases for permitting authorities to conclude that a proposed source with a predicted impact below the EPA SIL value will not cause or contribute to a violation of the NAAQS. Based on this EPA guidance, the proposed THSES emissions will not contribute significantly to existing ambient air concentrations at locations where the project-related impacts are less than the EPA SILs. Therefore, the EPA SILs were utilized to define the scope of the full impact modeling analyses.

Guidance from TCEQ's *AQMG* (Appendix A) regarding $PM_{2.5}$ SIL justification for use in PSD increment consumption analyses was followed. The PSD increment consumption limit was conserved with a conservative estimate for the amount of increment consumed between the major source baseline year and the most recent year of available data from the representative monitoring station. The analysis is conservative since the monitoring data includes impacts from non-increment consuming sources in addition to increment consuming sources. The results of this comparison are provided in Table 7-2. Note that monitoring data indicated a decrease in annual $PM_{2.5}$ concentrations since the major source baseline year. An annual value of zero was conservatively utilized in the justification analysis for the annual $PM_{2.5}$ SIL.

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Table 7-2
PSD Increment SIL Justification for $PM_{2.5}$

POLLUTANT	AVERAGING PERIOD	PSD INCREMENT CONSUMPTION LIMIT (µg/m³)	INCREMENT CONSUMED 2010 TO 2015* (µg/m3)	DIFFERENCE (µg/m³)	SIGNIFICANT IMPACT LEVEL (SIL) (µg/m³)
$PM_{2.5}$	24-Hour	9	0.47	8.53	1.2
	Annual	4	0	4	0.3

* Conservative estimates based on highest monitored values (H1H).

The differences between the $PM_{2.5}$ PSD increment consumption limits and the current ambient air monitor $PM_{2.5}$ concentrations are far greater than the EPA $PM_{2.5}$ SIL values for both averaging periods. The TCEQ states that it would be sufficient in most cases to conclude that a proposed source with a predicted impact below the EPA $PM_{2.5}$ SIL values will not cause or contribute to a violation of the PSD increment consumption limits. Based on this TCEQ guidance, the proposed THSES $PM_{2.5}$ emissions will not contribute significantly to existing ambient air concentrations at locations where the project-related impacts are less than the EPA SILs. Therefore, the EPA SILs will be utilized to define the scope of the full $PM_{2.5}$ increment consumption analyses.

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7.4 MODELING APPROACH – OZONE ANALYSIS

The potential impacts from the Project on the ozone concentration in area will be evaluated using a qualitative assessment. The two-part qualitative assessment will include an assessment of the current air quality in the area and an analysis of the Project's potential ozone impact.

7.4.1 Assessment of Current Air Quality

As discussed in Section 5, the current ozone design value monitored at the Waco Mazanec CAMS1037 for McLennan County is 67 ppb. The monitored values have steadily decreased for the past several years, and demonstrate the area is in attainment of the 2015 8-hour Ozone NAAQS of 70 ppb.

As suggested in the *draft AQMG*, a determination was made whether the project county was VOC-limited or NO_X-limited. The calculation of the VOC-to-NO_X ratio is provided on the table included as Attachment 6. The VOC-to-NO_x ratio for McLennan County is greater than 2:1. The VOC emissions in the Project area are dominated by biogenic VOCs. The VOC-to-NO_X ratio identified ensures that there will be enough VOC available to create ozone, and that the ozone formed in the area will be limited by the available NO_X emissions. Therefore, the project area is determined to be NO_X-limited. As a NO_X-limited area, the contribution from the Project to ozone formation will be evaluated based on the Project increase in NO_X emissions.

7.4.2 Analysis of Project's Potential Ozone Impact

The Heart of Texas Council of Governments (HOTCOG) 6-county area includes McLennan, Bosque, Hill, Falls, Limestone and Freestone Counties. Over the past few years, HOTCOG has funded work with Ramboll Environ US Corporation (Ramboll Environ) to study the sources of ozone and to assist the area in developing plans to reduce emissions of ozone precursors in the area. In December 2015, a final report was submitted to TCEQ which evaluated ozone formation in the Waco HOTCOG area, as well as the potential ozone impacts of newly-permitted and proposed new electric generating units in McLennan County, TX. An electronic copy of the *Final Report: Photochemical Modeling of June 2012 for the Heart of Texas Council of Government Area, Sue Kemball-Cook et al, Ramboll Environ US Corporation, December 2015* is provided in Attachment 7.

Ramboll Environ used the Comprehensive Air Quality Model with Extensions (CAMx) photochemical grid model base files developed by the TCEQ for Texas Near-Nonattainment Areas. Ramboll Environ performed photochemical modeling to evaluate the potential ozone impact of emissions from the permitted/proposed Tradinghouse and Lake Creek EGUs and ancillary facilities. The modeling report provides results for both the Waco Mazanec monitor location and at the grid cell with the maximum change in ozone concentration. Tradinghouse will use the Ramboll Environ photochemical modeling results to estimate the potential ozone impact from the Project. Since the report identifies the maximum 8-hour average impact (MDA8) in lieu

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of the 4th highest daily maximum 8-hour average impact (i.e., the design value), the modeling report's estimated impact represents an extremely conservative estimate of the potential ozone impact from the Project. These results will be added to the representative background concentration for the site to demonstrate that the total concentration will remain well below the NAAQS.

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Sent: Thur 4/7/2016 5:57:18 PM
Subject: Second Modeling Protocol - 7186 Invista s.a r.l
Second Modeling Protocol - 7186 Invista s.a r.l.docx
Revised INVISTA PSD Modeling Protocol for ADN 2016-0404.pdf

Ashley,

Attached are the revised modeling protocol submitted by Invista S A R L (permit No. 7186) and TCEQ comments on the revised modeling protocol.

Please let me know if you have any question.

Regards,

Ahmed Omar

TCEQ, Air Permits Division

Air Dispersion Modeling Team

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AIR QUALITY PSD MODELING PROTOCOL

INVISTA S.à r.l.

INVISTA™

Victoria Plant
Victoria County, Texas
NSR Permit No. 7186

Adiponitrile Unit

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Revised April 2016

Project 144402.0045

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1. EXECUTIVE SUMMARY

INVISTA S.à r.l. (INVISTA) owns and operates a synthetic organic chemical manufacturing plant in Victoria, Victoria County, Texas (Victoria Plant). INVISTA has been assigned Texas Commission on Environmental Quality (TCEQ) Costumer Number (CN) 602582231. Additionally, the Victoria Plant has been assigned TCEQ Air Quality Account No. VC-0008-Q and Regulated Entity Number (RN) 102663671. The Adiponitrile (ADN) Unit at the Victoria Plant is authorized under TCEQ New Source Review (NSR) Permit No. 7186.

The Victoria Plant is located in Victoria County, which is currently classified as "attainment/ unclassifiable" or "attainment (maintenance)" for all criteria pollutants with respect to compliance with the National Ambient Air Quality Standards (NAAQS).[1] The plant is a major source with respect to the Prevention of Significant Deterioration (PSD) and the Title V Operating Permit programs.

INVISTA submitted an amendment application to the NSR Permit 7186 in March 2015 and a subsequent addendum to the amendment application in January 2016. The amendment and addendum were to authorize the following at the ADN Unit:

- Improvement of the distributed control system (DCS) and implementation of advanced process
- controls (APC) for the ADN Unit;
- Upgrades to the Natural Gas Plant (NGP);
- Add a raw Natural Gas Bypass/Blending System;
- Equipment replacement, reliability, availability, and efficiency improvements;
- Removal of shut down facilities and facilities authorized but not constructed;
- Updates to the Maintenance, Startup, and Shutdown (MSS) representations;
- Update loading representations for some loading operations;
- Incorporation of Permit by Rule (PBR) Registrations into TCEQ Permit No. 7186;
- Changes to TCEQ Permit No. 7186 Special Conditions; and
- Revisions and corrections to the Maximum Allowable Emission Rate Table

The emissions increase of nitrogen oxides (NO_X), carbon monoxide (CO), and volatile organic compounds (VOC) from the proposed project are greater than the PSD Significant Emission Rate (SER) threshold, and therefore trigger PSD review. Emissions increases of sulfur dioxide (SO_2) from the project are less than the PSD Significant Emission Rate (SER) threshold, and therefore do not trigger PSD review. For particulate matter (PM) including particulate matter less than 10 microns (PM_{10}) and particulate matter less than 2.5 microns ($PM_{2.5}$), the only emission increases are at upstream/downstream sources; there are no changes to any $PM/PM_{10}/PM_{2.5}$ emission rates within the Permit No. 7186. The upstream/downstream increases are less than the PSD SER threshold, and therefore PSD review is not triggered for $PM/PM_{10}/PM_{2.5}$.

As part of the application, a Class II air quality analysis is required to demonstrate that proposed emissions of NO_X and CO from the ADN permit amendment will not cause or contribute to a violation of any applicable National Ambient Air Quality Standards (NAAQS), applicable PSD Increment, or adversely affect public health and welfare. An air quality analysis is required to demonstrate compliance with the TCEQ State NAAQS for SO_2. As the VOC project emissions increase is greater than 100 tpy, a qualitative ozone analysis will be performed in accordance with TCEQ guidelines.

[1] Based on TCEQ's internet site http://www.tceq.texas.gov/airquality/sip/victoria-sip/vic-status as of January, 2016.

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A State Health Effects evaluation is required for emissions increases of speciated volatile organic compounds (VOC) from the proposed project at the Victoria Plant to demonstrate compliance with TCEQ toxicology division's Effects Screening Levels (ESL) guidelines.

This document summarizes the methodologies that will be used for the PSD review, TCEQ State NAAQS, State Property Line Analysis, and Health Effects Evaluations, the data used to conduct the analyses, and the results of these analyses. The methodologies used to perform these analyses are consistent with Modeling and Effects Review Applicability (MERA) guidance package, the TCEQ's *Air Quality Modeling Guidelines, and the EPA's Guideline on Air Quality Models (Revised)*.[2,3,4] In consideration of the single property designation among INVISTA, DuPont, and Equistar, a combined single fence line will be used in the PSD modeling. This fenceline represents the extents of the INVISTA Victoria Site property that have a physical barrier restricting public access. Access to the DuPont and Equistar properties is controlled by INVISTA via the fenceline and gates. Therefore, INVISTA has concluded that the DuPont and Equistar properties do not constitute ambient air.

[2] Code of Federal Regulations, Title 40–Protection of Environment, Part 51, Appendix W, November 9, 2005.

[3] TCEQ, *Air Quality Modeling Guidelines*, APDG 6232 (Revised), Air Permits Division, Austin, TX, April 2015.

[4] TCEQ, *Modeling and Effects Review Applicability: How to Determine the Scope of Modeling and Effects Review for Air Permits*, APDG 5874, July 2009.

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2. BACKGROUND

This section of the report provides a brief summary of the proposed project and location.

2.1. PROJECT DESCRIPTION

INVISTA submitted the permit application to authorize the following changes:

2.1.1. DCS and APC Implementation

The distributed control system (DCS) will be replaced with modern controls which improve safety, reliability, and efficiency. INVISTA will also implement advanced process controls (APC) to optimize production via improvements in process safety, reliability, and efficiency.

2.1.2. Install a Raw Natural Gas Bypass/Blend System

INVISTA proposes to install a new natural gas (NG) bypass/blend system. The proposed system will allow a controlled flow of raw natural gas to bypass the NGP and then be blended with the methane product gas stream from the NGP. This bypass or slip stream will enable using the NGP to full capacity regardless of the C2+ concentration in the raw gas. The bypass/blend system will add additional fugitive emission components (e.g., valves and connectors).

2.1.3. Replacement, Reliability, Availability, and Efficiency Improvement Projects

As part of this project, INVISTA will replace and improve equipment located in the ADN Unit. These projects include end-of-life replacements, projects to reduce downtime, and projects that improve the overall reliability of the unit. Additional information is provided in the confidential volume of the application.

2.1.4. Removal of Shut Down Facilities and Facilities Not Constructed

With this amendment application, INVISTA proposes to remove from the permit facilities that have been permanently shut down and facilities that were authorized by a previous permit amendment but were never constructed. A detailed list of these facilities to be removed can be found in the March 2015 Amendment application and subsequent January 2016 Addendum.

2.1.5. Maintenance, Startup, and Shutdown (MSS) Activities

MSS activities performed at the ADN Unit have previously been represented in applications for TCEQ Permit No. 7186; a detailed list of changes to MSS activities can be found in the permit application and addendum.

2.1.6. Update Loading Representations

Loading representations are being updated to reflect different tanks that some materials are loaded from and different loading points for some materials.

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2.1.7. Incorporate Permit by Rule (PBR) and Standard Permit Registrations into NSR Permit 7186.

INVISTA is proposing to roll PBRs and Standard Permits claimed at the ADN Unit into TCEQ Permit No. 7186. These PBRs will be voided after inclusion in TCEQ Permit No. 7186.

2.1.8. Changes to Special Conditions

INVISTA is requesting several changes to special conditions for Permit No. 7186.

2.1.9. Revisions and Corrections to the Maximum Allowable Emission Rate Table

INVISTA is requesting several revisions and corrections to the Maximum Allowable Emission Rate Table (MAERT).

Detailed information on the project description can be found the in the March 2015 Amendment application and the subsequently submitted January 2016 Addendum.

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This section presents a summary of the pollutants evaluated and outlines the general dispersion modeling approach and screening technique used for this analysis.

3.1. POLLUTANTS TO BE EVALUATED

3.1.1. Prevention of Significant Deterioration

Per the PSD definitions in Title 30, Texas Administrative Code, Chapter 116, Subchapter A (30 T.A.C. § 116.12), the Victoria site is considered a major source under the PSD program (i.e., chemical process plant, one of the 28 major source categories, and has emissions of any single criteria pollutant that exceeds 100 tons per year [tpy]). Based on the ADN Unit permit amendment application submitted in March 2015 and amendment addendum submitted in January 2016, the project is considered a major modification for NO_X, CO, and VOC since the project emissions of NO_X, CO, and VOC exceed their respective significant emission rates.

The impacts from NO_X (evaluated as nitrogen dioxide [NO_2]) and CO will be evaluated in accordance with applicable federal and state air quality dispersion modeling and screening procedures, as discussed in Section 3.2 of this protocol. Modeled concentrations will be compared to the EPA established Significant Impact Levels (SIL), NAAQS, and PSD Increments shown in Table 3-1.

Table 3-1. Scope of PSD Modeling Review

Pollutant	Averaging Period	Modeling Significance Level (SIL/MSL) (µg/m³)	Monitoring *de minimis* concentration SMC (µg/m³)	NAAQS (µg/m³)	PSD Class II Increment (µg/m³)
NO_2	1-hour	7.5	N/A	188	--
	Annual	1	14	100	25
CO	1-hour	2000	N/A	40000	--
	8-hour	500	575	10000	--

3.1.2. State NAAQS Analysis

The project net annual emissions increases of SO_2 are less than the Significant Emission Rate (SER) for PSD, and hence they do not trigger PSD modeling, but must be modeled in State NAAQS. For the State NAAQS analysis, a preliminary impacts determination, which considers project emissions increases associated with the affected sources at the facility, was performed to determine whether the proposed emissions of SO_2 will have a significant impact upon the area surrounding the facility. The maximum modeled ground-level concentrations (H1H) for SO_2 for each averaging period evaluated were compared to the corresponding SILs to determine whether the maximum modeled ground-level concentration (GLC_{max}) at any receptor exceeds the applicable SIL. The SILs are presented in Table 3-2. For SO_2, if the GLC_{max} resulting from project emissions increases exceeds the corresponding SIL, a State NAAQS Analysis may be required.

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Table 3-2. Scope of Modeling Review for State NAAQS Analysis

Pollutant	Averaging Period	Modeling Significance Level (SIL/MSL) (µg/m³)	NAAQS (µg/m³)
SO_2 [A]	1-hour	7.8	196
	3-hour [B]	25	1,300
	24-hour	5	365
	Annual	1	80

[A] The existing annual and 24-hour SO_2 NAAQS standards will be revoked one year after the effective date in areas with a designated status for the revised SO_2 NAAQS, per 40 CFR §50.4(e).

[B] The SO_2 3-hr standard is a secondary NAAQS standard.

3.1.3. State Property Line Analysis

A property line analysis is required for SO_2 in accordance with Title 30 Texas Administrative Code (TAC) Chapter 112. The maximum modeled ground level concentrations of SO_2, and H_2S should not exceed the corresponding thresholds listed below in Table 3-3 at the fenceline.

Table 3-3. Scope of Modeling Review for Property Line Analysis

Pollutant	Regulation/ Guidance	Averaging Period	Standard (µg/m³)
SO_2	30 TAC 112.3(a)	30-min	1,021[A]

[A] The 30-minute standard of 0.4 ppm (1021 µg/m³) for Victoria County is evaluated using the model's 1-hr averaging period.

3.1.4. State Health Effects Evaluation (ESL Evaluation)

As mentioned in Section 1 of this protocol, the State Health Effects Evaluation will be based on the July 2009 TCEQ MERA guidance package. The TCEQ MERA guidance document provides a flowchart to be used to determine the required scope of the modeling and effects review for each compound required to be included in the analysis. The flowchart provides a process to determine if refined air dispersion modeling or effects review is required for a permitting project, and if required, the minimum requirements for the scope of the modeling and effects review. The MERA guidance document requires comparison to the Effects Screening Level (ESL) for each compound under consideration. A list of the compounds to be evaluated in this analysis, along with the corresponding hourly and annual ESLs for each are provided in Table 3-4.

