2011 Updated Facility Design Ambient Air Quality Impact Assessment and PSD Additional Impacts Analyses for Prevention of Significant Deterioration Air Quality Construction Permit Application Source ID No. 1890231

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Prepared For

Abengoa Bioenergy Biomass of Kansas, LLC
Hugoton, Kansas

WLA Project No. 165-009

June 2011

Revision No. 0

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June 30, 2011

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Ms. Mindy Bowman, P.E.
Kansas Department of Health and Environment
Bureau of Air and Radiation
1000 SW Jackson, Suite 310
Topeka, Kansas 66612-1366

Re: 2011 Updated Facility Design Ambient Air Quality Impact Assessment and PSD Additional Impacts Analyses for Prevention of Significant Deterioration Air Quality Construction Permit Application Source ID No. 1890231
WLA Project No. 165-001

Dear Ms. Bowman:

On behalf of Abengoa Bioenergy Hybrid of Kansas (ABBK), WLA Consulting, Inc. is presenting the 2011 Updated Facility Design Ambient Air Quality Impact Assessment (AQIA) and PSD Additional Impacts Analyses for Prevention of Significant Deterioration Air Quality Construction Permit Application. Based on the results of the AQIA, the following requirements will need to be enforced to ensure compliance with the National Ambient Air Quality Standards and PSD Class II increments:

1. Based on the 24-hour $PM_{10}/PM_{2.5}$ averaging period modeling results, the worst-case paved haul road traffic scenario was identified as the scenario in which 70% of the truck traffic associated with shipping and receiving occurs from 6:00 AM to 6:00 PM and 30% of the truck traffic occurs from 6:00 PM to 6:00 AM. This modeling scenario was based on a maximum truck count of 148 trucks per day; therefore, the facility will be limited daily to not more than 44 trucks onsite for shipping and receiving operations from 6:00 PM to 6:00 AM.
2. Annual $PM_{10}/PM_{2.5}$ emissions from all haul roads were modeled based on the scenario in which 70% of the truck traffic associated with shipping and receiving occurs from 6:00 AM to 6:00 PM and 30% of the truck traffic occurs from 6:00 PM to 6:00 AM, which was the worst-case paved haul road traffic scenario identified during the 24-hour averaging period. This modeling scenario was based on a maximum truck count of 47,852 trucks per year; therefore, the facility will be limited annually to not more than 14,356 trucks onsite for shipping and receiving operations from 6:00 PM to 6:00 AM.
3. The Firewater Pump Engine operations will be limited such that the Firewater Pump Engine will not be operated at any time that the Flare is operating except in the event of a facility emergency.

Please let me know if you have question or concerns regarding the enclosed report.

Sincerely,

WLA CONSULTING, INC.

Stephanie Salter

Stephanie E. Salter, P.E.

Prepared for:

Abengoa Bioenergy Biomass of Kansas, LLC
16150 Main Circle Drive, Suite 300
Chesterfield, MO 63017

WLA Project No. 165-009

June 2011

Revision No. 0

2011 Updated Facility Design
Ambient Air Quality Impact Assessment
and PSD Additional Impacts Analyses for
Prevention of Significant Deterioration
Air Quality Construction Permit Application
Source ID No. 1890231

Prepared by:

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Section 1.0
Introduction and Purpose