Table 3-4. Pollutants to be Evaluated and Associated Effects Screening Levels

Compound	CAS No.	Short-term ESL (µg/m³)[A]	Long-term ESL (µg/m³)[A]
Butadiene (BD as 1,3-C4H6)	106-99-0	510	9.9
trans 2-Butene (T-C4H8, t-2-C4H8)	107-01-7	10000	480
Hydrogen Cyanide (HCN)	74-90-8	20	2
Benzene (C6H6)	71-43-2	170	4.5
Cyclohexane (CYAN, C6H12)	110-82-7	3400	340
trans-2-Methyl-2-Butenenitrile (T2M2BN)	30574-97-1	70	7

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Compound	CAS No.	Short-term ESL (µg/m³)[A]	Long-term ESL (µg/m³)[A]
2-Methyl-3-Butenenitrile (2M3BN)	16529-56-9	800	80
cis-2-Pentenenitrile (C2PN)	25899-50-7	700	70
Vinylcyclohexene (VCH, C8H12)	695-12-5	2000	200
cis-2-Methyl-2-Butenenitrile (C2M2BN)	20068-02-4	70	7
Valeronitrile (VN)	110-59-8	220	22
Pentenenitriles (PNs as 3,4 Pentenenitrile)	4635-87-4	120	12
trans-2-Pentenenitrile (T2PN)	26294-98-4	700	70
Phenol (PHENOL, C6H6O)	108-95-2	150	3.3
Benzonitrile (BZNIT, C7H5N)	100-47-0	500	50
IB	-	2	0.2
Ethylene Glycol (E-GLYCOL, C2H6O2)	107-21-1	260	26
m-Cresol (MCRESOL, C7H8O)	108-39-4	4.4	10
Phenyl Ethylene Glycol Borane (PEGB)	-	2	0.2
Ethyl Succinonitrile (ESN)	110-61-2	200	20
Methylglutaronitrile (MGN, C6H8N2)	4553-62-2	80	8
Adiponitrile (ADN, C6H8N2)	111-69-3	90	9
Triphenyl Borane (PROM, C18H15B)	960-71-4	10	1
Tritolylphosphate (TTP, C21H21P03) -	1330-78-5	100	10
Ligand Hydrolysis Product (LHP, C14H15PO3)	-	2	0.2
Ligand Degradation Product (LDP, C21H21PO3)	-	10	1
Acrylonitrile (ACRN, CH2CHCN)	107-13-1	330	2.1
Acetonitrile (ACEN, CH3CN)	75-05-8	340	34
Propionitrile (PROPN, CH3CH2CN)	107-12-0	140	14
Biphenyl (C12H10)	92-52-4	13	1.3
n-Hexane (C6H14)	110-54-3	6200	200
p-Xylene (C8H10)	106-42-3	2200	180
Toluene (C7H8)	108-88-3	4500	1200
Isopentane (i-C5H12)	78-78-4	59000	7100
Pentane (as n-C5H12)	109-66-0	59000	7100
2,2 Dimethylbutane (C6H14)	75-83-2	3500	350
2,3 Dimethylbutane (C6H14)	79-29-8	3500	350
2-Methylpentane (C6H14)	107-83-5	3500	350
3-Methylpentane (C6H14)	96-14-0	3500	350
2,2-Dimethylpentane (C7H16)	590-35-2	3500	350

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Compound	CAS No.	Short-term ESL (µg/m³)[A]	Long-term ESL (µg/m³)[A]
2,3-Dimethylpentane (C7H16)	565-59-3	3500	350
Methylcyclopentane (C6H12)	96-37-7	2600	260
2-Methylhexane (C7H16)	591-76-4	3070	307
3-Methylhexane (C7H16)	589-34-4	3070	307
Methylcyclohexane (C7H14)	108-87-2	16100	1610
Octane (as n-C8H18)	111-65-9	3500	350
Nonane (as n-C9H20)	111-84-2	10500	1050
Butane (as n-C4H10)	106-97-8	66000	7200
Isobutane (i-C4H10)	75-28-5	23000	7200
Heptane (as n-C7H16)	142-82-5	3500	350
Decane (as C10H22)	124-18-5	10000	1000
Undecane (as C11H24)	1120-21-4	3500	350
Dodecane (as n-C12H26)	112-40-3	3500	350
Tridecane (as n-C13H28)	629-50-5	3500	350
Tetradecane (as n-C14H30)	629-59-4	3500	350
Pentadecane (as n-C15H32)	629-62-9	2	0.2
Hexadecane (as nC16H34)	544-76-3	3500	350
Methacrylonitrile (C4H5N)	126-98-7	27	2.7
Isobutyronitrile (C4H7N)	78-82-0	220	22
C&T-2-Butenenitrile (transcrotonitrile, C4H5N)	4786-20-3	70	7
Butanenitrile (n-butyronitrile, C4H7N)	109-74-0	220	22
Pyridine (C5H5N)	110-86-1	30	3
Ethylbenzene (C8H10)	100-41-4	26000	570
Styrene (C8H8)	100-42-5	110	140
1,2-Dimethylbenzene (o-Xylene, o-C8H10)	95-47-6	2200	180
Benzofuran (C8H6O)	271-89-6	2	0.2
Aniline (Aminobezene, C6H7N)	62-53-3	80	8
Alpha-Methylstyrene (C9H10)	98-83-9	250	48
m-Methylstyrene (C9H10)	100-80-1	250	48
Glutaronitrile (C5H6N2)	544-13-8	50	5
Indene (C9H8)	95-13-6	240	24
Phenylacetonitrile (C8H7N)	140-29-4	2	0.2
m-Ethylphenol (as p-C8H10O)	620-17-7	290	3.3
Naphthalene (C10H8)	91-20-3	440	50
2-Methylnaphthalene (C11H10)	91-57-6	200	20
Diphenylmethane (C13H12)	101-81-5	125	12.5
Formic Acid (CH2O2)	64-18-6	90	9

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Compound	CAS No.	Short-term ESL (µg/m³)[A]	Long-term ESL (µg/m³)[A]
Sodium Cyanide (NaCN)	143-33-9	50	5
Methyl Diethanolamine	105-59-9	500	50
Isopropanol (IPA)	67-63-0	4920	492
Methanol	67-56-1	3900	2100
COD		2	0.2
CDDT		2	0.2
2-Butoxy ethanol	111-76-2	2900	3700
Hexamethylenediamine	124-09-4	16	0.54
Cyclohexanone	108-94-1	800	80
Cyclohexanol	108-93-0	630	200
Cyclohexene	110-83-8	10000	1000
Caproic Acid	142-62-1	200	48
Pentanal	110-62-3	98	180
Hexanal	66-25-1	330	818
Acetic Acid	64-19-7	250	25
Propionic Acid	79-09-4	85	30
Butyric Acid	107-92-6	26	90
Valeric Acid	109-52-4	63	42
n-Butanol	71-36-3	610	61
Pentanol	71-41-0	360	73
Aliphatic Hydrocarbon	69430-33-7	2450	245
Oil			
Ethyl nonafluoroisobutyl ether	163702-06-5	200	20
Ethyl nonafluorobutyl ether	163702-05-4	200	20
1,2-Trans-dichloroethylene	156-60-5	7900	790
Methyl nonafluoroisobutyl ether	163702-08-7	200	20
Methyl nonafluorobutyl ether	163702-07-6	200	20
Poly(dimethylsiloxane)	63148-62-9	1000	100
Ethanol	64-17-5	18800	1880
1,1-difluoroethane	75-37-6	27000	2700
Propyl acetate	109-60-4	8350	835
Acetone	67-64-1	7800	4800
Naphtha (petroleum), hydrotreated light	64742-49-0	3500	350
Hydrotreated Heavy Alkanes	64742-52-5	1000	100
C9-15 Heavy Aromatic Hydrocarbons	68132-00-3	2450	245
Middle Alkanes	64742-46-7	3500	350
Light Aromatic Hydrocarbons; Stoddard Solvent	8052-41-3	3500	350
1,2,4-Trimethylbenzene	95-63-6	4400	54

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Compound	CAS No.	Short-term ESL (µg/m³)[A]	Long-term ESL (µg/m³)[A]
2-(2-butoxyethoxy) ethanol	210818-08-9	600	60
Amyl acetate	628-63-7	2700	270
2-methylbutyl acetate	624-41-9	2700	270
VOC-u	-	2	0.2
Ammonia (NH3)	7664-41-7	180	92
Chlorine (Cl2)	7782-50-5	15	1.5
Hydrogen Peroxide (H2O2)	7722-84-1	14	1.4
cis-3-Pentenenitrile (C3PN)	4635-87-4	120	12
trans-3-Pentenenitrile (T3PN)	16529-66-1	120	12
Nicotinonitrile (3-Pyridinecarbonitrile)	100-54-9	2	0.2
Phenyl Propylene Glycol Boronate (PPGB)	-	2	0.2
Propylene Glycol	57-55-6	1560	156
CS-Plus Solvent		2	0.2
MDEA	105-59-9	500	50
BDP		2	0.2
IPA		4920	492
ACA	373-04-6	100	10
BHMT	143-23-7	16	0.54
Isophorone	78-59-1	230	23
Methacrylic acid	79-41-4	180	18
MPMD	15520-10-2	250	25
NHA	111-26-2	100	10
Propylene glycol t-Butyl ether	57018-52-7	730	73
Lube Oils	-	1000	100
Octatriene	-	300	30
oxybismethane	115-10-6	19000	1900
1-Butene	106-98-9	19000	1600
TBC	98-29-3	20	2
PBCB	-	2	0.2
PPGB	-	2	0.2
P-GLYCOL	57-55-6	1560	156
CPI	-	2	0.2
Formaldehyde	50-00-0	15	3.3
Chloroform	67-66-3	100	10
Hydrochloric Acid (HCl)	7647-01-0	190	7.9

[A] TCEQ, Effects Screening Level List, http://www.tceq.state.tx.us/toxicology/esl/list_main.html/#esl_1; updated September 30, 2015.

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3.2. GENERAL PSD MODELING APPROACH

PSD air quality dispersion modeling analyses are organized into two major sub-sections based on U.S. EPA modeling guidance: the Preliminary (Significance) Analysis and the Cumulative (Full Impact) Analysis. Per EPA Guidance, the Significance Analysis considers the emissions associated *only* with the proposed project to determine whether it will have a significant impact upon the surrounding area. The modeled ground-level concentrations (GLCs) will be compared to the corresponding SILs to determine whether any modeled GLCs at any receptor locations are greater than the SIL (i.e., "impact area").

If the Significance Analysis reveals that modeled GLCs for a particular pollutant and averaging period are greater than the applicable SIL, a Full Impact Analysis will be perform ed within the impact area.[5] The Full Impact Analysis includes a NAAQS analysis and a PSD Increment analysis.

For this project, it is not expected that any criteria pollutant will show a significant impact, as determined based on SILs; thus, a Full Impacts Analysis is not expected to be required.

A summary of the tasks that are performed in a standard PSD Class II area air quality modeling analysis is presented in the flow chart provided as Figure 3-1. Special considerations for pollutants and each analysis proposed to be conducted are discussed in detail below.

[5] Code of Federal Regulations, Title 40-Protection of Environment, Part 51, Appendix W.

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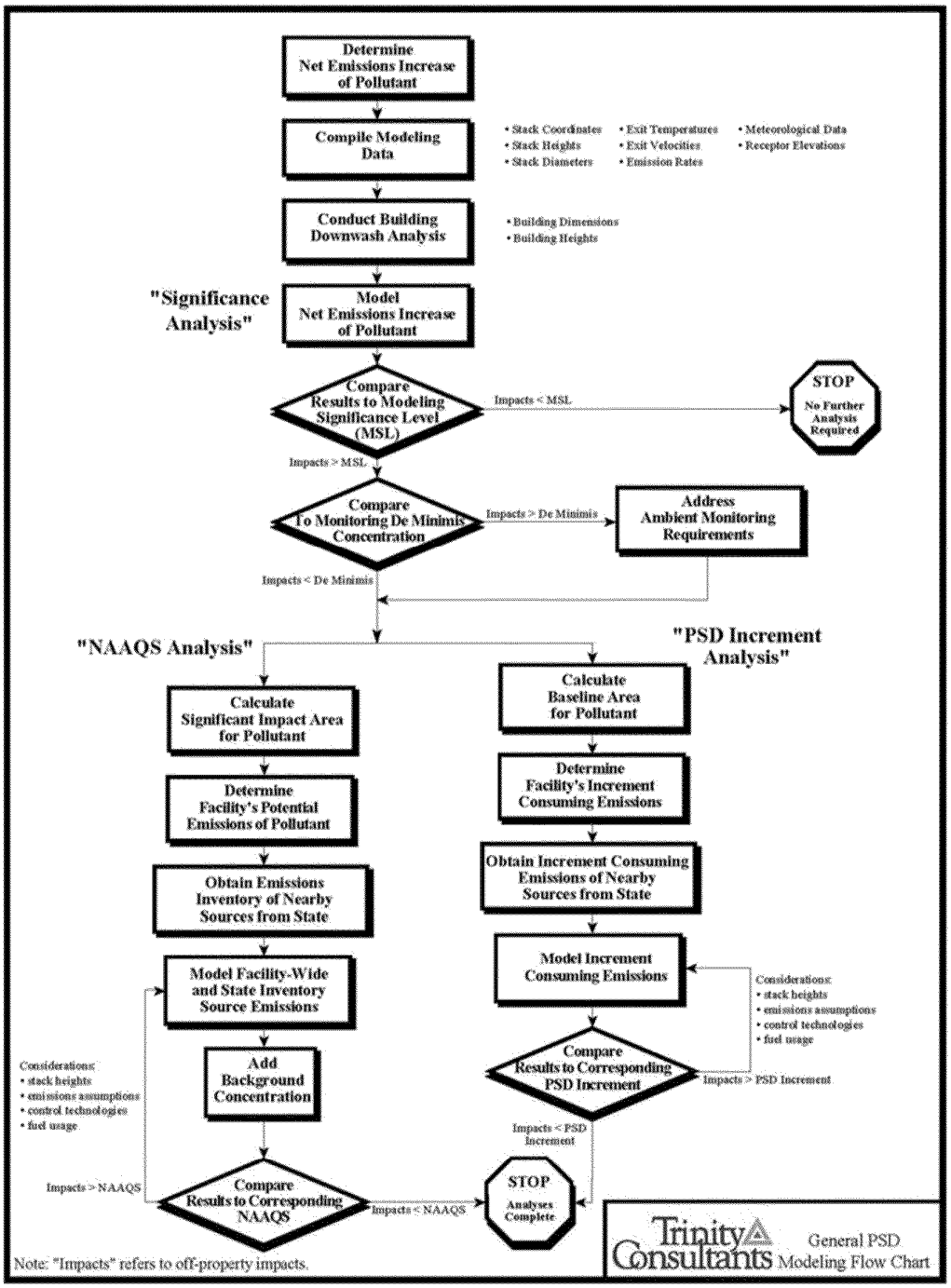
Figure 3-1. PSD Modeling Flowchart



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3.2.1. Significance Analysis

The Significance Analysis is conducted to determine if the emissions increases from a project cause a significant impact upon the area surrounding the facility. "Significant" is defined by ambient concentration thresholds referred to as the Significant Impact Levels (SIL).

In the Significance Analysis, the increase in emissions of NO_2 (1-hour and annual averaging periods), CO (1-hour and 8-hour averaging periods), and SO_2 (1-hour, 3-hour, 24-hour, and annual averaging periods) from the project were evaluated to determine whether they have the potential for a significant impact upon the area surrounding the Victoria Plant. Per EPA and TCEQ modeling guidance, all impacts for the Significance Analysis are reported as the highest first high (H1H) modeled concentration.[6] If the highest ambient concentration for a pollutant is less than the SIL when emissions increases from only the project are modeled, then further analysis (NAAQS) is not required.

The Significance Analysis determines whether INVISTA is required to conduct further analyses for the modeled pollutant for the averaging period and also defines the radius of impact (ROI) within which a Full Impact Analysis is required. According to EPA guidance, the ROI for an air quality dispersion modeling analysis is the farthest distance from the center of the proposed emissions source to the receptor where modeled GLCs are equal to or greater than the applicable SIL for each corresponding averaging period. The largest radius for each pollutant, regardless of averaging period, will be used in the air quality dispersion modeling analysis to establish the pollutant-specific ROI.

As stated above, it is not expected that any criteria pollutant will show a significant impact, as determined based on SILs; thus, a Full Impacts Analysis is not expected to be required. However, if the SILs are exceeded for any pollutant, INVISTA will discuss the NAAQS modeling methodologies with the TCEQ.

[6] Ibid.

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4. AREA MAP

The project will be located at INVISTA's Victoria Site, 2695 Old Bloomington Road North, Victoria, Texas 77905. The plant is situated in a rural area approximately 10 miles so utheast of the city of Victoria at Latitude 28˚40'41" North, Longitude 96˚57'17" West. The Victoria Site is currently used for INVISTA's chemical manufacturing facility (nylon intermediates plant). A local map is provided at the in Figure 4-1.

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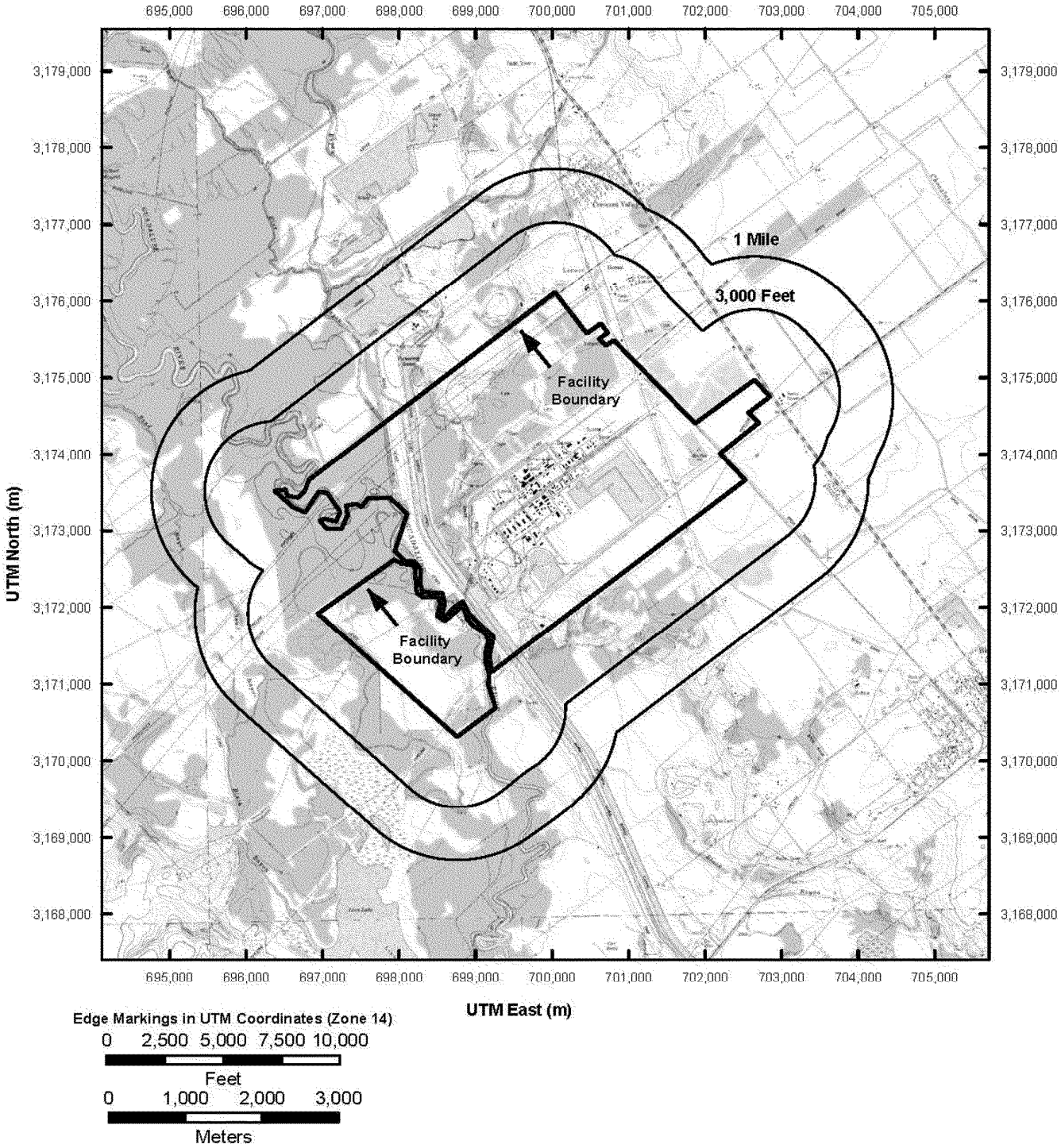
Figure 4-1. Area Map



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5. PLOT PLAN

A complete plot plan depicting the locations of the Victoria facility modeled sources, building structures, and property line will be provided with the final air dispersion modeling report. Figure 5-1 depicts the project sources which were considered in the analysis. A zoomed-in aerial image of the detailed area indicated in Figure 5-1 is also included.

In all air quality dispersion modeling analysis input and output data files, the location of emission sources, structures, and receptors are represented in the Universal Transverse Mercator (UTM) coordinate system. The U.S. EPA and the TCEQ require that coordinates for permits and air quality dispersion modeling analyses be represented in the UTM system. The UTM grid was originally created by the Defense Mapping Agency of the United States as a special grid for military use throughout the world. In this grid, the world is divided into 60 north-south zones, each covering a strip 6° wide in longitude. The INVISTA Victoria are located in UTM Zone 14. In each zone, coordinates are measured north and east in meters. The northing values are measured continuously from zero at the Equator, in a northerly direction. A central meridian through the middle of each 6° zone is assigned an easting value of 500,000 meters (m). Grid values to the east of this central meridian, as in the case of the INVISTA Victoria Plant, are greater than 500,000. The center of the INVISTA Victoria Plant is located near UTM coordinates 699,726 m East and 3,173,206 m North, based on the North American Datum (NAD) of 1927.

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Figure 5-1. Plot Plan

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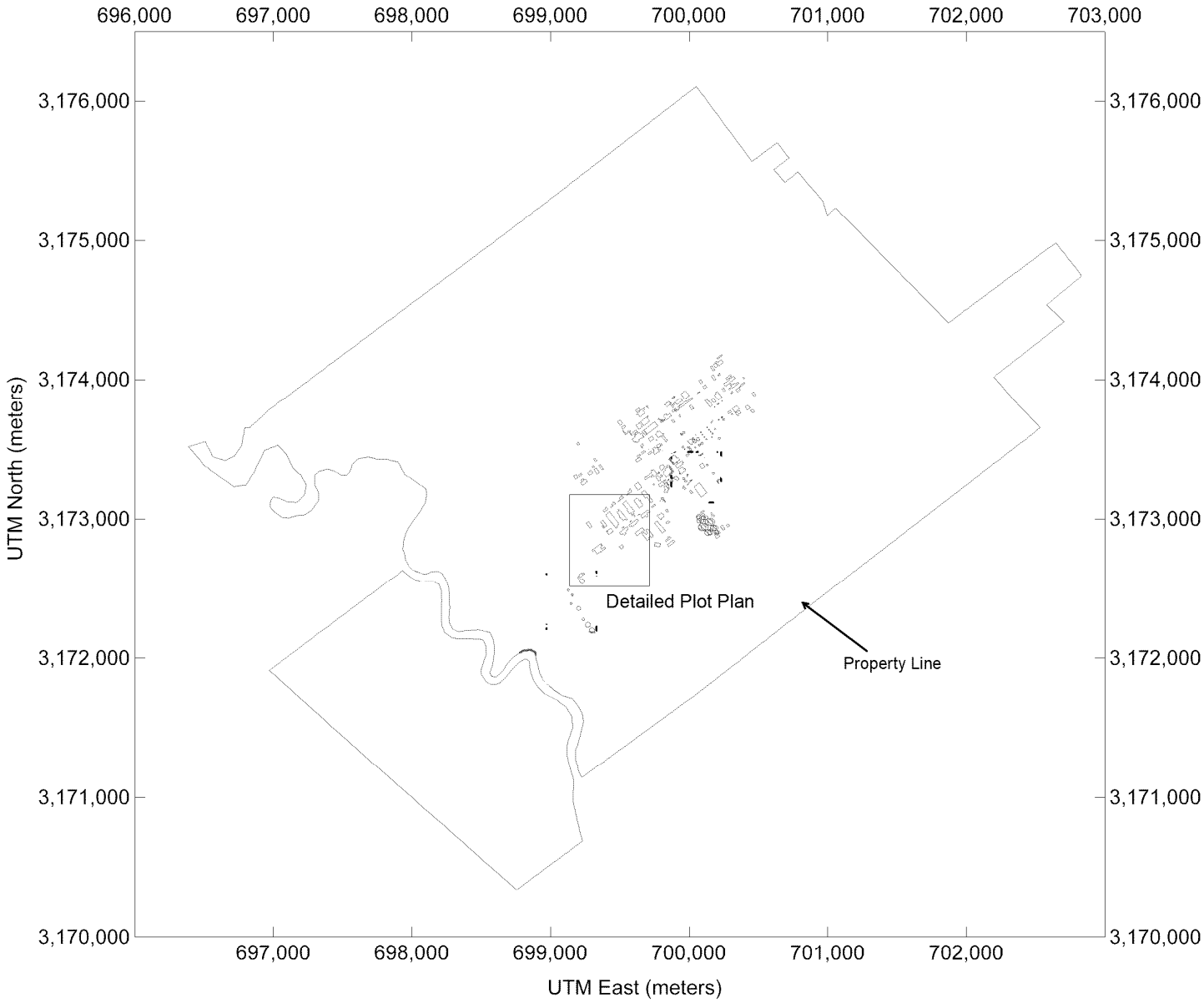
INVISTA S.a.r.l.
Victoria Plant
Plot Plan



Legend

- Emission Points
- Buildings

0 1,000 2,000 3,000
Meters

6. AIR QUALITY MONITOR DATA

The Victoria Plant is located in Victoria County, and is located within Air Quality Control Region (AQCR) 214, as described in 40 CFR §81.136.[7] The portion of this AQCR that contains Victoria County has been designated by the United States Environmental Protection Agency (U.S. EPA) as "unclassifiable" or "in attainment" for all pollutants in regards to the NAAQS.[8] Issues related to the air quality monitoring data proposed for the air quality analysis are discussed below.

6.1. PRE-CONSTRUCTION MONITORING

The U.S. EPA's monitoring de minimis concentrations establish the levels at which a facility needs to conduct pre-construction ambient air quality monitoring for pollutants subject to PSD review in order to evaluate the existing air quality. If the air quality dispersion modeling analyses show that maximum modeled GLCs from the project emissions increases in the Significance Analysis do not exceed the U.S. EPA monitoring de minimis concentrations, pre-construction monitoring may be avoided. Monitoring de minimis concentrations for the pollutants of concern are summarized in Table 6-1.

Table 6-1. Monitoring De Minimis Concentrations

Pollutant	Averaging Period	Monitoring *De Minimis* Concentration (SMC) (µg/m³)
NO_2	1-Hour	--
	Annual	14
CO	1-hour	--
	8-hour	575

It is expected that impacts from the project will be less than the SMCs listed above and preconstruction monitoring will not be required.

[7] Code of Federal Regulations, 40 CFR §81.136, December 16, 2015.

[8] http://www.tceq.state.tx.us/airquality/sip/victoria-sip/vic-status, December 16, 2015.

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The following sections discuss the Victoria Plant ADN Unit emission sources, other on-property sources and the methodology for obtaining the off-property industrial emission sources that were included in the air quality dispersion modeling analysis.

7.1. ON-PROPERTY PROJECT SOURCES

All on-site project related emissions sources, including fugitive releases, are represented as point, pseudo-point, or volume sources for modeling purposes. The following sections describe the methodology that was used to characterize the source parameters for the sources under consideration as well as the methodology used to determine the emission rates for each of the sources. A summary of the on-property source parameters and emission rates associated with this project is included in Appendix B of this report.

7.1.1. Source Parameters

The following procedures were utilized to develop the source inventory for the point sources at INVISTA ADN Unit:

7.1.1.1. Point Sources

- Flares will be modeled using the following parameters, per TCEQ guidance:
  - Velocity = 20 m/s
  - Temperature = 1,273 K
  - The heat release and effective flare diameter are calculated using the following methodology using TCEQ guidance.

    To model emissions from the flares, stack parameters are determined using TCEQ guidance obtained from the *Air Quality Modeling Guidelines*[9]. The effective stack diameter (D) is calculated using the following equations:

$$D(m) = \sqrt{10^{-6} \cdot q_n}$$

$$q_n = q \cdot 1 - 0.048\sqrt{MW}$$

Where:
q = normal gross heat release of hypothetical flared material
MW =molecular weight of hypothetical flared material

- For stacks that are oriented at an angle relative to the ground. The exit velocity from these stacks is calculated using the following formula:

$$V_a = \text{Sin (angle)} * (V_0)$$

[9] Texas Commission on Environmental Quality, *Air Quality Modeling Guidelines*, APDG-6232, Austin, TX, April 2015, p. 73.

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Where: V_a = angled release velocity
V_0 = vertical release velocity

- Sources with raincaps or horizontal discharges are modeled as pseudo-point sources with the following parameters:

  Velocity = 0.001 m/s
  Diameter[10] = 0.001 m
  Temperature[11] = 0 K

- Unless velocities are available, tanks are modeled as pseudo-point sources.

7.1.1.2. Area Sources

Fugitive emissions associated with the ADN unit are modeled as an area source. For area sources, the dimensions (i.e. length and width) of the modeled source are determined based on the geographical location where emissions could occur. Release heights were reflective of the midway height from ground-level to the maximum potential release height as representative emissions are equally distributed throughout the source area. The source parameters were based on the physical dimensions of the source. Area sources were depicted geographically using the southwest corner as a pivot point and the axis degrees as an indicator of the source configuration relative to the pivot.

Plot plans depicting the location of the applicable sources considered in the Significance modeling analysis will be provided with the final air quality analysis submission.

7.1.2. Modeled Emission Rates Determination

In the development of various source emission rates at the ADN Acid Unit, the following methodology was used:

- For NO_2 and CO hourly averaging periods, only modified sources will be modeled. This is because no increase in hourly production is needed for the upstream/downstream sources (boilers) in order to meet the projected annual production rates. Since there will not be any hourly emissions increases from the affected upstream/downstream sources, only modified sources are included in short-term emissions analysis. The hourly emission rates are obtained by using the following equation:

$$\frac{PAE - BAE}{4.38}$$

where:
PAE = Project Actual Emissions (tpy)
BAE = Baseline Actual Emissions (tpy)
4.38 = conversion factor from tpy to lb/hr

- For NO_2 annual averaging period, the modified sources and affected upstream/downstream sources including support facilities will be modeled.

[10] Actual diameters are used where available; however, please note that some sources modeled as pseudo-point sources have no physical diameter.

[11] As per the nature of operation, some tanks operate consistently at higher temperatures; hence, such tanks are modeled at their actual temperatures instead of ambient temperature.

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- For SO_2, whose emissions increases are less than the PSD Significant Emission Rate (SER), the permit-to-permit maximum allowable emissions increase will be modeled for both the short-term and long-term averaging periods.

- The conversion from NO_X emission rates to modeled NO_2 emission rates will be accomplished using the Tier 2 Ambient Ratio Method (ARM) wherein a short-term ARM of 0.80 and annual ARM of 0.75 will be employed.

- For sources that can either operate in normal mode or MSS mode in a given hour, the normal and MSS emissions will be conservatively represented with the ability to occur simultaneously when determining the project proposed emission rate. If source parameters are different in each of the different modes, the worst case will be modeled.

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8. SELECTION OF MODEL OPTIONS

The version dated 15181 of the AERMOD air dispersion model was used to estimate maximum ground-level off property concentrations of CO, NO_2, and SO_2.[12] For convenience, a concatenated meteorology file was used in NO_2 and SO_2 short-term analyses. The annual averaging periods were run in separate modeling files, separated by year.

In this analysis, modeling was performed using the regulatory default options, which include stack heights adjusted for stack-tip downwash, buoyancy-induced dispersion, and final plume rise. Ground-level concentrations occurring during "calm" wind conditions were calculated by the model using the calm processing feature. Regulatory default values for wind profile exponents and vertical potential temperature gradients were used since no representative on-site meteorological data are available. As per U.S. EPA requirements, direction-specific building dimensions were used in the downwash algorithms.

[12] EPA, Office of Air Quality Planning and Standards, Federal Register Vol. 70 / No. 216, pp. 68,218-68,261, 40 CFR 51, Appendix W, Revision to Guideline on Air Quality Models, November 9, 2005.

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9. TERRAIN

The Victoria Plant is located in Victoria County, Texas. The terrain surrounding the Victoria Plant varies in elevation from 0.3 feet (0.1 meters) to 110 feet (34 meters) within 10 km of the Victoria Plant. The average elevation at the Victoria Plant is approximately 50 feet (15 meters) above mean sea level.

AERMOD uses advanced terrain characterization to account for the effects of terrain features on plume dispersion and travel. AERMOD's terrain pre-processor, AERMAP, imports digital terrain data and computes a height scale for each receptor from National Elevation Database (NED) data files. A height scale is assigned to each individual receptor and is used by AERMOD to determine whether the plume will go over or around a hill.

The receptor terrain elevations input into AERMAP are the highest elevations extracted from United States Geological Survey (USGS) Seamless database. The data extracted was 1/3 arc second (30 m) data for the area. For each receptor, the maximum possible elevation within a box centered on the receptor of concern and extending halfway to each adjacent receptor was chosen. This is a conservative technique for estimating terrain elevations in that it ensures that the highest terrain elevations are accounted for in the analysis. Source and building elevations are extracted in the same manner, using interpolated elevation values.

All existing and proposed sources and buildings were included at their actual heights above their respective ground level elevations.

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10. BUILDING WAKE EFFECTS (DOWNWASH)

The emission sources are evaluated in terms of their proximity to nearby structures. The purpose of this evaluation is to determine if stack discharges might become caught in the turbulent wakes of these structures. Wind blowing around a building creates zones of turbulence that are greater than if the building was absent.

10.1. GENERAL DISCUSSION

EPA has promulgated stack height regulations that restrict the use of stack heights in excess of "Good Engineering Practice" (GEP) in air dispersion modeling analyses. Under these regulations, that portion of a stack in excess of the GEP height is generally not creditable when modeling to determine source impacts. This essentially prevents the use of excessively tall stacks to reduce ground-level pollutant concentrations. The minimum stack height not subject to the effects of downwash, called the GEP stack height, is defined by the following formula:

$H_{GEP} = H + 1.5L$, where:

H_{GEP} = minimum GEP stack height,

H = structure height, and

L = lesser dimension of the structure (height or projected width).

This equation is limited to stacks located within 5L of a structure. Stacks located at a distance greater than 5L are not subject to the wake effects of the structure. The wind direction-specific downwash dimensions and the dominant downwash structures used in this analysis were determined using BPIP. In general, the lowest GEP stack height for any source is 65 meters by default.[13] None of the stacks at the Victoria Plant exceed a stack height of 65 m. If any of the inventory stacks exceeded a stack height of 65 meters, they were modeled at a stack height of 65 m.

Direction-specific building dimensions and the dominant downwash structure parameters used as inputs to the dispersion models were determined using the *BREEZE-WAKE/BPIP* software, developed by Trinity Consultants, Inc. This software incorporates the algorithms of the U.S. EPA-sanctioned Building Profile Input Program with PRIME enhancement (BPIP-PRIME), version 04274.[14] BPIP-PRIME is designed to incorporate the concepts and procedures expressed in the GEP Technical Support document, the Building Downwash Guidance document, and other related documents.

The output from the BPIP-PRIME downwash analysis lists the names and dimensions of the structures, and the emission unit locations and heights. In addition, the output contains a summary of the dominant structure for each emission unit (considering all wind directions) and the actual building height and projected widths for all wind directions. This information is then incorporated into the data input files for the AERMOD air dispersion model.

All existing and proposed sources and buildings were included at their actual heights above their respective ground level elevations.

[13] 40 CFR §51.100(ii).

[14] U S. Environmental Protection Agency, *User's Guide to the Building Profile Input Program*, Research Triangle Park, NC, EPA-454/R-93-038.

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10.2. MODELING EQUIVALENT BUILDING DIMENSIONS

Appendix A provides a summary of structures that were considered in the modeling analysis with their corresponding heights.

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11. RECEPTOR GRIDS

In the air quality dispersion modeling analysis, the modeled ground-level concentrations were determined within four main Cartesian receptor grids. These four grids cover a region extending at least 10 km beyond the Victoria Plant ADN sources. The grids are defined as follows:

- The "fence line grid" (corresponding to single property designation) is a discrete receptor grid with the receptors spaced at 25-m intervals along the combined INVISTA/DuPont/Equistar fence line. Figure 11-1 shows receptor locations for the fence line grid. The fence line grid is at least 300 m away from the sources under consideration. Therefore, a tight grid will not be developed.

- The "fine grid" contains 100-m spaced receptors extending at least 1 km from the sources under consideration, excluding the receptors within the fence line grid. Figure 11-2 shows receptor locations for the fine grid.

- The "medium grid" contains 500-m spaced receptors extending 5 km from the sources under consideration, excluding the receptors within the fence line and fine grids. Figure 11-3 shows receptor locations for the medium grid.

- The "coarse grid" contains 1-km spaced receptors extending at least 10 km from the sources under consideration, excluding the receptors in the fence line, fine, and medium grids. Figure 11-4 shows receptor locations for the coarse grid.

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Figure 11-1. Receptor Locations for the Fence line Grid

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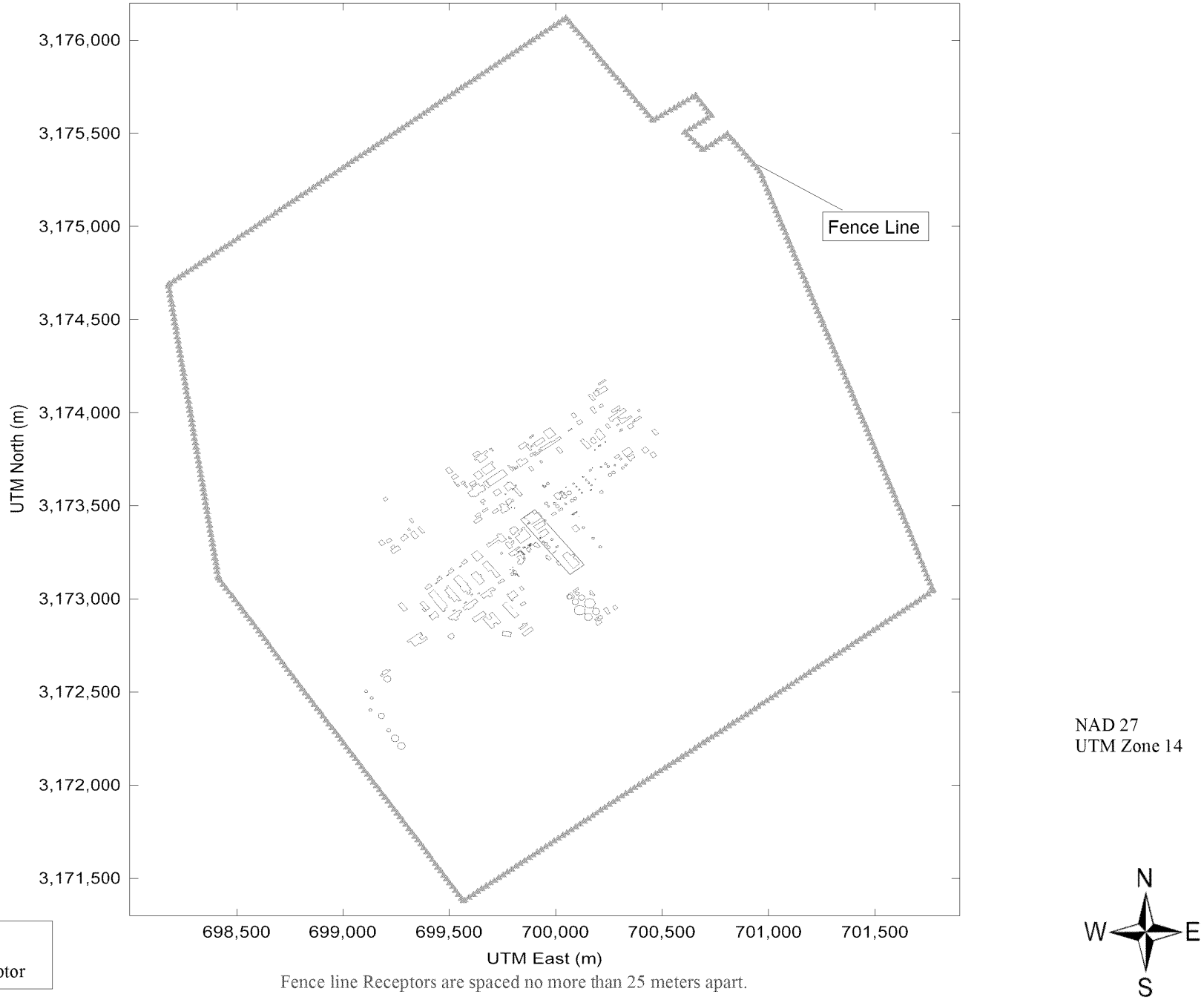
Figure 11-1. Receptor Locations for the Fence line Grid



Fence line Receptors are spaced no more than 25 meters apart.