1.1 Current Proposed Project

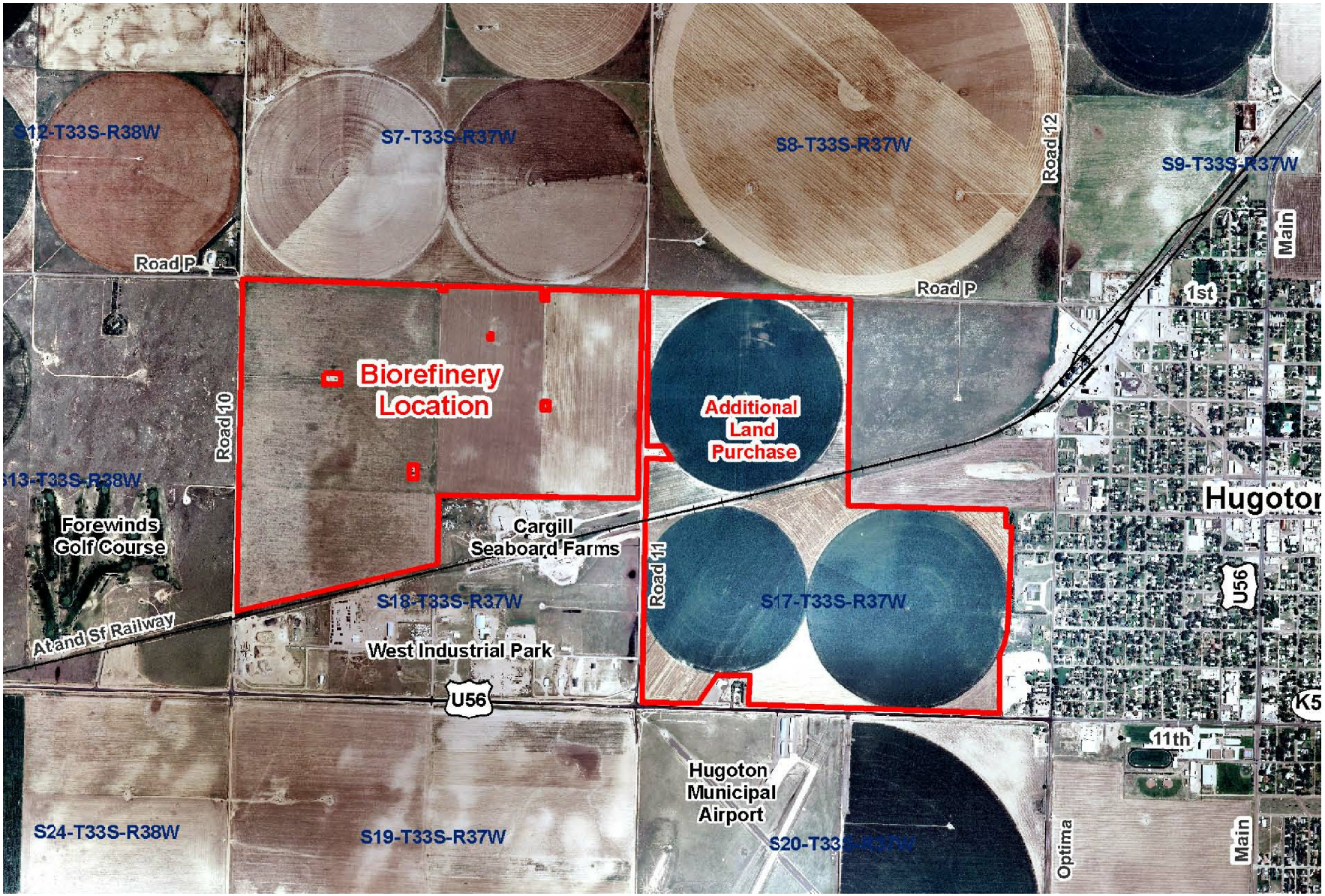
Abengoa Bioenergy Biomass of Kansas, LLC (ABBK) intends to build and operate a biomass-to-ethanol and biomass-to-energy production facility. The proposed facility will employ two different biomass processes to produce fuel ethanol, lignin-rich stillage and stillage syrup, soil amendment ash, and power. These two processes include the following:

- Biomass-to-Ethanol: Enzymatic Hydrolysis Ethanol Production Process (EH Plant), 30 Million Gallon Per Year Anhydrous Ethanol Capacity; and
- Biomass-to-Power: Cogeneration Process (CoGen Plant), 22 Megawatt Capacity.

1.2 Project Location and Regulatory Status

The proposed facility location is situated one mile west of the City of Hugoton, in Stevens County, Kansas along U.S. Highway 56/Kansas State Highway 51. Figures 1-1 through 1-3 present the general facility location, regional topography, and revised facility layout, respectively. The proposed facility will be constructed in Section 18, Township 33S, Range 37W. The portion of Section 18 that will be developed includes the area north of the Cimarron Valley Railroad right-of-way, which consists of approximately 385 acres. The property is currently used as row-cropped agricultural land and is adjoined by grain elevators, an asphalt plant, an industrial park, and the Hugoton Municipal Airport to the south; a golf course and agricultural land to the west; two residences to the northwest; agricultural cropland to the north; and the City of Hugoton to the east.