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Figure 11-2. Receptor Locations for the Fine Grid

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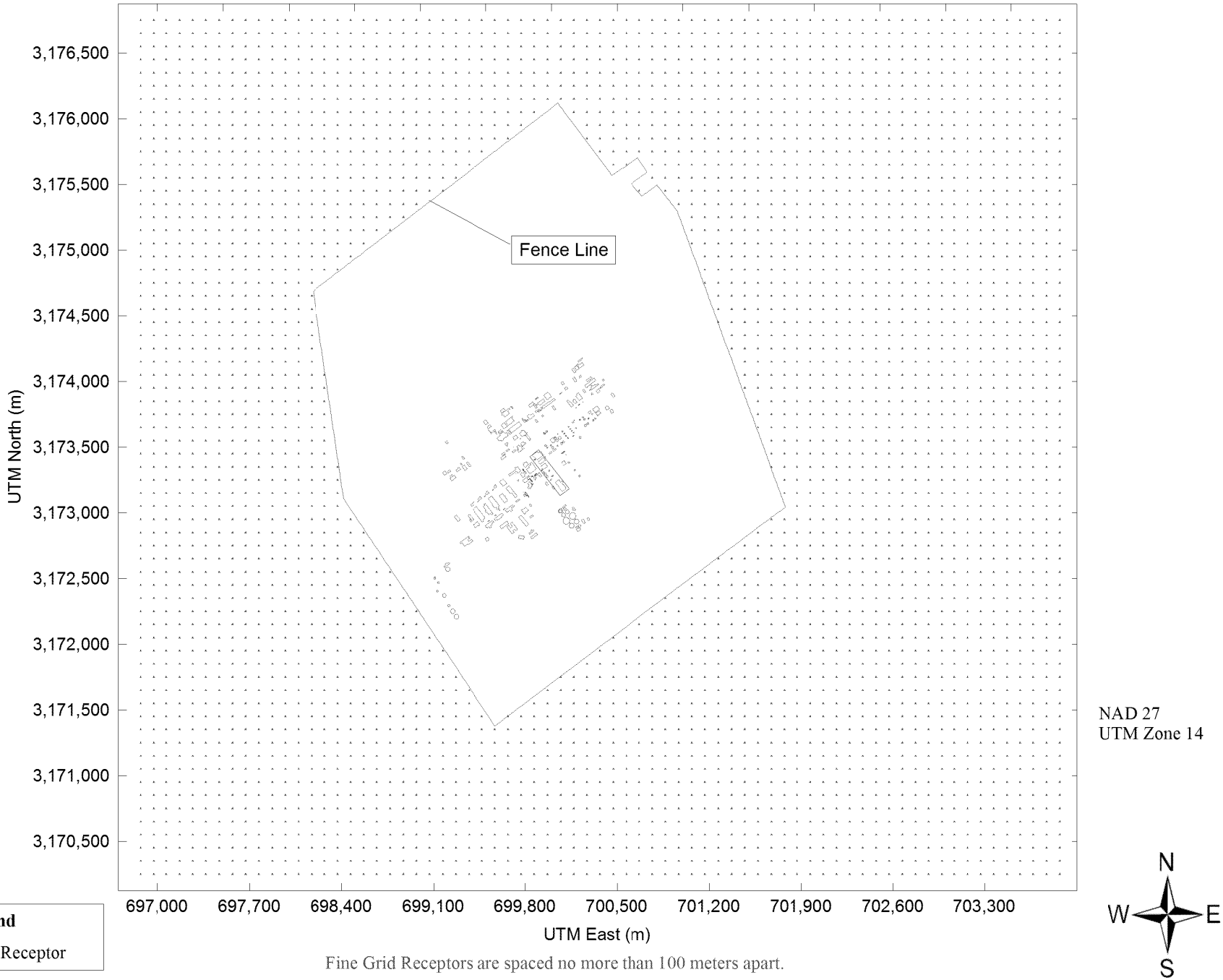
Figure 11-2. Receptor Locations for the Fine Grid



Fine Grid Receptors are spaced no more than 100 meters apart.

Figure 11-3. Receptor Locations for the Medium Grid

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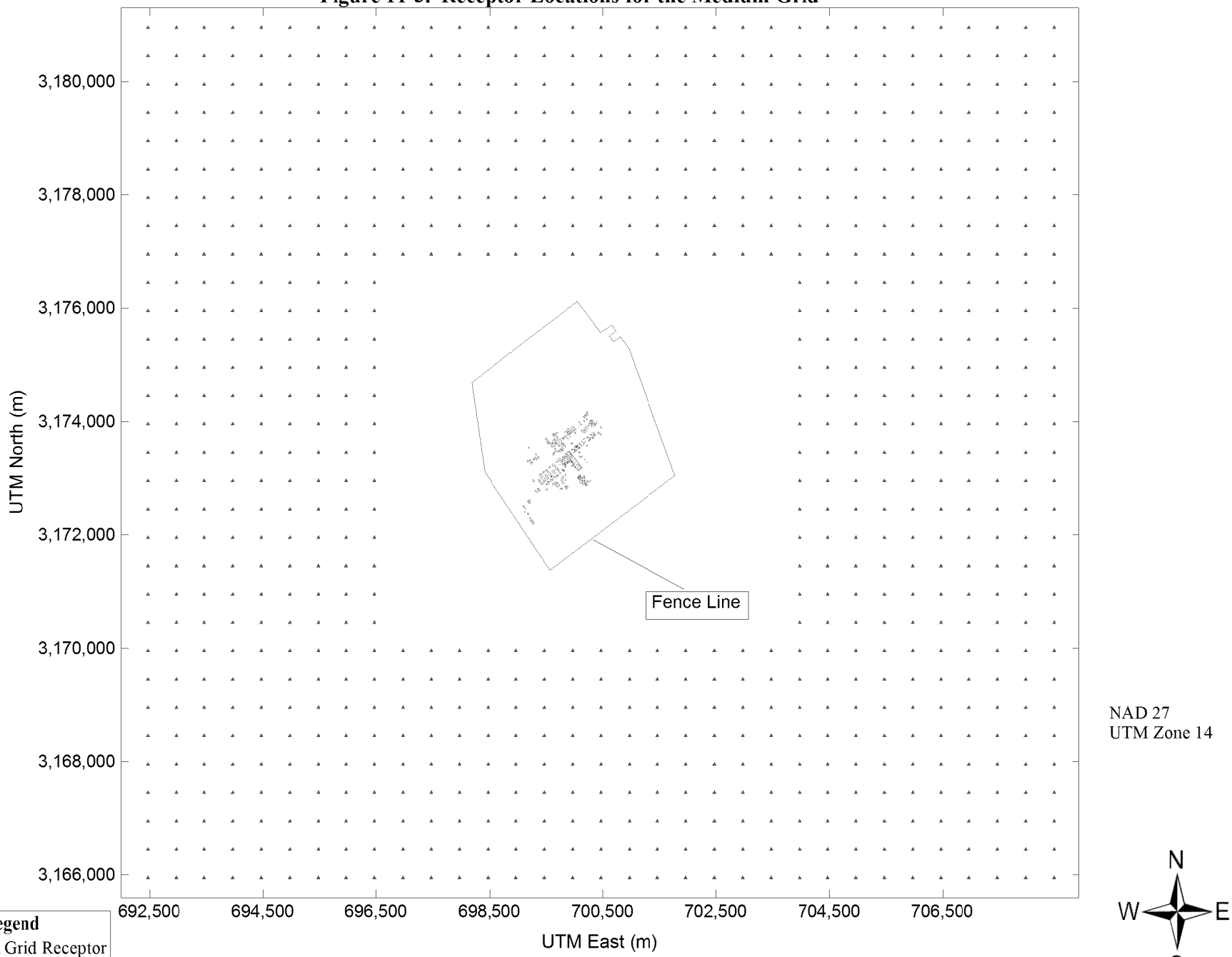
Figure 11-3. Receptor Locations for the Medium Grid



Medium Grid Receptors are spaced no more than 500 meters apart.

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Figure 11-4. Receptor Locations for the Coarse Grid

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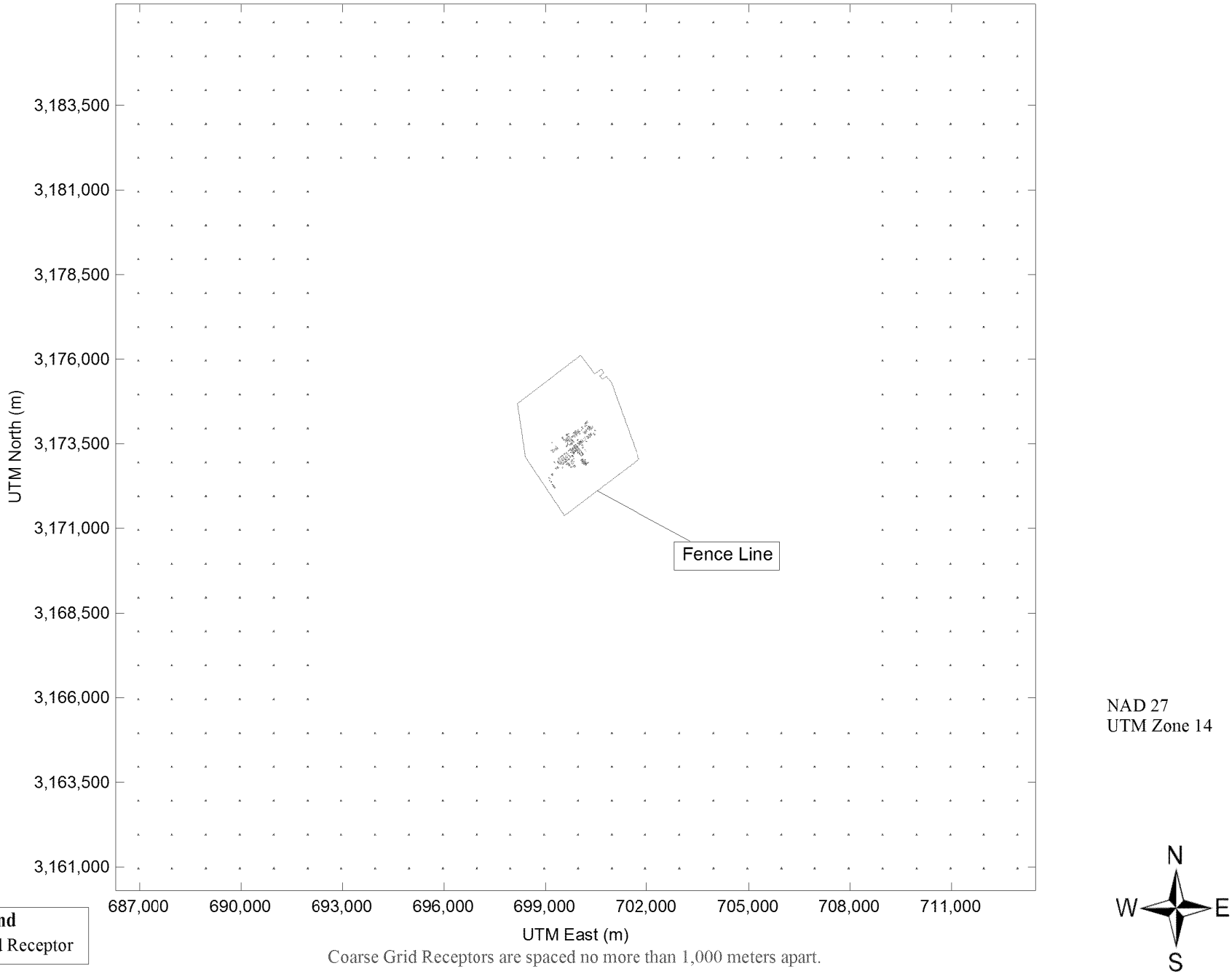
Figure 11-4. Receptor Locations for the Coarse Grid



Coarse Grid Receptors are spaced no more than 1,000 meters apart.

12. METEOROLOGICAL DATA

As recommended by the TCEQ for modeling in Victoria County, pre-processed meteorological data files for the years 2008, 2009, 2010, 2011, and 2012 are based on surface observations taken from the Victoria Regional Airport (Surface ID: VCT, NWS station number 12912), and upper air observations were taken from Corpus Christi (Upper Air ID: CRP, NWS station number 12924), as obtained from the TCEQ. The wind roses for Victoria Regional Airport from the years considered in this modeling analysis are provided in Figure 12-1 through Figure 12-5 to supplement the meteorological data used in the modeling analyses. The wind roses show the direction towards which wind is blowing.

According to the EPA AERMOD Users Guide, a land use analysis must be conducted to properly define surface characteristics, such as albedo, Bowen ratio, and surface roughness length, for input into the AERMET meteorological pre-processor. The AERMOD Users Guide provides surface characteristic parameters based on seasons and the following land use characteristics: water (fresh and sea), deciduous forest, coniferous forest, swamp, cultivated land, grassland, urban, and desert shrub land.[15]

Pre-processed meteorological files obtained from the TCEQ allow the choice of varying roughness length (i.e., short, medium, and long) based on the land use surrounding the facility under evaluation. The land use surrounding the Victoria Plant is predominantly cultivated land, grassland and deciduous forest a moderate density of existing commercial, industrial, and residential structures. The typical surface roughness for this type of land use is generally between 0.1 – 0.7 m, which corresponds to the medium surface roughness category. Therefore, the TCEQ meteorological file containing medium surface roughness parameters was used in this analysis.

[15] Section 4.7.7 of the EPA's AERMOD User Guide, Draft Version, January 1999.

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Figure 12-1. Frequency of Wind Speed and Direction for Meteorological Year 2008

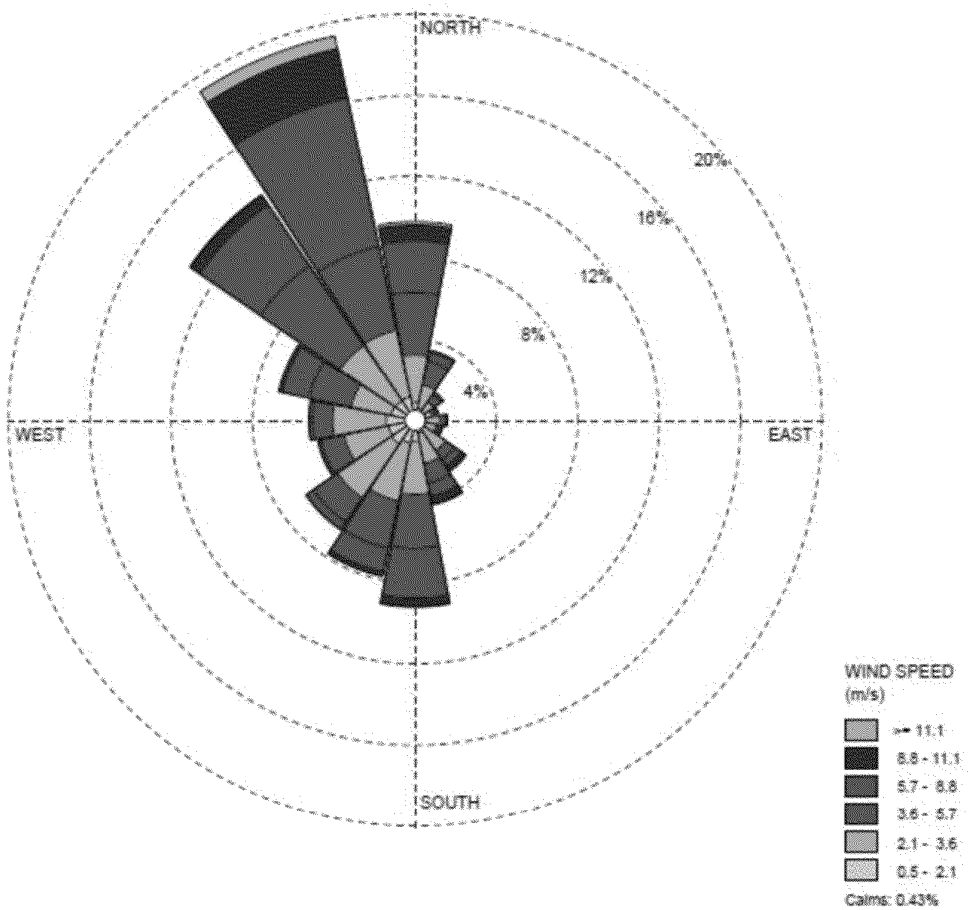

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Figure 12-2. Frequency of Wind Speed and Direction for Meteorological Year 2009

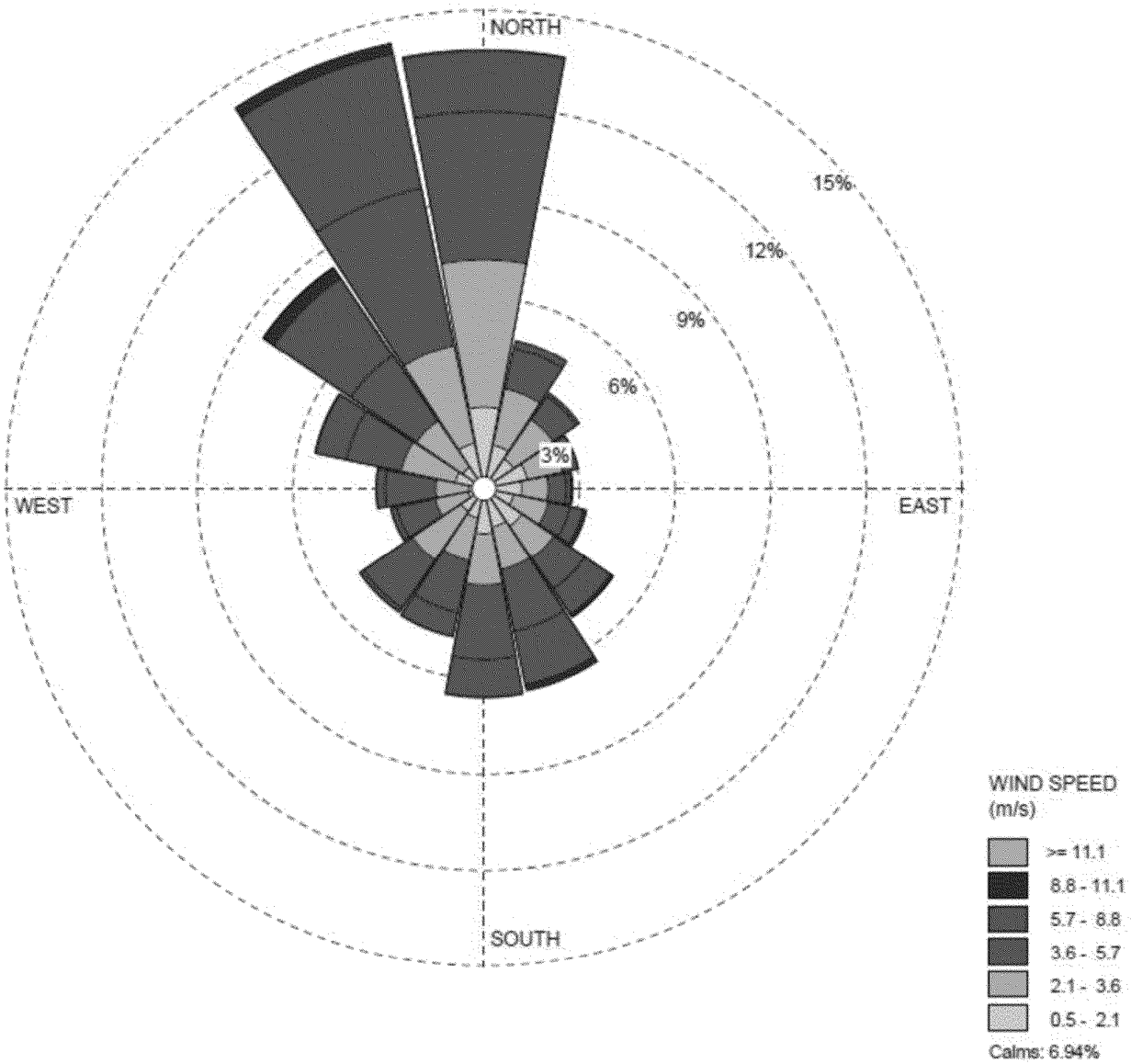

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Figure 12-3. Frequency of Wind Speed and Direction for Meteorological Year 2010

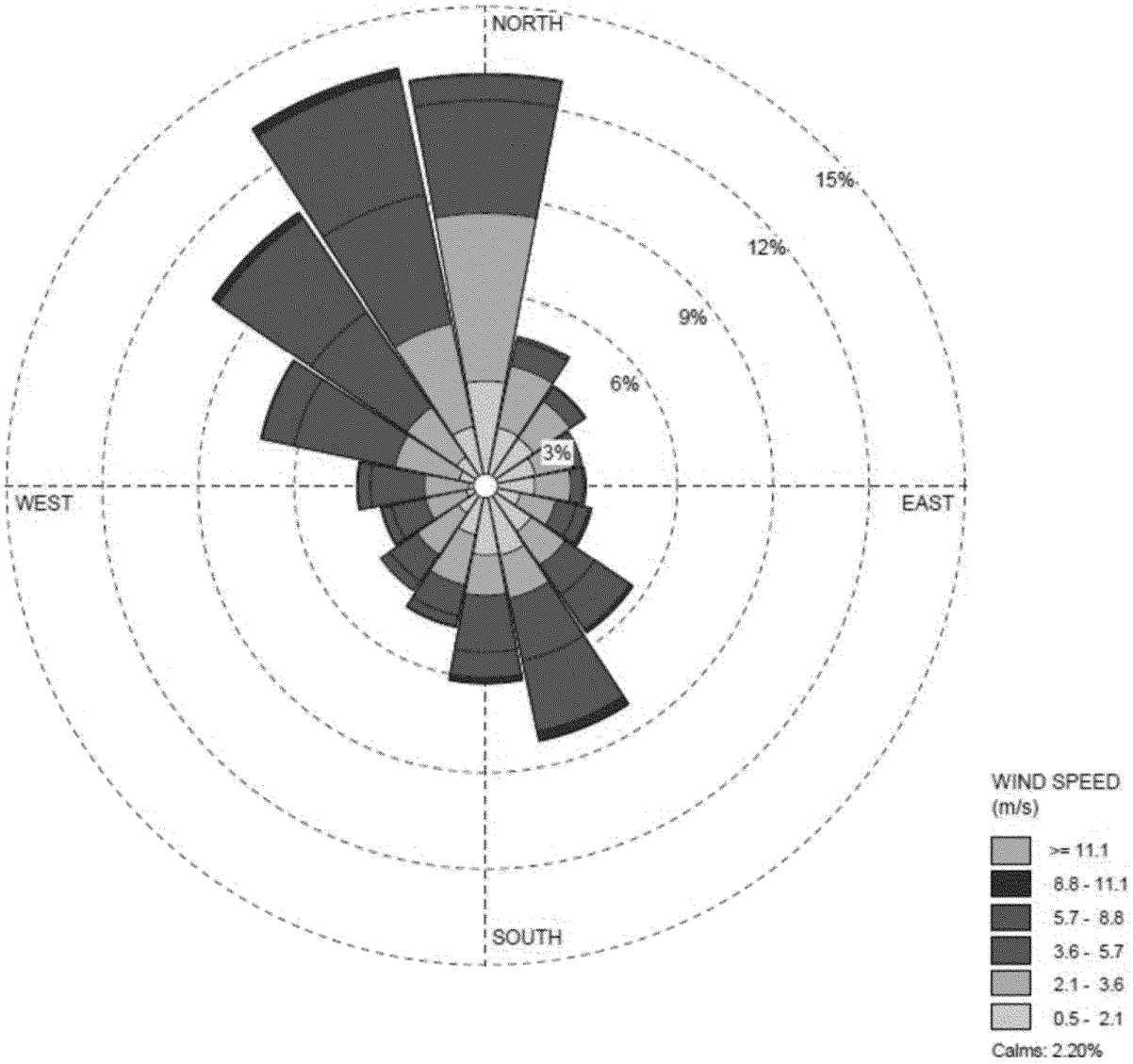

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Figure 12-4. Frequency of Wind Speed and Direction for Meteorological Year 2011

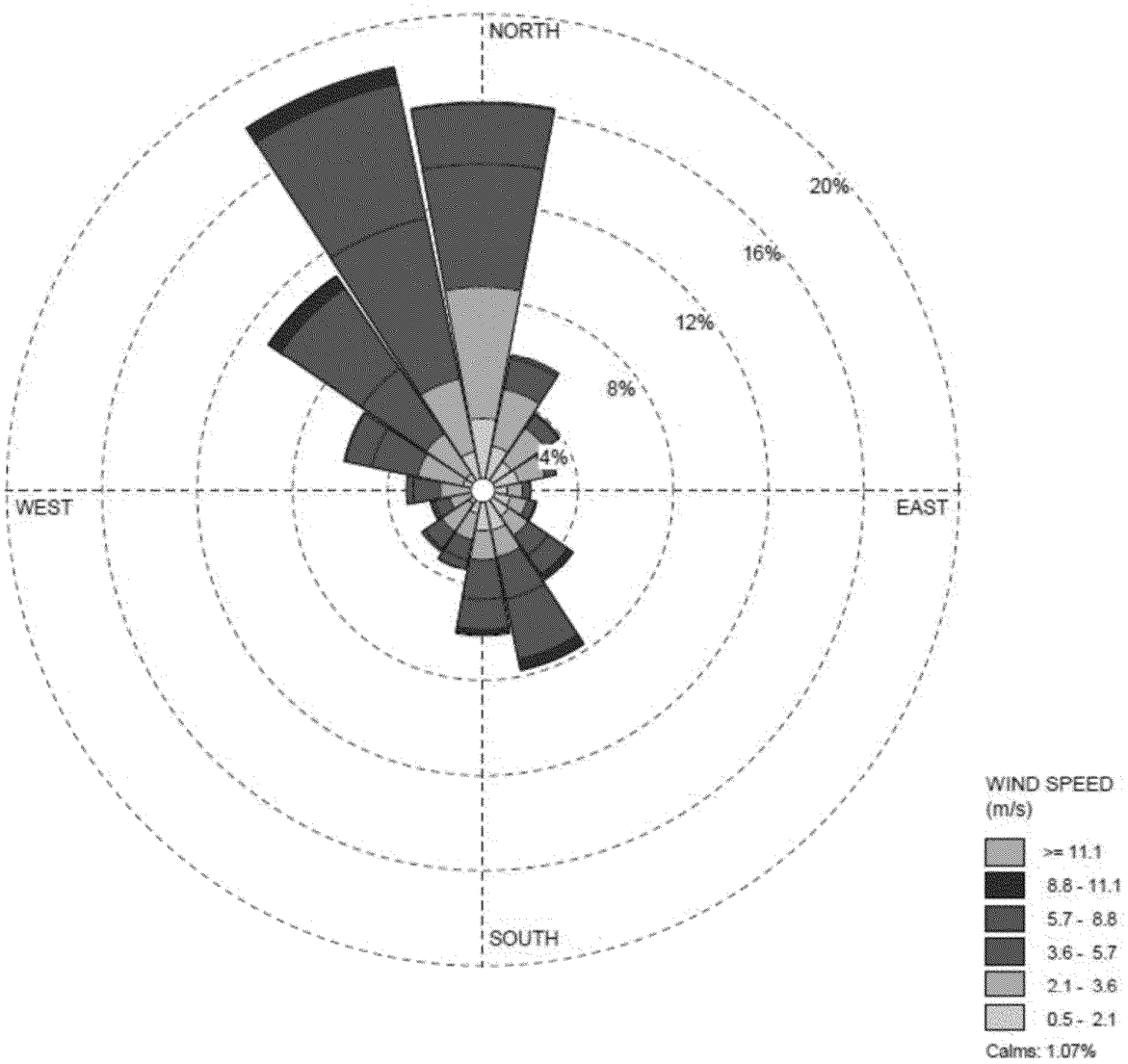

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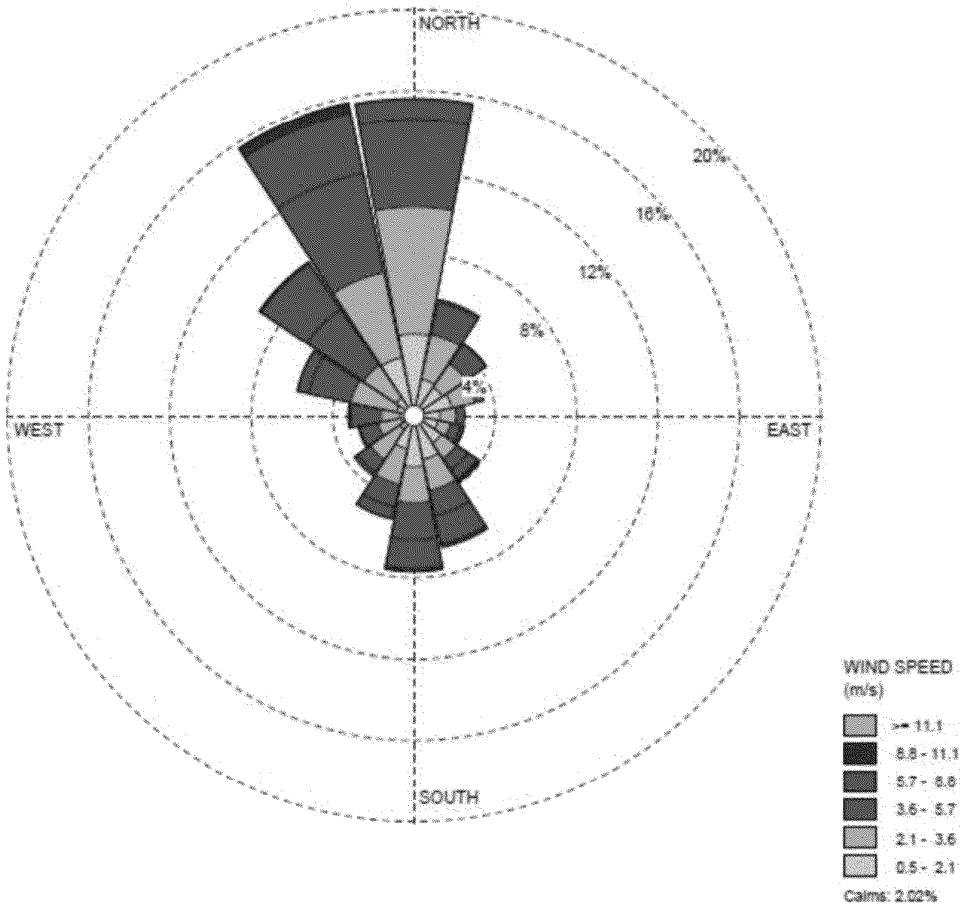
Figure 12-5. Frequency of Wind Speed and Direction for Meteorological Year 2012



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13. MODELING RESULTS

The following section details how the results of the PSD Significance Analysis, the State NAAQS analysis, the State Property Line Analysis, the State Health Effects Analysis, the Ozone Impact Assessment, and the Additional Impacts Analysis (i.e., analyses of impacts on growth, soil and vegetation, visibility, and Class I Areas) will be evaluated and presented in the final modeling report.

13.1. PSD SIGNIFICANCE ANALYSIS

The significance analysis involves modeling the impacts from on-site sources associated with the project to determine if the resulting concentrations exceed the SILs. It is expected that all impacts will be below the corresponding SIL and a Full Impacts Analysis will not be triggered. Modeling results will be presented in tabular format. Concentration plots will also be provided for each set of results.

13.2. STATE NAAQS ANALYSIS

The maximum modeled ground-level concentrations of SO_2 obtained using the approach described in Section 3 will be compared with applicable concentration standards to determine if Full Impact Analysis will be required. It is expected that all impacts will be below the corresponding SIL and a Full Impacts Analysis will not be triggered. If the Full Impact Analysis is required, off-site emission inventory would be obtained and the analysis will be conducted accordingly.

13.3. STATE PROPERTY LINE ANALYSIS

The maximum modeled ground-level concentrations of SO_2 at and beyond the property line obtained using the approach described in Section 3 will be compared with applicable concentration standards. The results will be discussed in this section in the modeling report.

13.4. STATE HEALTH EFFECTS EVALUATION

The maximum modeled ground-level concentrations for each compound listed in Table 3-3 obtained using the approach described in Section 3 will be used to determine if refined air dispersion modeling or effects review is necessary in the MERA analysis. If necessary, the scope of the modeling and effects review will be determined, and such modeling and review will be conducted appropriately.

13.5. OZONE IMPACTS ANALYSIS

Available ozone background monitors in Victoria County were evaluated to establish a representative background concentration for the analysis. There are three ozone monitors located in Victoria County. The documentation in Appendix D provides the 3-year average 8-hour high, fourth-high background concentration at each monitor. The Victoria monitor (EPA ID 48-469-0003) meets the EPA completeness criteria, while the other two monitors do not. In addition, the Victoria monitor is the closest monitor to the INVISTA Victoria site (approximately 18 km). Therefore, the Victoria monitor is chosen as the most representative monitor for purposes of the ozone impacts analysis. As the documentation in Appendix D shows, the 3-year average 8-hour high, fourth-high background concentration at the Victoria monitor is 63 ppb.

INVISTA then evaluated VOC and NO_x emissions in Victoria County using data obtained from the EPA National Emissions Inventory (NEI) to determine that Victoria County is NO_x-limited based on the VOC-to-NO_x ratio

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obtained from the NEI data. The determination was made as follows: the calculated VOC-to-NOx ratio obtained from the NEI data was multiplied by 2.875, which reflects the molar equivalents based upon parts per billion by volume. The molar equivalent conversion factor of 2.875 represents the ratio of NO_2-to-CH_4 molecular weights, consistent with TCEQ guidance. TCEQ guidance further suggests that, if the adjusted VOC-to-NO_x ratio is greater than 2:1, the county is NO_x-limited. As the adjusted VOC-to-NO_x ratio is greater than 2:1 for Victoria County, INVISTA concludes that the county is NO_x-limited.

INVISTA then evaluated the sitewide emissions in the same manner to determine if the project site is VOC-limited or NO_x-limited. As the documentation in Appendix D shows, the INVISTA Victoria site is VOC-limited; thus additional review is required.

Based on TCEQ guidance, INVISTA will employ EPA's recommended ozone impacts screening approach. With this approach, INVISTA will evaluate project 1-hr NO_2 impacts at a distance of 10 km from the Victoria Site using AERMOD. The resulting maximum modeled concentration (in □g/m³) will be converted to ppb using standard temperature and pressure conditions. Using a maximum yield of 90% and three ppb of ozone per one ppb of NO2, a maximum predicted ozone concentration on a 1-hour basis will be conservatively estimated. Conservatively assuming that the ozone increase just calculated would occur for every hour of an 8-hour period, the ozone increase will be added to the representative background concentration for comparison to the ozone NAAQS. In addition, the ozone increase determined as part of the recently approved Permit No. PSDTX1416 will also be added to the background concentration (as emissions from this project will not be included in the monitor data). This analysis will be used to demonstrate that NOx emissions will not have a detrimental impact on ozone concentration in the area.

Also, based on the most recent available emission inventory data from NEI, Victoria County is NO_x-limited. Therefore, any additional VOC emissions, like the VOC emissions from this project, are not expected to impact ozone concentrations.

13.6. ADDITIONAL IMPACTS ANALYSIS

The PSD additional impacts analysis depends on existing air quality, the quantity of emissions, and the sensitivity of local soils, vegetation, and visibility in the source's impact area. The analysis is presented in four parts:

1. Growth analysis
2. Soils and vegetation analysis
3. Visibility impairment analysis
4. Class I area impact analysis

13.6.1. Growth Analysis

The elements of the growth analysis include a projection of the associated industrial, commercial, and residential growth that will occur in the area of impact due to the source, including the potential impact on ambient air due to this growth. Emissions from such growth should be considered if they are specific, well defined, quantifiable, and impact the same general area. Emissions from such growth would be viewed as impacting the same area if they impact an area that is predicted to have impacts from the Victoria Plant's emissions that are greater than the SIL. INVISTA does not anticipate any associated industrial or commercial growth that would impact the significant impact area due to the project. Therefore, negligible growth-related ambient air impacts that would be required to be considered in the PSD application are expected.

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13.6.2. Soil and Vegetation Analysis

The U.S. EPA developed the secondary NAAQS in order to protect certain air quality-related values (i.e., soil and vegetation) that were not sufficiently protected by the primary NAAQS. The secondary NAAQS represent ambient air concentrations below which most types of soil and vegetation are unaffected by criteria pollutants. If ambient air concentrations are found to be less than the secondary NAAQS, emissions from the proposed sources will not result in harmful effects to either soil or vegetation.[16] The maximum modeled ground-level concentrations resulting from the proposed emission sources are compared to the secondary NAAQS to demonstrate insignificant impacts on local soils and vegetation.

13.6.3. Visibility Impairment Analysis

TCEQ guidance states that as part of the Additional Impacts Analysis, a visibility impairment analysis should be performed for a Class I area if the area is within 100 km of the project.[17] The nearest Class I area (Big Bend National Park) is greater than 500 km from the Victoria Plant. The facility is located near Class II areas. Per TCEQ guidance, Class II areas do not require a visibility impairment analysis. The Victoria Plant is in compliance with the visibility and opacity requirements in 30 TAC Chapter 111, which is sufficient to satisfy visibility impairment analysis requirements for Class II areas.

13.6.4. Class I Area Impact Analysis

Class I areas are defined by the U.S. EPA's New Source Review Manual as those areas of the nation that are of special natural, scenic, recreational, or historic interest to the public. Class I areas are designated by the Clean Air Act and have a separate set of PSD increments that are more stringent than the typically considered Class II increments. Federal and TCEQ guidelines require that an air quality dispersion modeling analysis (including visibility analysis) be performed for each Class I area located within 100 km of a facility undergoing an installation/modification that exceeds PSD significant emission rates. Since the nearest Class I area is more than 500 km from the Victoria Plant, a Class I area analysis is not required.

[16] U.S. EPA, Office of Air Quality Planning and Standards, *New Source Review Workshop Manual*, Research Triangle Park, NC, October 1990.
[17] TCEQ, *Air Quality Modeling Guideline*, APDG-6232, Air Permits Division, Austin, TX, April 2015.

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14. ELECTRONIC FILES

The flash drive included with the modeling report package will contain all of the air quality dispersion modeling analysis electronic data files used to generate the results presented in this report. These electronic data files include the following:

- All AERMOD input, output, and plot data
- All BPIP-PRIME (i.e. downwash) input and output data files
- Meteorological Data Files
- National Elevation Dataset (NED) Terrain Data Files

All the AERMOD and BPIP files for each pollutant, averaging period and scenario will be included in respective .zip or .amz extension folders both of which are zipped files.