Stevens County is located within the Southwest Kansas Intrastate Air Quality Control Region and is designated as attainment or unclassifiable/attainment for particulate matter (PM; aka total suspended particulate (TSP), generally defined as particulate matter with an aerodynamic diameter less than or equal to 30 micrometers, PM_{30}), particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (PM_{10}), particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers ($PM_{2.5}$), nitrogen oxides (NOx), sulfur dioxide (SO_2), carbon monoxide (CO), and volatile organic compounds (VOCs). Attainment areas are where the air quality meets or is better than the National Ambient Air Quality Standards (NAAQS).



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DATE:	12/29/09
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FIGURE 1-1	

GENERAL FACILITY LOCATION
ABENGOA BIOENERGY BIOMASS OF KANSAS, LLC
HUGOTON, KANSAS

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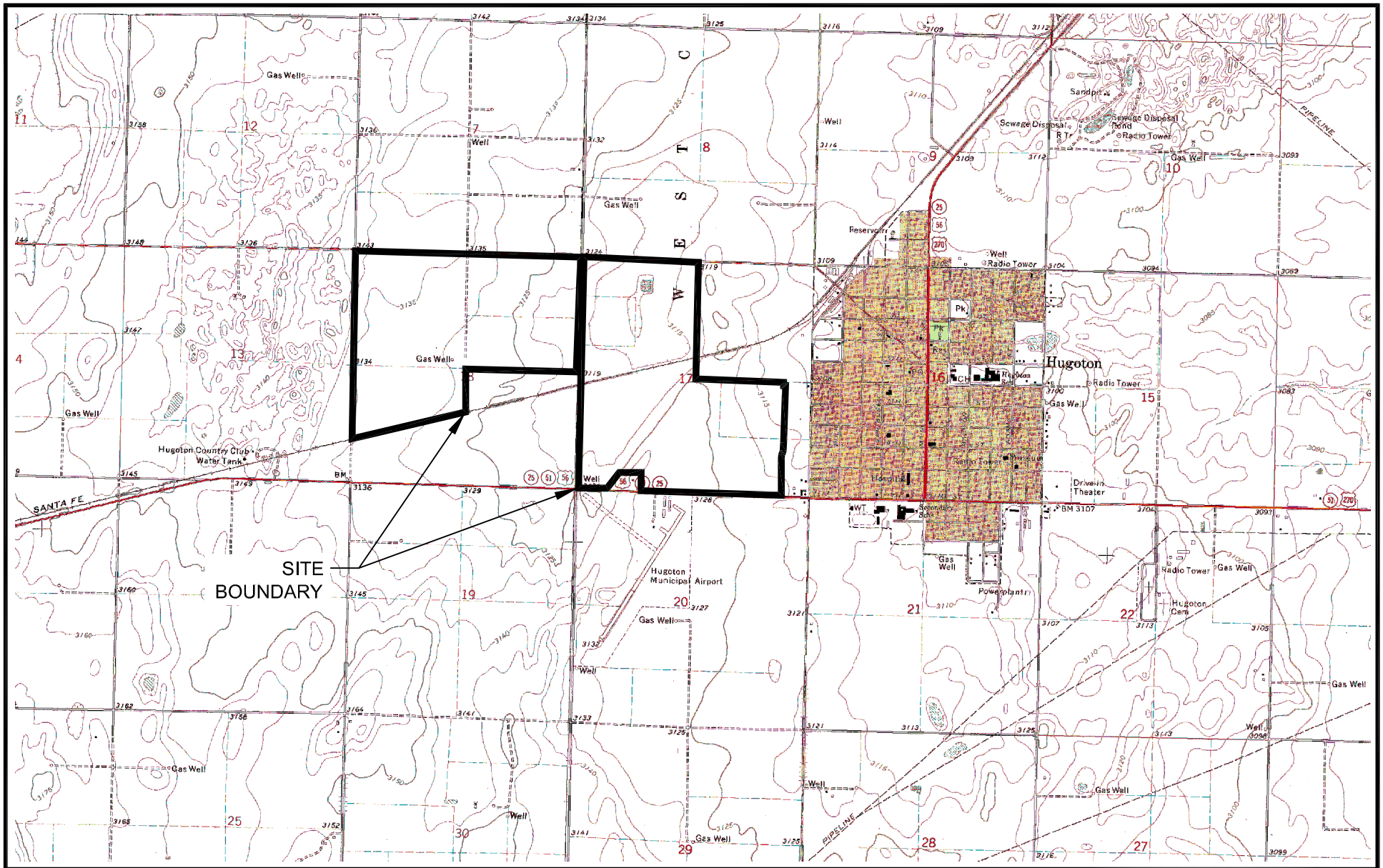

WLA Consulting, Inc.