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Appendix A: LIST OF BUILDINGS/STRUCTURES CONSIDERED IN MODELING

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Table A-1. Circular Buildings

ID	Description	X coordinate	Y coordinate	Elevation	Height	Radius	Corners
		Meters	Meters	Meters	Meters	Meters	
BLD102	08TFX001	700066	3173012	21.34	12.43	11.28	24
BLD103	08RXN006	700092	3172985	21.34	9.75	14.48	24
BLD105	08RXN008	700113	3172940	21.34	9.75	25.45	24
BLD106	08CLF012	700153	3172903	21.34	5.49	18.29	24
BLD107	08RXN007	700121	3173008	21.34	9.75	14.48	24
BLD109	08RXN009	700160	3172977	21.34	9.75	25.45	24
BLD111	08CLF013	700191	3172933	21.34	5.49	18.29	24
BLD113	08TFX016	700213	3172902	21.34	8.53	9.75	24
BLD119	NH3 TANK	699227	3172551	21.03	33.53	16.6	24
BLD121	06TFX013	699129	3172486	20.43	11.28	7.3	24
BLD122	06TFL014	699157	3172451	20.04	11.28	7	24
BLD124	06TFL015	699149	3172388	16.53	11.28	6.8	24
BLD125	06TFL016	699204	3172355	15.59	11.28	14.4	24
BLD126	10TFX080	699270	3172238	14.2	14.63	17.8	24
BLD128	10TANK01	699300	3172198	12.66	8.78	18.29	24
BLD129	07TFX32F	699238	3172277	14.91	8.78	9.14	24
BLD1	04TFX020	700155	3173624.8	21.34	7.01	3.81	24
BLD6	04TFX021	700169	3173611	21.34	7.01	3.81	24
BLD11	04TFX025	700250	3173711	21.34	7.01	5.64	24
BLD13	04TFX026	700238	3173726	21.34	7.01	5.64	24
BLD15	04TFX027	700185	3173800	21.03	7.01	1.83	24
BLD30	04TFX028	700212	3173825	21.03	7.01	2.74	24
BLD34	04TFX029	700204	3173822	21.03	7.01	2.74	24
BLD138	04TFX031	700237	3173843	21.03	7.01	1.52	24
BLD147	06TFX012	699983	3173305	21.03	6.1	1.83	24
BLD180	06TFX033	699930	3173326	21.03	6.1	1.83	24
BLD181	06TFX035	699937	3173321	21.03	4.27	1.52	24
BLD182	06TFX038	699961	3173288	21.03	11.28	7.39	24
BLD183	06TFX041	699865	3173401	20.73	6.1	1.83	24
BLD184	06TFX044	700017	3173276	21.03	9.75	3.58	24
BLD185	06TFX045	700009	3173270	21.03	7.32	2.9	24
BLD186	06TFX054	699933	3173322	21.03	6.1	2.29	24
BLD187	06TFX056	699975	3173270	21.03	11.28	7.39	24

ID	Description	X coordinate	Y coordinate	Elevation	Height	Radius	Corners
		Meters	Meters	Meters	Meters	Meters	
BLD188	06TFX065	699912	3173402	20.73	6.1	3.35	24
BLD189	10TFX027	700084	3173620	21.03	7.32	3.81	24
BLD190	10TFX028	700097	3173603	21.07	7.32	3.81	24
BLD191	10TFX029	700110	3173587	21.26	7.32	3.81	24
BLD192	10TFX030	700123	3173571	21.34	7.32	3.81	24
BLD193	10TFX031	700130	3173656	21.13	6.1	3.81	24
BLD194	10TFX032	700143	3173639	21.34	6.1	3.81	24
BLD195	10TFX035	699963	3173620	20.75	6.1	7.01	24
BLD196	10TFX035B	699941	3173608	20.73	9.14	3.35	24
BLD197	10TFX035C	699954	3173607	20.73	9.14	3.35	24
BLD198	10TFX035D	699948	3173601	20.73	9.14	3.35	24
BLD199	10TFX036	699967	3173498	21.03	6.1	3.81	24
BLD200	10TFX036A	699995	3173513	21.03	12.19	5.94	24
BLD201	10TFX037	699956	3173513	20.99	6.1	7.01	24
BLD202	10TFX037A	700008	3173497	21.03	17.07	8.53	24
BLD203	10TFX054	700167	3173587	21.34	8.84	2.13	24
BLD204	10TFX059	699407	3172911	18.32	7.62	3.05	24
BLD205	10TFX067	699366	3172812	19.91	7.62	2.13	24
BLD206	10TFX33	700130	3173384	21.03	10.98	6.17	24
BLD207	10TFX34A	700175	3173326	21.08	10.98	6.17	24
BLD208	10TFX34B	700212	3173280	21.34	10.98	6.17	24
BLD209	11TFX036	700042	3173551	21.03	7.62	9.14	24
BLD210	11TFX019	700076	3173528	21.03	9.76	7.62	24
BLD211	11TFX018	700091	3173540	21.14	9.76	7.62	24
BLD212	11TFX078	700218	3173575	21.34	9.97	7.62	24
BLD154	04TFX023	700215	3173709	21.29	6.1	3.96	24
BLD213	11TFX55	700048	3173600	21.03	4.27	2.13	24
BLD214	11TFX064	700038	3173570	21.03	2.74	3.05	24
BLD215	11TFX048	700028	3173576	21.03	7.62	4.11	24
BLD216	11SEP055A	700019	3173572	21.03	1.83	1.88	24
BLD217	11TFX070	700022	3173534	21.03	1.22	0.91	24
BLD218	1TFX067	700110	3173441	21.14	12.43	1.07	24
BLD219	11TFX053	700072	3173453	21.03	9.75	1.19	24
BLD221	11TFX052	700081	3173454	21.04	9.75	3.05	24
BLD222	11TFX051	700086	3173458	21.09	5.49	3.05	24

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ID	Description	X coordinate	Y coordinate	Elevation	Height	Radius	Corners
		Meters	Meters	Meters	Meters	Meters	
BLD223	11TFX050	700093	3173463	21.16	9.75	3.05	24
BLD224	11TFX049	700098	3173468	21.21	9.75	3.05	24
BLD225	15TFX021	699792	3173492	20.73	5.49	1.83	24
BLD226	15TFX023	699808	3173488	20.73	8.53	0.84	24
BLD228	15TFX022	699765	3173564	20.73	33.53	1.83	24
BLD229	15TFX024	699709	3173500	20.73	11.28	0.76	24
BLD220	Head Tank 1	700138	3172921	21.34	11.28	1.98	24
BLD227	Head Tank 2	700178	3172952	21.34	11.28	1.98	24
BLD230	18TFX028	699796	3173134	21.34	7.01	7.39	24
BLD231	18TFX062	699786	3173159	21.34	14.63	1.52	24
BLD232	18TFX062A	699799	3173171	21.34	8.78	0.38	24
BLD233	18TFL030	699801	3173153	21.34	6.4	4.88	24
BLD234	18TFL027	699809	3173144	21.34	7.01	7.39	24
BLD235	18TFX072	699811	3173129	21.34	7.01	1.52	24
BLD237	18TFX073	699818	3173134	21.34	7.01	2.29	24
BLD238	18TFL065	699823	3173128	21.34	7.01	2.13	24
BLD239	18TFX061	699828	3173121	21.34	7.01	2.13	24
BLD240	07TFX023	699857	3173216	21.34	7.01	1.52	24
BLD241	07TFX040	699852	3173222	21.34	7.01	4.57	24
BLD242	07TFX025	699825	3173255	21.34	7.01	1.37	24
BLD243	07TFX057	699829	3173254	21.34	6.1	1.83	24
BLD244	07TFX038B	699835	3173260	21.34	6.1	3.35	24
BLD245	07TFX040A	699841	3173253	21.33	4.27	3.35	24
BLD246	07TFX038A	699846	3173246	21.34	11.28	3.35	24
BLD247	97TFX024	699852	3173240	21.34	6.1	3.35	24
BLD248	07TFX034	699849	3173276	21.26	9.75	3.35	24
BLD249	07TFX033A	699854	3173281	21.19	7.32	1.83	24
BLD250	07TFX033B	699857	3173277	21.18	6.1	1.83	24
BLD251	07TFX032C	699872	3173288	21.03	11.28	1.83	24
BLD252	07TFX032D	699875.5	3173285.2	21.03	6.1	1.83	24
BLD253	07TFX032B	699876	3173291	21.03	7.32	1.83	24
BLD254	07TFX032A	699879	3173294	21.03	7.32	1.83	24
BLD255	07TFX032E	699884.4	3173290.9	21.03	7.32	1.83	24
BLD236	10TFX054A	700163	3173584	21.34	7.32	2.13	24
BLD256	10TFX032B	700063	3173570	21.03	6.1	10.69	24

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ID	Description	X coordinate	Y coordinate	Elevation	Height	Radius	Corners
		Meters	Meters	Meters	Meters	Meters	
BLD257	06TFX387	699989	3173313	21.03	7.62	5.33	24
BLD258	07TFX039	699846.8	3173240.8	21.34	5.79	1.83	24
BLD259	07TFX697	699782.3	3173330.3	21.12	5.49	3.35	24
BLD260	07TFX013A	699879.3	3173287.8	21.03	3.05	1.83	24
BLD261	07TFX013B	699881.9	3173285.2	21.03	3.05	1.83	24
BLD262	07TFX014	699882	3173297	21.03	2.74	1.83	24
BLD263	07TFX017	699885	3173299	21.03	6.1	1.37	24
BLD264	07TFX698	699787.6	3173324.5	21.15	5.49	3.35	24
BLD265	07TFX035	699730	3173301	21.34	1.83	0.81	24
BLD266	07TFX054A	699883	3173271	21.08	0.76	0.46	24
BLD145	17TFX547	699892	3173877	20.73	9.14	4.57	24
BLD268	17TFX548	699882	3173868	20.73	9.14	4.57	24
04TFX22B		700317	3173704	21.34	9.14	5.79	24
04TFX22A		700332.4	3173719	21.34	9.14	5.79	24
4TFX034A	04TFX034A	700257	3173666	21.34	9.75	7.92	24
4TFX034B	04TFX034B	700274	3173679	21.34	9.7536	7.9248	24
4TFX044	04TFX044	700280	3173719	21.34	7.32	3.66	24

Table A-2. Polygon Buildings

ID	Description	X coordinate	Y coordinate	Elevation	Height
		Meters	Meters	Meters	Meters
BLD4	BLDG 11	699268.9	3173326.4	19.81	7.28
BLD16	BLDG 1	699611.7	3173776.6	20.64	4.27
BLD20	BLDG 531	699813.8	3173737.8	20.73	5.43
BLD25	BLDG 530	699926.2	3173810.1	20.73	4.39
BLD26	BLDG 539	699936.6	3173867.5	20.73	16.37
BLD40	BLDG 2	699705.7	3173793.5	20.73	2.8
BLD52	BLDG 551	700182.7	3173996	21.03	6.71
BLD53	BLDG 561	700212.2	3174026.4	21.03	19.81
BLD56	BLDG 560A	700191.8	3174086.1	21.03	7.62
BLD57	BLDG 560	700190.4	3174125	21.03	5.49
BLD60	BLDG 570	699724.3	3173115.7	21.34	4.21
BLD61	BLDG 404	699558.8	3173197	20.73	7.38

ID	Description	X coordinate	Y coordinate	Elevation	Height
		Meters	Meters	Meters	Meters
BLD62	BLDG 460	699601.8	3173129.1	20.74	22.86
BLD63	BLDG 403	699505.4	3173136.4	20.42	7.38
BLD64	BLDG 450	699520.4	3173108.3	20.2	19.66
BLD65	BLDG 402	699450.1	3173094.8	20.12	7.28
BLD66	BLDG 440	699495.5	3173070.8	20.12	32.77
BLD67	BLDG 401	699391.9	3173050.7	19.92	7.28
BLD68	BLDG 430	699399.5	3173027.8	19.81	38.28
BLD69	REGRIG	699404.1	3172907.9	18.22	14.05
BLD74	OFFICES	699828.5	3172844.1	20.42	3.57
BLD78	BLDG 611	699796.8	3172988.9	20.98	4.57
BLD84	BLDG 323	700352.8	3173737.8	21.34	7.53
BLD88	OPER 4	699851.1	3173430	20.73	27.22
BLD89	OPER 2&3	699914.9	3173362.2	21.03	25.36
BLD90	OPER 1	699941.6	3173320.8	21.03	44.78
BLD94	OFFICE & CCR	699836.5	3173298	21.15	7.07
BLD99	OP 16	699685.3	3173280.2	21.34	27.61
BLD115	BLDG 387	700187.3	3172874	21.34	15.24
BLD116	BLDG 382	700248.3	3172917.4	21.34	7.44
BLD120	NH3 STG&REFRIG	699202.7	3172570.8	21.03	10.67
BLD135	BLRS 1THRU4	699736.2	3173502.8	20.73	18.29
BLD136	OPER 5	699796.9	3173589.2	20.73	22.4
BLD137	SHOP	699800.3	3173344.3	21.03	7.62
BLD141	OP 13	699855.1	3173208.6	21.34	18.84
BLD142	OP 12	699860.1	3173267.2	21.22	16.64
BLD143	OP 11	699907.3	3173284.5	21.03	16.25
BLD150	PRIMARY FILTRATION BLDG	699989.1	3173557.1	21.02	14.51
BLD155	BLDG 542	700151.4	3173805.8	21.03	15.24
BLD156	BLDG 543	700180	3173834	21.03	6.71
BLD163	AOP	699797.8	3173590	20.73	22.4
BLD165	BLDG 540	700183.8	3173890.1	21.03	24.44
BLD167	BLDG 553	700263	3173954.1	21.03	13.72
BLD168	BLDG 554 & 556	700293	3173971.8	21.03	6.1
BLD170	BLDG 558 & 559	700351.1	3173912.8	21.03	27.43
BLD171	BLDG 557	700364.2	3173943.6	21.03	6.1

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ID	Description	X coordinate	Y coordinate	Elevation	Height
		Meters	Meters	Meters	Meters
BLD173	BLDG 555A	700305.2	3173898.1	21.03	5.49
BLD2	Natural Gas Purification	699494.6	3172800.6	16.32	9.27
BLD18	TANK FARM #3	699663.7	3173003	20.15	12.5
BLD19	TANK FARM #2	699565.2	3172955	18.39	12.31
BLD21	TANK FARM #1	699497.2	3172900.9	17.48	15.36
BLD22	CUBE SHOP	699700.4	3172841.7	19.92	9.6
BLD23	OP 15	699783.7	3173269.8	21.34	14.02
BLD24	OP 14	699790.6	3173230.9	21.34	20.97
BLD41	WW EQUALIZATION	700089.9	3173031.4	21.34	9.24
BLD49	ACIDS WW EQUALIZATION	700061	3173025.1	21.34	15.03
BLD55	COOLING TOWERS	700159.1	3173026.3	21.34	5.52
BLD80	BLDG 491	700047.4	3173504.4	21.03	4.15
BLD81	SWITCH GEAR ROOM	699778.4	3173506.8	20.73	5.43
BLD92	BLDG 3	699607.2	3173596.2	20.42	4.45
BLD104	BLDG 5	699649.2	3173694.8	20.62	9.42
BLD127	CHEMICAL BLDG	699904.7	3173767.5	20.73	4.15
BLD140	WATER BLDG	699882.9	3173795.8	20.73	5.09
BLD149	POWERHOUSE	699838.2	3173802.3	20.73	18.35
BLD178	BLDG 13	699373.1	3173352.3	19.81	4.45
BLD179	NRU PROCESS BLDG	699336.6	3172746.9	20.89	38.28
BLD267	Op 11 A	699953.7	3173231.9	21.03	7.62

Table A-3. Rectangular Buildings

ID	Description	X coordinate	Y coordinate	Elevation	Height	X length	Y length	Angle
		Meters	Meters	Meters	Meters	Meters	Meters	Degree
BLD31	Abatement Complex	699181.9	3173286.1	20.1	2.44	20.1	24.2	-37.7
BLD32	BLDG 36	699210.4	3173301.1	19.81	4.45	23.6	14	-37.9
BLD33	BLDG 8	699338.2	3173323.2	19.81	6.61	20.7	36.9	-37.9
BLD35	BLDG 6	699325.8	3173408.3	19.82	5.88	11	24.5	-38.3
BLD36	BLDG 15	699500.4	3173671.6	20.42	5.09	23	30.4	-36.2
BLD37	BLDG 16	699521.3	3173641.3	20.42	5.18	27.4	17.6	-37.7
BLD38	BLDG 10	699684.1	3173597	20.73	5.18	12.6	36.4	-37.6

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ID	Description	X coordinate	Y coordinate	Elevation	Height	X length	Y length	Angle
		Meters	Meters	Meters	Meters	Meters	Meters	Degree
BLD39	BLDG 4	699695.9	3173606.9	20.73	11.77	97.8	36	-37.7
BLD42	BLDG 109	699796.3	3173687.5	20.73	5.18	9.7	19.8	-37.5
BLD43	BLDG 119	699780.1	3173708.7	20.73	5.09	7.4	10.4	-38.4
BLD44	BLDG 525	699887.7	3173686.6	20.73	5.52	13.2	24.1	-37.9
BLD45	BLDG 101 & 102	699932.5	3173730	20.73	5.18	9.8	14.4	-33.4
BLD46	BLDG 537	699928	3173788.8	20.73	5.91	8	15.1	-38.4
BLD47	BLDG 538	699887.3	3173816.4	20.73	4.57	10.3	6	-38.3
BLD48	BLDG 526	700021.7	3173782.9	20.73	5.03	14.5	32.3	-36.3
BLD50	BLDG 12	700085	3173972.5	21.03	5.79	17.1	22.9	-37.4
BLD51	BLDG 544	700108.1	3173935.4	21.03	5.79	22.3	18	-35.9
BLD54	BLDG 591	700175.5	3174065.3	21.03	5.49	13.2	35.5	-37.9
BLD58	BLDG 567	700206.3	3174148.5	21.03	4.27	41.2	7.9	-38
BLD59	BLDG 420	699632.1	3173203.5	21.34	5.12	35.1	44.1	-38.2
BLD70	BLDG 418	699623.1	3172877.6	18.45	6.74	64.9	24.1	-36.8
BLD73	PIPE SHOP	699808.1	3172898.4	20.42	8.23	24.7	90.2	-39.7
BLD75	ADMINISTRATION	699852.9	3172800.7	20.42	4.72	55	18.1	-38.6
BLD76	RECEIVING AND STORES	699748.8	3172805.2	20.12	6.4	40.3	22.8	8.4
BLD77	PAINT SHOP	699842	3172961.7	20.73	5.79	24.2	12.5	-38.3
BLD79	BLDG 552	700271.4	3174000.6	21.03	6.71	45.2	13.2	-36.8
BLD82	BLDG 324	700332.3	3173764.6	21.34	7.04	40.1	31.9	-36.8
BLD85	SHOPS	700420.3	3173782.9	21.34	6.1	24.5	24.9	-37.7
BLD86	CHANGE ROOM	700458.7	3173758.1	21.34	4.57	20.4	25.6	-36.8
BLD87	BLDG 568	700470.5	3173880.2	21.34	5.49	16.2	30.2	-38.2
BLD100	OP SHELTER	699745.2	3173239.5	21.34	3.9	10.3	8.7	-41.4
BLD101	BLDG 572	699734.7	3173080.8	21.34	3.96	30.4	10.3	-36.6
BLD114	DEWATERING	700186.4	3172883.9	21.34	7.19	20.4	9.4	-35.2
BLD117	BLDG 339	700281.4	3172941.8	21.34	5.61	15.8	20.1	-39.3
BLD118	BLDG 417	699285.7	3172934.7	19.42	4.57	20	44.5	-37.7
BLD130	COGEN TURBINE	699625	3173404.6	20.68	19.51	39.9	16.9	-37.7
BLD131	EIR	699629.2	3173437.9	20.72	6.49	25.8	13.4	-37.1
BLD133	SHOP	699710.1	3173458.1	20.73	7.62	29.2	12.3	-37.3
BLD134	BLDG 17	699661.6	3173465.7	20.73	9.63	28.3	9.2	-37.7
BLD144	OP 1A	700016.5	3173180.4	21.03	4.79	11.1	23.5	-37.3
BLD146	OPERATION 1A	700088.1	3173154.7	21.34	16.76	49.7	91	-37
BLD148	NICKEL WHSE	700093.2	3173359.1	21.03	6.1	24.9	30.7	-37.3