FILE: 165001FIG1-2(0)

DATE:	12/29/09
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DRAWN:	JAS
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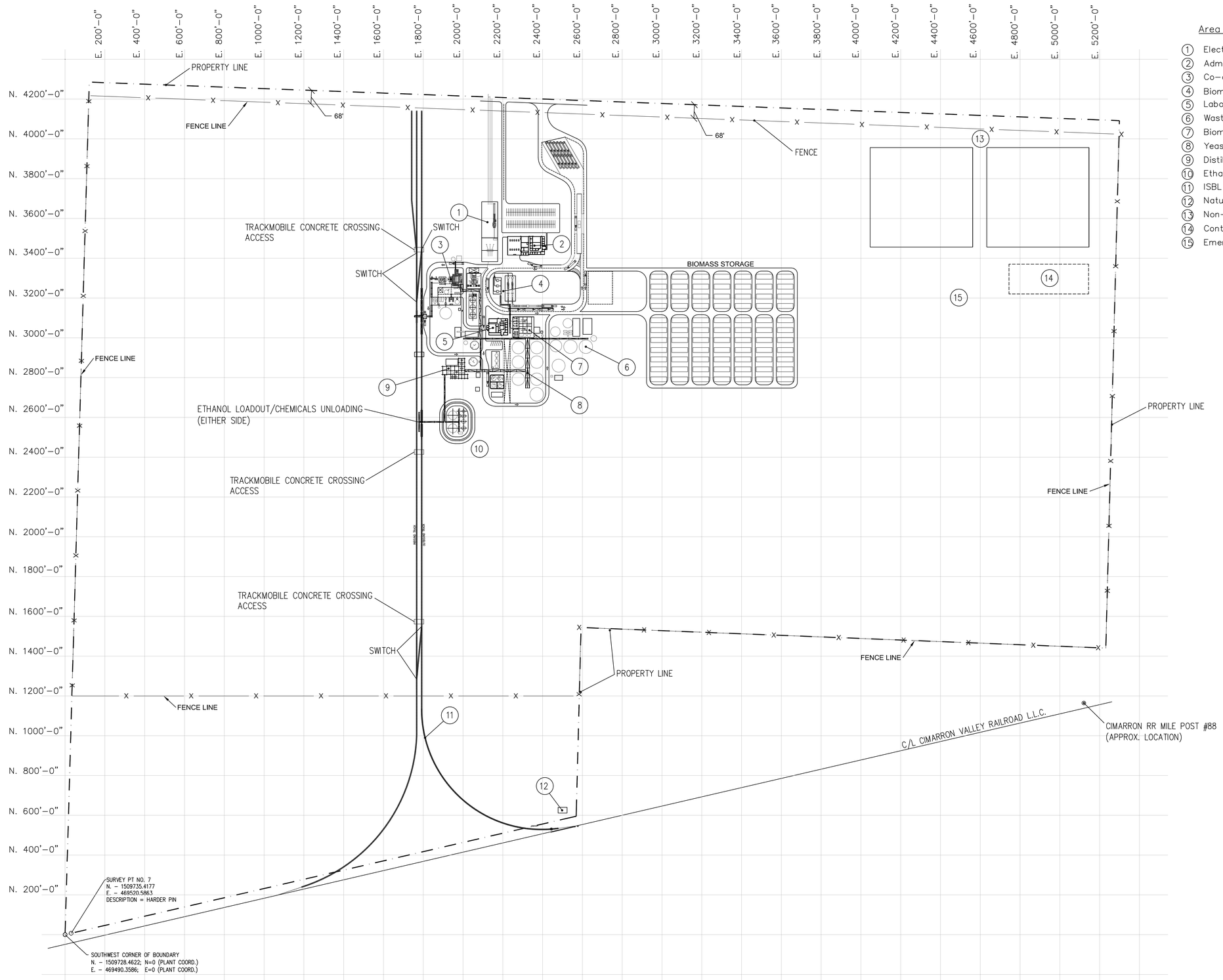
FIGURE 1-2	

REGIONAL TOPOGRAPHY
ABENGOA BIOENERGY BIOMASS OF KANSAS, LLC
HUGOTON, KANSAS

R:_Drawings\165-001 ABHK - Air Constr Permit\165001FIG1-2(0).dwg, 11 X 8.5, 12/29/2009 10:18:15 AM



Area Legend:

1. Electric Substation
2. Administration Building
3. Co-generation Plant
4. Biomass Receiving/Handling
5. Laboratory & Control Room
6. Waste Water Treatment
7. Biomass Pretreatment
8. Yeast Propogation & Fermentation
9. Distillation & Ethanol Dehydration
10. Ethanol Storage & Loadout
11. ISBL Trail Spur
12. Natural Gas Metering, Let Down Station & Tie-In
13. Non-Contact Water Retention Ponds
14. Contact Water Retention Ponds
15. Emergency Ponds

N

0 250' 500'

Ford, Bacon & Davis
A Limited Liability Company

REVISION TRACKING		
DATE	DESCRIPTION	REVISION
12/29/2009	ORIGINAL DRAWINGS	0
04/26/2011	SAMPLING PROTOCOL REVISION	1
05/16/2011	REVISION	2

ABENGOA BIOENERGY BIOMASS OF KANSAS, LLC
HUGOTON, KANSAS

REVISED FACILITY LAYOUT

PROJECT NUMBER: 165-009
DESIGNED: FBD
DRAWN: JAS
CHECKED: SES

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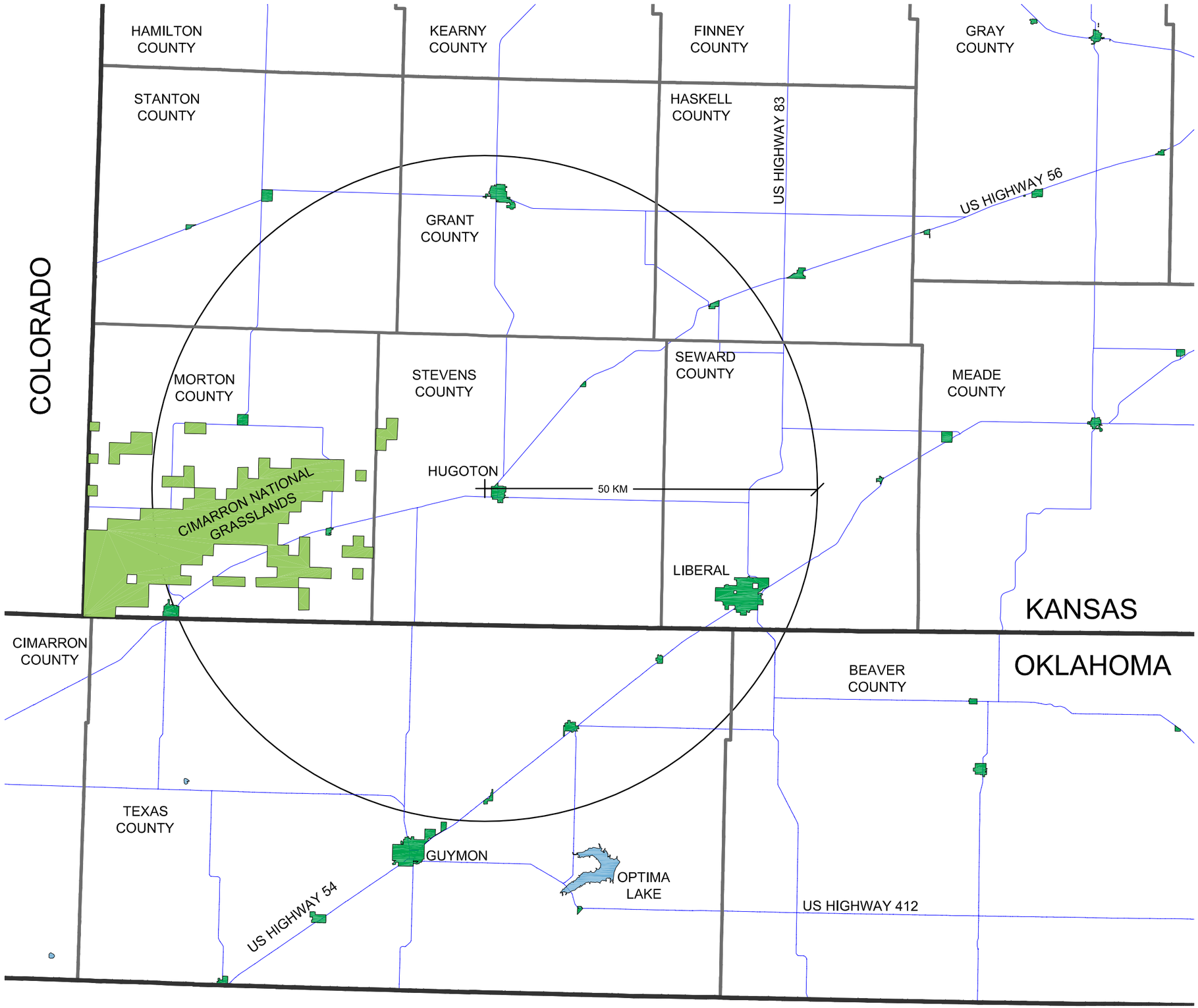
DRAWING NUMBER FIG 1-3