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ID	Description	X coordinate	Y coordinate	Elevation	Height	X length	Y length	Angle
		Meters	Meters	Meters	Meters	Meters	Meters	Degree
BLD151	BLDG 509B	700186.3	3173640.2	21.34	10.06	7.9	6.4	-35.7
BLD153	BLDG 509A	700161.5	3173685.3	21.14	8.23	9.9	8.1	-36.4
BLD158	SUB 27 ECR	700307.7	3173745.1	21.34	4.57	10.2	8	-38.2
BLD160	BLDG 4093	700284.9	3173752.7	21.34	9.57	24.1	13.4	-36.4
BLD161	GARAGE	699842	3173046.4	21.32	6.1	12.6	18.9	-37
BLD162	BLDG 528	699654.5	3173514.2	20.68	15.88	21.4	13.2	-36.1
BLD164	ACIDS POWER SHOP	699721.5	3173553.8	20.73	2.44	31.6	25.9	-36.8
BLD166	BLDG 108	700060.7	3173901	20.73	4.45	23.3	3.4	-35.4
BLD169	BLDG N2	700392.4	3174005.1	21.03	6.61	9.9	11.2	-36.4
BLD172	BLDG 589TF	700249.1	3173914.5	21.03	5.88	13.9	23.8	-35.1
BLD174	BLDG 555B	700290.4	3173930.1	21.03	5.09	12.6	5.1	-37
BLD3	BLDG 483	699392.6	3172939.4	19.36	5.18	17.6	49.4	-39.9
BLD5	ChemTRT	699383.6	3172931.9	18.99	5.18	8.9	18.5	-39.6
BLD7	DVH1	699437.1	3173081.9	20.12	11.77	12.6	2.8	-38.2
BLD8	DVH2	699489.7	3173123	20.35	5.18	12.7	2.9	-38
BLD9	DVH3	699550.8	3173170.7	20.6	5.09	13	3	-38.5
BLD10	DVH4	699519.4	3172933.4	17.91	5.52	12.8	3.4	-37
BLD12	DVH5	699573.6	3172975.8	18.88	5.18	11.4	3.3	-37.9
BLD14	MAINT PAD	699604.5	3173018.4	19.93	5.91	8.7	5.2	-39.4
BLD17	DVH6	699635.1	3173024.5	20.14	4.57	12.7	3.1	-39.2
BLD27	OPSHELTERB	699987.8	3173242.3	21.03	5.03	10	4.3	-38.9
BLD28	OPER SHELTER	699998.9	3173254.3	21.03	5.79	5.5	3.1	-36.9
BLD29	INFLUENT COOLING TOWERS	700086.3	3173036.4	21.34	5.79	29.7	8.7	-38.7
BLD71	COOLING TOWER	699986	3173444.5	21.03	5.49	22.2	12.3	-38.8
BLD72	COOLING TOWER	700017.1	3173468.6	21.03	4.27	23.1	10.6	-38.3
BLD83	DRY STORAGE	699662.4	3173506.6	20.73	5.12	4.3	5.3	-42.2
BLD91	BLDG 3A	699603	3173606.1	20.42	6.74	29.9	15.4	-37.5
BLD93	LIBRARY	699612.3	3173600.9	20.42	8.23	21.9	9.7	-37.4
BLD95	COVERED STORAGE	699561.1	3173616.2	20.42	4.72	18.5	10	-37.3
BLD96	COVERED DRUM STORAGE	699583.8	3173597.1	20.42	6.4	6.4	25.5	-36.7
BLD97	COVERED STORAGE	699542.8	3173603.1	20.42	5.79	9.2	9.9	-35.8
BLD98	COVERED CYL STORAGE	699534.8	3173613.8	20.42	6.71	3.2	21.9	-41.2
BLD108	STORES WAREHOUSE	699638.1	3173640.9	20.5	7.04	30.5	36.3	-37.3

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ID	Description	X coordinate	Y coordinate	Elevation	Height	X length	Y length	Angle
		Meters	Meters	Meters	Meters	Meters	Meters	Degree
BLD110	FIRETRUCK SHELTER	699808	3173693	20.73	6.1	6.3	20.2	-38
BLD112	FTBLDG1	699814.5	3173698.4	20.73	4.57	4.3	5.9	-37.4
BLD123	FTBLDG2	699818.8	3173701.4	20.73	5.49	8.5	8.8	-39.7
BLD132	WATER TREATMENT	699900.9	3173774.1	20.73	3.9	13.3	12.2	-36.4
BLD139	WATER BLDG	699884.4	3173763.7	20.73	3.96	15.8	12.8	-37.3
BLD157	DELUGE	700170.5	3173702.2	21.04	5.61	3.8	2.4	-35.4
BLD159	ARTHUR BROS PAINT SHOP	699198.2	3173525.2	20.12	4.57	16.5	17.5	-36.9
BLD175	BLDG 31	699236.4	3173243.4	19.81	19.51	42.8	22.2	-38.1
BLD176	PAINT SHOP	699231.4	3173268.4	19.81	6.49	19.5	13.5	-37.5
BLD177	OIL DRUM STORAGE	699309.4	3173364.3	19.81	7.62	8.4	12.9	-36.3
USFLTR	US Filter Building	699969	3173860	20.73	9.63	40.23	45.72	-37

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Appendix B: SOURCE PARAMETERS AND EMISSION RATES

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Table B-1. Modeled Point Source Parameters

Emission Points			UTM Coordinates of Emission Points			Stack Height	Stack Exit Data		
							Diameter	Velocity	Temp
Model ID	EPN	Source Description	Zone	East (meters)	North (meters)	(ft)	(ft)	(fps)	(°F)
10FLR03	10FLR-001 10FLR-002 10FLR-003 10FLR-003A	Converter Flares	14	699420	3173000	140	8.50	65.6168	1831.73
10FLR4	10FLR-004	Ammonia Startup Flare	14	699397	3173250	140	0.003	65.6168	1831.73
10FLR04A	10FLR-004A	Ammonia Tank Flare	14	699252	3172593	35	0.33	65.6168	1831.73
10FLR04B	10FLR-004B	Butadiene Flare	14	699252	3172593	35	0.003	65.6168	1831.73
10FLR05	10FLR-005	Adiponitrile Flare	14	699473	3172901	151	0.003	65.6168	1831.73
10VNT255	10VNT-255	Pump Tank Scrubber and Closed Sump	14	699448	3173161	0	0.003	0.78	76

Table B-2. Modeled Area Source Parameters

Emission Point			UTM Coordinates of Emission Points			Release Height	Fugitive Data		
							Length	Width	Axis Degrees
Model ID	EPN	Source Description	Zone	East (meters)	North (meters)	(ft)	(ft)	(ft)	
10FUG	10FUG	ADN Fugitives	14	699180	3172709	0	870	700	0

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Table B-3. Emission Increases and Modeled Emission Rates for PSD Analysis

Pollutant	Affected Source EPN	Source Description	Project Increase	Modeled Emission Rate [1]	
			tpy	lb/hr	tpy
NO_X	10FLR-001 10FLR-002 10FLR-003 10FLR-003A	Converter Flares	9.55	1.74	7.16
	10FLR-004	Ammonia Startup Flare	4.50	0.82	3.38
	10FLR-004A	Ammonia Tank Flare	0.84	0.15	0.63
	10FLR-004B	Butadiene Flare	2.85	0.52	2.14
	10FLR-005	Adiponitrile Flare	163.25	29.82	163.25
	15STK-006	Boiler 3 & 4 Stack	180.52	--	135.39
	17STK-007	Boiler 7 & 8 Stack	242.65	--	181.99
CO	10FLR-001 10FLR-002 10FLR-003 10FLR-003A	Converter Flares	27.46	6.27	27.46
	10FLR-004	Ammonia Startup Flare	8.66	1.98	8.66
	10FLR-004A	Ammonia Tank Flare	2.23	0.51	2.23
	10FLR-004B	Butadiene Flare	9.92	2.26	9.92
	10FLR-005	Adiponitrile Flare	2240.21	511.46	2240.21
	10FUG	ADN Fugitives	0.08	0.02	0.08
	10VNT-255	Pump Tank Scrubber and Closed Sump	0.07	0.02	0.07
	15STK-006	Boiler 3 & 4 Stack	35.75	--	35.75
	17STK-007	Boiler 7 & 8 Stack	14.39	--	14.39

1. Modeled Emission Rate reflects NO_2 emission rate, based on applying the ARM ratio of 0.80 to (lb/hr) NO_X rates and 0.75 to (tpy) NO_X rates

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Table B-4. Emission Increases and Modeled Emission Rates for State NAAQS Analysis

Pollutant	Affected Source EPN	Source Description	Proposed Emission Rates		Current Emission Rates Authorized under Permit # 7186		Emission Increases		Modeled Emission Rate	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
SO_2	10FLR-004A	Ammonia Tank Flare	0.04	0.02	0.02	0.02	0.02	--	0.02	--

Appendix C: **PLOT PLAN**

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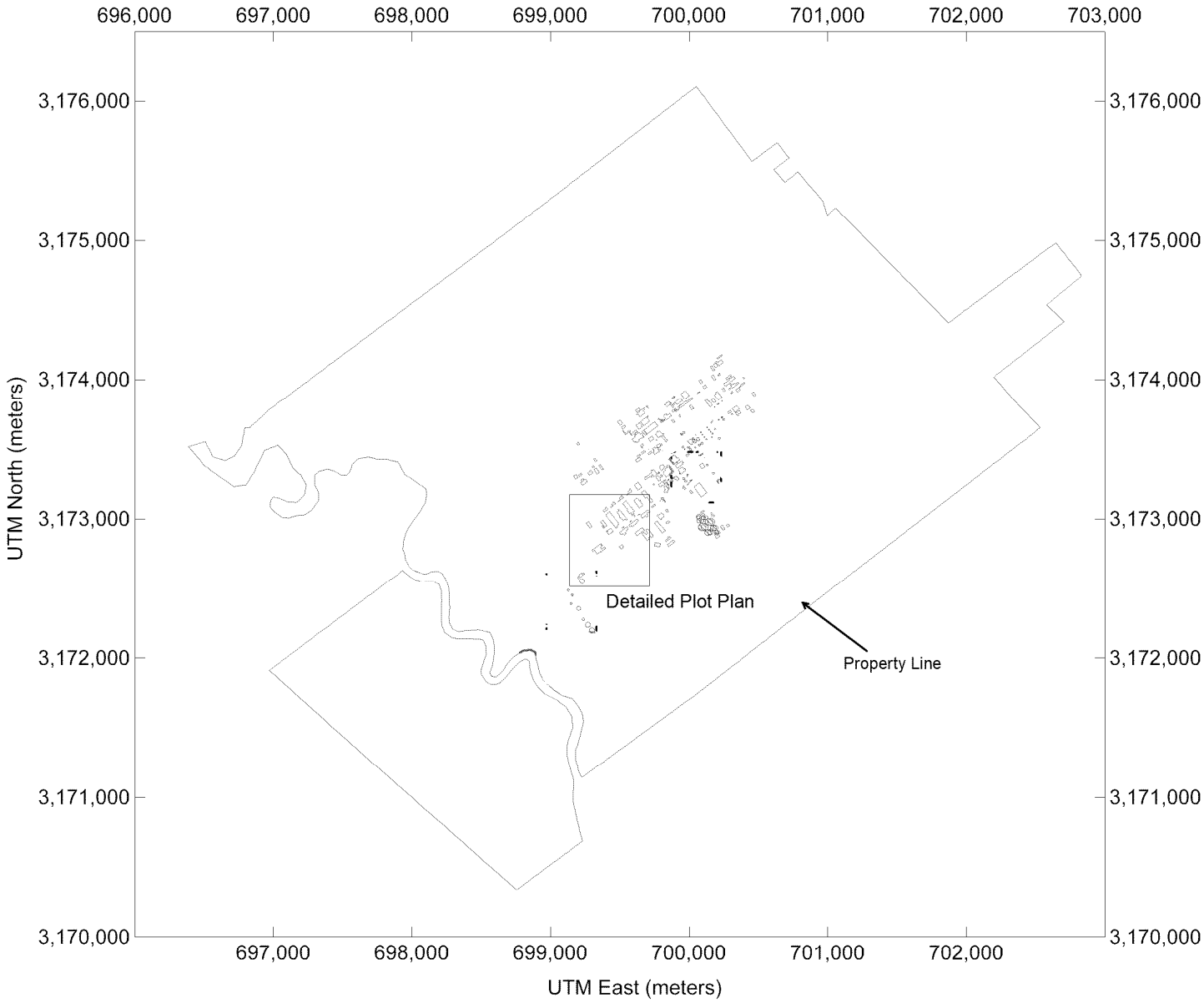
INVISTA S.a.r.l.
Victoria Plant
Plot Plan

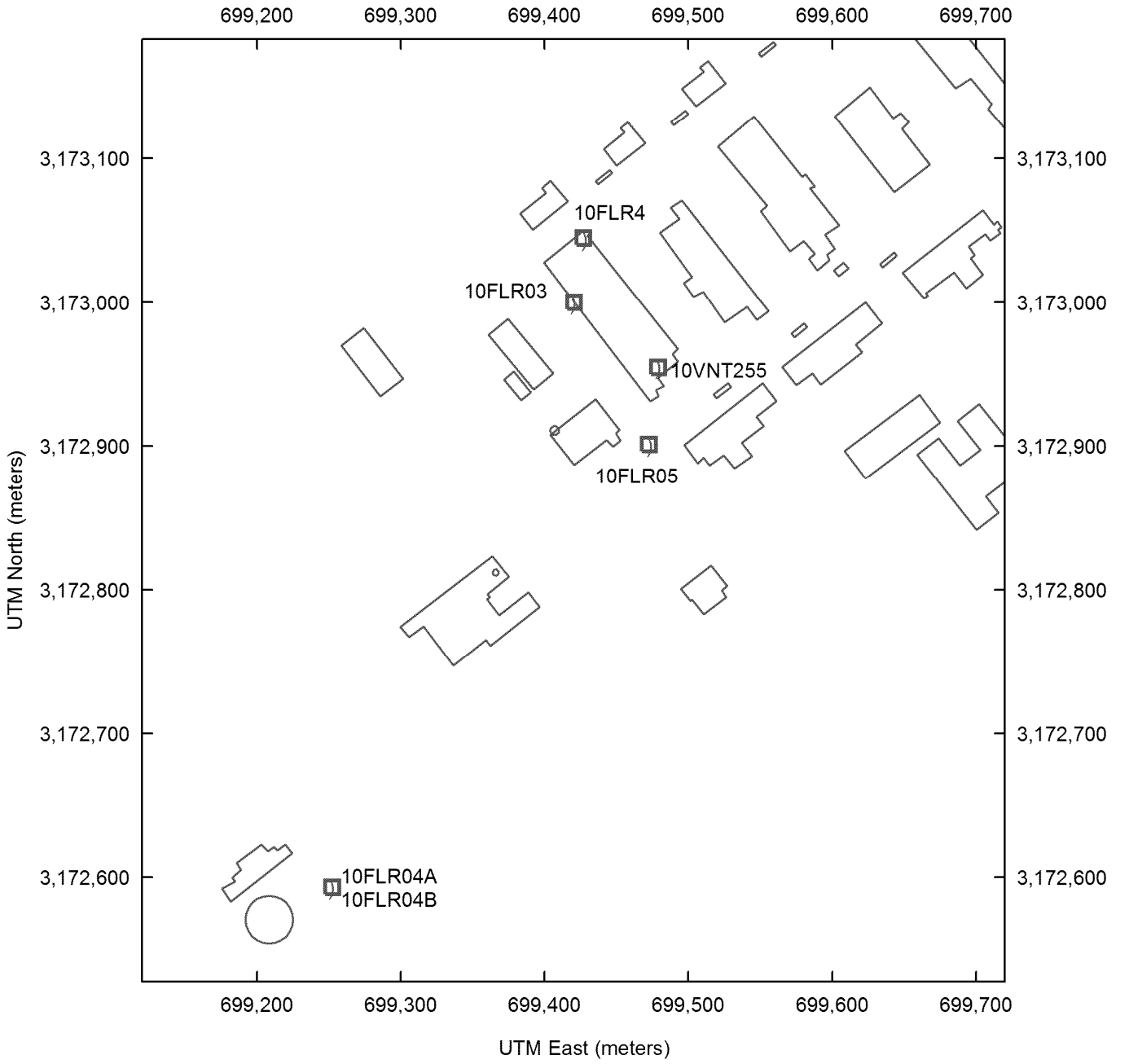


Legend

- Emission Points
- Buildings

0 1,000 2,000 3,000
Meters

INVISTA S.a.r.l.
Victoria Plant
Detailed Plot Plan



Legend

- Emission Points
- Buildings

0 100 200 300
Meters

Appendix D: **OZONE ANALYSIS DATA**

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Table 2-1. Victoria County Emissions[1]

Year	NOx (tpy)	VOC (tpy)	VOC-to-NOx	Adjusted VOC-to-NOx[2]	Conclusion
2011	6,500	5,933	0.91	2.62	NOx-limited
2008	8,191	7,268	0.89	2.55	NOx-limited

[1]Source: http://www3.epa.gov/ttn/chief/eiinformation.html

[2] Adjusted using molar equivalent conversion factor of 2.875, representing the ratio of NO_2-to-CH_4 molecular weights.

Table 2-2. INVISTA Victoria Site Emissions

	NOx (tpy)	VOC (tpy)	VOC-to-NOx	Adjusted VOC-to-NOx[1]	Conclusion
Sitewide	6,139	1,357	0.22	0.64	VOC-limited

[1] Adjusted using molar equivalent conversion factor of 2.875, representing the ratio of NO_2-to-CH_4 molecular weights.

Table 2-3. Monitor Data (H4H)[1]

Monitor ID	Name	2014	2013	2012	Average
48-469-0003	Victoria	62	62	66	63
48-469-0609	Inez	55	58	58	57
48-175-0624	Coleto	58	58	59	58

[1]Source: https://www.tceq.texas.gov/cgi-bin/compliance/monops/8hr_4highest.pl

April 7, 2016

Subject: Invista S.A R.L. Air Quality Analysis Protocol

On March 22, 2016, the Air Dispersion Modeling Team (ADMT) sent comments via e-mail to the applicant regarding the Prevention of Significant Deterioration (PSD) and Minor New Source Review (NSR) Air Quality Analysis (AQA) Protocol for the Invista S.AR.L. project (Adiponitrile Unit) located at the Victoria Plant in Victoria, Victoria County, Texas, dated February 2016. The applicant submitted a revised modeling protocol, dated April 2016. My comments related to the revised protocol are provided below. The comments represent a complete set of comments and are included as a reminder for information to be included with the AQA.

1.0 Executive Summary – The purpose of any AQA for permitting is for the applicant to make a demonstration that their operation, as represented, would not cause or contribute to a National Ambient Air Quality Standard (NAAQS) or PSD Increment violation or adversely affect public health and welfare. The representation made in the demonstration is typically a worst-case representation of the operation. All representations must be supported with technical justifications. Though assumptions and selections can be made using general guidance, these assumptions and selections must be justified why the particular guidance is appropriate to a specific case. A statement that the guidance has been followed or referencing discussions with TCEQ staff is not sufficient justification.

The protocol indicates that a single property line designation (SPLD) exists between Invista, DuPont, and Equistar. The single property line boundary should be used as the basis for receptor placement as well as identifying "site-wide" sources for the minor NSR analyses. However, single property line agreements do not apply to PSD modeling and ambient air starts at the applicant's fence line or other physical barrier to public access. Be sure to include a copy of the SPLD agreement, as well as the associated property line map, with the AQA.

The protocol notes that as the VOC project emissions increase is greater than 100 tons per year, a qualitative ozone analysis will be performed in accordance with TCEQ guidelines. The protocol did not provide sufficient information on the proposed project emissions of VOCs and NO_x. The proposed project emissions of VOCs and NO_x should be documented in the AQA as part of the ozone impact analysis.

3.1.3 State Property Line Analysis – While the text in this section mentions H_2S, Table 3-3 of the protocol does not list H_2S. Be sure that the documentation included with the AQA is consistent between the text and data presented in tables.

3.1.4 State Health Effects Evaluation (ESL Evaluation) – Be sure to use the most recent ESL list from the Toxicology Division (September 2015). If a contaminant is not on the ESL list, be sure to provide verification from the Toxicology Division for the ESL used.

3.2 General Modeling Approach – The protocol notes that for this project, it is not expected that any criteria pollutant will show a significant impact; thus, a full impacts analysis is not expected to be required. If the expected results change and the model predictions are greater than or equal to the applicable de minimis levels, then a revised protocol will need to be submitted to the TCEQ and EPA Region 6 that includes a discussion on how off-property sources will be evaluated, as well as the monitor selected for the background concentration. Be sure to provide the justification for the selected monitor and include the monitoring concentrations that would be used. Justification should include more than just proximity of the monitor to the project site or containing sufficient data to meet the completeness criteria. The justification for the monitor should include an analysis of the area surrounding the project site relative to the monitor site with respect to nearby sources of emissions.

5.0 Plot Plan – Provide a plot plan with the AQA (electronic format preferred: dwg or dxf autocad format) that depicts the site property line, fence line, locations of production activities, locations of emission sources represented in the AQA, and the locations of any building or structures represented in the AQA. Be sure to clearly label all features included with the plot plan. In addition, be sure that the plot plan is an independent representation and not generated from model input software.

6.1 Pre-Construction Monitoring – The protocol notes that it is expected that CO and NO_2 predictions associated with the project will be less than the corresponding significant monitoring concentrations (SMCs) and preconstruction monitoring will not be required. Be aware that if the modeled concentrations are greater than the SMC, a revised protocol that discusses the preconstruction monitoring analysis will need to be submitted prior to submitting the AQA. For future projects, the preconstruction monitoring requirement should be addressed in the modeling protocol since data are available.

7.1 On-Property Project Sources – Be sure to provide a copy of the Table 1(a) that was submitted with the permit application with the AQA. In addition, be sure to include full documentation for each source characterization and complete technical justification for the associated source parameters in the AQA.

7.1.1.1 Point Sources – Be sure to provide flare effective stack diameter calculations with the AQA.

The protocol provides a calculation formula for the exit velocity for a tilted stack without providing any information about the tilted stack. If the tilted stack releases emissions into the atmosphere at any angle from the vertical greater than zero but less than or equal to 45 degrees, then the modeled stack velocity should be set equal to the vertical velocity component. The vertical velocity component should be calculated by multiplying the velocity by the cosine (cos) of the offset angle from the vertical.

However, if the tilted stack releases emissions into the atmosphere at any angle from the vertical greater than 45 degrees, then the release of emissions into the atmosphere should be considered horizontal and the default exit gas velocity of 0.001 m/s should be

used in the modeling demonstration. For more information about modeling emissions from tilted stacks, refer to the following guidance:

https://www.tceq.texas.gov/assets/public/permitting/air/memos/tiltstck.pdf

7.1.2 Modeled Emission Rates Determination – Be sure to verify project sources that will be included in the modeling demonstration, as well as the emission rates to model with the permit reviewer before submitting the AQA.

10.2 Modeling Equivalent Building Dimensions – The meaning of the title of this section, Modeling Equivalent Building Dimensions, is not clear. However, the input data to the downwash analyses should be consistent with the aerial photography and the plot plan.

12.0 Meteorological Data – The protocol notes that the land use surrounding the Victoria Plant is predominantly cultivated land, grassland, and deciduous forest with a moderate density of existing commercial, industrial, and residential structures. The typical surface roughness for this type of land use is generally between 0.1 – 0.7 m, which corresponds to the medium surface roughness category. Therefore, the TCEQ meteorological file containing medium surface roughness parameters will be used in this analysis. The ADMT recommends that an AERSURFACE analysis be conducted to support the selection of the meteorological data set. Otherwise, provide the source of data to support that the listed land use types have typical roughness lengths on the range of 0.1 – 0.7. If an AERSURFACE analysis is used to determine the surface roughness length, be sure to provide the AERSURFACE files with the AQA.

The protocol notes that the wind roses for Victoria Regional Airport from the years considered in this modeling analysis are provided in Figure 12 - 1 through Figure 12 - 5 to supplement the meteorological data used in the modeling analyses. The wind roses show the direction towards which the wind is blowing. The standard convention for the wind rose is to show the directions in which the winds are blowing from. Be sure the documentation in the AQA is clear and figures follow the standard convention.

13.3 State Property Line Analysis – The protocol notes that the maximum modeled ground - level concentrations of SO_2 at and beyond the property line obtained using the approach described in Section 3 will be compared with applicable concentration standards. Note that section 3 does not contain any approach that describes how the

maximum modeled ground - level concentrations of SO_2 will be determined. Be sure that the documentation in the AQA is clear and complete.

13.4 State Health Effects Evaluation – The protocol notes that the maximum modeled ground - level concentrations for each compound listed in Table 3 - 3 of the protocol will be obtained using the approach described in Section 3 to determine if refined air dispersion modeling or effects review is necessary in the MERA analysis. Note that section 3 does not contain any approach that describes how the maximum modeled ground - level concentrations for the health effects compounds will be determined. Be sure that the documentation in the AQA is clear and complete.

13.5 Ozone Impact Analysis – The protocol makes reference to TCEQ guidance; note that the TCEQ Air Quality Modeling Guidelines indicates that the guidance on conducting an ambient ozone impacts analysis is under further review.

Also, the method for determining if the project area is NO_x-limited or VOC-limited should be based on ambient concentrations in the area and not from county emissions inventories. If the local atmosphere's ozone formation is NO_x-limited, then following EPA's recommended ozone impacts screening approach, as described in the protocol, is appropriate.

Based on the discussion provided with the revised protocol, the proposed monitor is reasonable. Note that 2015 ozone background monitoring data is available. Be sure to update the ozone background concentration with the AQA to include 2015 monitoring data.

13.6.3 Visibility Impairment Analysis – The protocol notes that per TCEQ guidance, Class II areas do not require a visibility impairment analysis. This is incorrect; TCEQ guidance does not state that Class II areas do not require a visibility impairment analysis. The visibility analysis is required; however, the applicant can meet the requirement by acknowledging compliance with the visibility and opacity requirements in 30 TAC Chapter 111.

If you have any questions, please contact Ahmed Omar at (512) 239-1285, by fax at (512) 239-1400, or by email at Ahmed.Omar@tceq.texas.gov.

April 6, 2016

Subject: The Dow Chemical Company Air Quality Analysis Protocol

I have reviewed the Prevention of Significant Deterioration (PSD) Air Quality Analysis (AQA) Protocol for The Dow Chemical Company located near Freeport, Brazoria County, Texas, dated March 2016, and my comments are provided below.

3.0 Project Overview – The purpose of any AQA for permitting is for the applicant to make a demonstration that their operation, as represented, would not cause or contribute to a NAAQS or PSD Increment violation or adversely affect public health and welfare. The representation made in the demonstration is typically a worst-case representation of the operation. All representations must be supported with technical justifications. Though assumptions and selections can be made using general guidance, these assumptions and selections must be justified why the particular guidance is appropriate to a specific case. A statement that the guidance has been followed or referencing discussions with TCEQ staff is not sufficient justification.

3.2 Type of Analysis – When conducting the PSD Significance analyses, consider all new and increased emissions from the site related to the project, including emissions associated with all planned MSS activities. For pollutants that exceed the associated de minimis levels, conduct a NAAQS analysis that considers all allowable emissions at the site, including emissions associated with all planned MSS activities, permit-by-rules (PBRs), and emissions from off-property sources and activities.

When conducting the Minor New Source Review (NSR) analyses, consider all new and increased emissions from the site related to the project, including emissions associated with all planned MSS activities. For pollutants and averaging periods that exceed the associated de minimis levels, conduct a full Minor NSR NAAQS analysis that considers all allowable emissions at the site, including emissions associated with all planned MSS activities, PBRs, and emissions from off-property sources and activities.

When conducting the State Property Line analysis, consider all emissions at the site. The AQA must include justification why some emissions have not been modeled and how site-wide emissions have been considered in the demonstration of compliance with the standards.

When conducting the Health Effects analysis, consider all new and increased emissions from the site related to the project. For all health effects pollutants evaluated, provide the corresponding Chemical Abstract Service (CAS) numbers, as applicable, with the AQA.

3.3 Air Contaminants Evaluated – The short-term and long-term effects screening levels (ESLs) for propadiene, styrene, toluene, vinyl acetylene, and xylenes in Table 3-2 of the protocol are reported incorrectly. Make sure the ESLs for these air contaminants are reported correctly in the AQA. Be sure to use the most recent ESL list provided by the Toxicology Division (September 2015).

4.0 Plot Plan – Provide a plot plan with the AQA (electronic format preferred) that depicts the

entire site. The plot plan should include the site property line, fence line, locations of production activities, locations of emission sources represented in the AQA, and the locations of any buildings or structures represented in the AQA. Please be sure to clearly label all of these features on the plot plan.

The protocol notes that a single property line designation (SPLD) exists between Dow, Air Liquide, Freeport Power Limited, and Braskem. Be sure to include a copy of the SPLD order with the AQA. In addition, the protocol notes that Dow and Olin Corporation are in the process of obtaining an SPLD. Be sure to provide the SPLD order to the ADMT as soon as the agreement is finalized. Also, be sure to clearly mark the property lines and label the other entities within the SPLD.

6.0 Air Quality Monitoring Data – The protocol includes a discussion on the selection of a representative monitor for $PM_{2.5}$. The discussion made reference to a quantitative analysis of $PM_{2.5}$ emissions from sources near the project site and near the monitoring sites. In addition, the protocol notes that the 2013 point source emissions inventory from the TCEQ was used in the quantitative analysis. It should be noted that the 2014 point source emissions inventory is available from the TCEQ and should be used in lieu of the 2013 inventory. Be sure to provide all supporting documentation (for example, spreadsheets that show any calculations) of this quantitative analysis with the AQA.

Table 6-2 of the protocol includes a footnote that the fourth quarter of 2015 monitoring data for the Baytown monitor is not yet available. If this information becomes available prior to the AQA submittal, then this data should be used when determining monitoring background concentrations.

The protocol did not address monitors for any other applicable pollutant. If model predictions of any pollutant or averaging time are greater than or equal to an applicable de minimis level, then follow the same methodologies used for selecting ambient background concentrations for the pollutant discussed in the protocol. Be sure to address any recommendations discussed in these comments, if applicable. Furthermore, if the preliminary results for CO change, then a revised protocol will need to be submitted to address the pre-application analysis.

7.1 Project Sources and Parameters – Be sure to include full documentation for each source characterization and complete technical justification for the associated source parameters in the AQA. Be sure to clearly document and justify each scenario used in the demonstrations.

The protocol notes that for scenario 2 for the NO_x demonstration, the worst-case furnace will utilize MSS emissions (EPN OC2MEH124) and the remaining seven furnaces will utilize routine emissions. Be sure to provide the unit modeling that demonstrates EPN OC2MEH124 as the worst-case furnace.

The protocol includes a discussion on how a multi-point ground level pressure assisted flare will be modeled for planned MSS activities. The discussion did not include sufficient information to support the proposed modeled exit velocity of 600 feet per second. Please provide the supporting documentation and technical justification for the modeled exit velocity with the

AQA. Also, be sure to document the different types of activities related to the ground flare and how those activities factor into the effective diameter calculation.

7.2 Off-Property Sources – The protocol notes that the analysis will not require the inclusion of off-property sources, suggesting that all criteria pollutants will be less than their respective de minimis levels. If this changes and the model predictions are greater than or equal to the de minimis levels, a revised protocol that discuses a full NAAQS impacts analysis will need to be submitted prior to submitting the AQA.

8.1 Dispersion Model Selection – The protocol notes that AERMOD version 15181 will be used in the modeling demonstration. This is appropriate.

8.2.1 Significant Impact Analysis (PSD NAAQS) – The protocol notes that at present, Dow expects that all project modeled impacts will be less than the de minimis levels. If the model predictions are greater than or equal to the de minimis levels, a revised protocol that discusses a full NAAQS impacts analysis will need to be submitted prior to submitting the AQA.

8.2.2 PSD Pre-Application Analysis – Be aware that if the modeled concentrations are greater than the Significant Monitoring Concentration (SMC), a revised protocol that discusses a preconstruction monitoring analysis will need to be submitted prior to submitting the AQA.

8.2.3 Additional Impact Analysis – Be aware that the Class II visibility analysis can be met by acknowledging compliance with the visibility and opacity requirements in 30 TAC Chapter 111.

8.3 Minor NSR NAAQS – The protocol does not explicitly discuss whether the pollutants being evaluated for the Minor NSR NAAQS analysis will be less than their respective de minimis levels. However, if the model predictions are greater than or equal to the applicable de minimis levels, a revised protocol that discusses a full NAAQS impacts analysis will need to be submitted prior to submitting the AQA.

The demonstration provided to justify the $PM_{2.5}$ de minimis levels is appropriate.

8.4 State Property Line – The protocol notes that the maximum ground-level concentration from project-level emissions will be compared to the de minimis level of 2% of the applicable state property line standards. Be aware that if the predicted high concentration is less than 2% of the applicable standard, then technical justification for demonstrating compliance may require additional information such as project emissions increases, total site emissions, results from previous site-wide demonstrations, or ambient monitoring data. Refer to Appendix F of the TCEQ's Air Quality Modeling Guidelines (APDG 6232) to determine if site-wide modeling is needed.

8.5.1.3 Pollutant Specific Modeling (MERA Step 9A/C) – Be aware that chlorine, benzene, 1,3-butadiene, hydrogen chloride, and styrene cannot be used in step 9C or 9D of the MERA guidance document.

11.0 Building Wake Effects – Provide all structure heights used in the downwash analysis and

any computer assisted drawing files with the AQA.

Ensure that all GEP heights used in BPIP PRIME are justified according to Guideline for Determination of Good Engineering Practice Stack Height:

http://www.epa.gov/scram001/guidance/guide/gep.pdf

For structures not included in the downwash analysis or for air quality analyses conducted without consideration of downwash, please provide technical justification for supporting this approach. Please note that piping fugitives should not be included as a downwash structure unless sufficient justification can be provided.

In addition, from previous modeling demonstrations, four tall, skinny columns (Building IDs: T54A-OC6, T54B-OC6, T64A-OC6, and T64B-OC6) and a few elevated platforms for some tanks (Building IDs: V1DK-OC3, V2DK-OC3, and V3DK-OC3) were included in the downwash analysis without providing justification. Be sure to provide justification in the AQA for including these structures as downwash or exclude them from the analysis. Also note that the walls around the multi-point ground flares should not be considered in the downwash analysis.

12.0 Receptor Grid-Design – The receptor grid modeled should capture an appropriate maximum ground level concentration and exceedances for all pollutants, operating scenarios, and review types. The protocol notes that receptors will be placed at 25-m intervals along the property line out to 100 meters for any facility sources. TCEQ guidance notes that receptors be spaced at 25 meter intervals along the property line/fence line and should extend up to 200-300 meters from the facilities being evaluated. Follow TCEQ guidance regarding the receptor grid spacing. Be aware that ambient air for Minor NSR analyses starts at the property line; however, for PSD modeling, ambient air starts at the fence line or other physical barrier to public access. Be sure to make clear in the AQA whether the property line and fence line are the same.

As mentioned above, be sure to clearly mark the property lines and label the other entities within the SPLD.

13.0 Meteorological Data – The protocol notes that the annual $PM_{2.5}$ analysis will be evaluated using five individual years of meteorological data. Please note that annual $PM_{2.5}$ can be evaluated using the five-year concatenated meteorological file to obtain the highest five-year average. Be sure to include the meteorological data files with the AQA associated with the modeling analyses, including any concatenated files that may be used.

13.2 Surface Roughness – Be sure to provide the AERSURFACE files with the AQA associated with the modeling analyses.

14.0 Modeling Results and Analysis – For the PSD Significance analysis, report the maximum predicted high, first high (H1H) concentration.

For the Minor NSR Significance analyses, in general, report the maximum predicted H1H concentration. If five years of meteorological data are used, the results of the modeling for 1-hr

SO_2, $PM_{2.5}$, and 1-hr NO_2 should be presented as the highest five-year average of the maximum modeled concentration predicted each year at each receptor, consistent with EPA guidance.

For PSD pollutants with predicted concentrations greater than or equal to the associated de minimis levels, report the maximum predicted high, second high (H2H) concentration of the five yearly H2Hs.

For Minor NSR pollutants with predicted concentrations greater than or equal to the associated de minimis level, in general, report the maximum predicted H1H concentration. If five years of meteorological data are used, the results of the modeling for 1-hr SO_2 should be presented as the five-year average of the 99th percentile of the annual distribution of the maximum daily 1-hr predicted concentrations. The modeled value is then added to the three-year average of the 99th percentile of the annual distribution of the maximum daily 1-hr monitored background concentration for comparison to the NAAQS, consistent with EPA guidance. For 24-hr $PM_{2.5}$, the modeling may be presented as the highest five-year average of the maximum modeled $PM_{2.5}$ concentrations predicted each year at each receptor. The modeled value is then added to the three-year average of the 98th percentile of the annual distribution of the 24-hr monitored background concentrations for comparison to the NAAQS, consistent with EPA guidance. For annual $PM_{2.5}$, the modeling should be presented as the highest five-year average of the predicted concentrations from all receptors. The modeled value is then added to the three-year average of the annual mean monitored background concentration for comparison to the NAAQS, consistent with EPA guidance. For 1-hr NO_2, the modeling should be presented as the highest five-year average of the 98th percentile of the annual distribution of the maximum daily 1-hr predicted concentrations. The modeled value is then added to the three-year average of the 98th percentile of the annual distribution of the maximum daily 1-hr monitored background concentration for comparison to the NAAQS, consistent with EPA guidance. For 24-hr PM_{10}, report the maximum predicted high, sixth high (H6H) concentration for the entire five-year period.

Be aware of model limitations when using a concatenated meteorological data set with multiple averaging times in the same model run. For example, when modeling NO_2 with a concatenated five-year meteorological data set in AERMOD and both the 1-hr and annual averaging times are selected, AERMOD will compute five-year average concentrations for both averaging times. This is not appropriate for the annual averaging time.

For the Health Effects and State Property Line analyses, report the maximum predicted H1H concentrations.

Deliverables – All modeling and downwash input and output files should be sent electronically via email, FTP, or CD/DVD. Electronic copies of the modeling report, plot plan, and maps are also preferred.

If you have any questions, please contact Justin Cherry at (512) 239-0955 or by fax at (512) 239-1400, or by email at justin.cherry@tceq.texas.gov.