FILE: 165009FIG1-3(1)



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ABENGOA BIOENERGY BIOMASS OF KANSAS, LLC
HUGOTON, KANSAS

MAXIMUM AREA OF INFLUENCE

PROJECT NUMBER: 165-001
DESIGNED: DAJ
DRAWN: JAS
CHECKED: SES

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DRAWING NUMBER FIG 1-4

FILE: 165001FIG1-4(0)

R:_Drawings\165-001 ABHK - Air Constr Permit\165001FIG1-4(0).dwg, FIG 1-4, 12/29/2009 11:11:33 AM

There are no Federal PSD Class I areas located within 100 kilometers (km) of the proposed facility. The nearest Federal PSD Class I Area is the Great Sand Dunes in southeastern Colorado, located approximately 370 km (230 miles) west of the proposed facility location. There is one potential Class II area of concern within 50 km (31 miles) to the proposed facility. The Cimarron National Grasslands, one of twenty National Grasslands administered by the U.S. Department of Agriculture (USDA) Forest Service is located within Morton and Stevens Counties in southwestern Kansas, approximately 24 km (15 miles) west of the proposed facility location. The Cimarron National Grasslands consist of 437.8 km^2 (108,175 acres) of protected grasslands. Figure 1-4 shows the 50 km area of influence for the proposed facility, and the nearby Cimarron National Grasslands.

1.3 Purpose of AQIA and PSD Additional Impacts Analyses

An Air Quality Impact Assessment (AQIA) and PSD additional impacts analyses for the proposed facility was performed to support the approval of the Prevention of Significant Deterioration, Air Quality Construction Permit Application for the 2011 Updated Facility Design, in accordance with K.A.R. 28-19-350. The purpose of the AQIA is to demonstrate that the proposed facility will not cause or contribute to ambient air concentrations in excess of the applicable NAAQS and PSD Class II area increment. The purpose of the PSD additional impacts analyses is to demonstrate that the proposed facility operations will not result in any significant adverse impacts to ambient air due to associated growth and construction, as well as to demonstrate atmospheric emissions on soils, vegetation, and visibility will not result in significant adverse impacts.

1.4 AQIA and PSD Additional Impacts Analyses Procedure and Results

This report includes a discussion on the approved technical procedures relied upon to conduct the AQIA and PSD additional impacts analyses with an acceptable level of confidence in the results. This report also presents the results of the AQIA and PSD additional impacts analyses and is intended to be a supplement to the PSD air quality construction application.

Section 2.0
PSD Significant Threshold Levels

2.1 Prevention of Significant Deterioration of Air Quality Requirements

Because the proposed facility meets the current K.A.R. definition for major source, K.A.R. 28-19-350, *Prevention of Significant Deterioration of Air Quality*, is applicable. The PSD regulations are designed to ensure that the air quality in existing attainment areas does not significantly deteriorate or exceed the NAAQS, while providing a margin for future industrial and commercial growth. The primary provisions of PSD regulations require that new major stationary sources, like the proposed facility, be reviewed prior to construction to ensure compliance with the applicable NAAQS, PSD Class II area increments, and BACT to minimize the emissions of air pollutants. Additional impacts analyses are also required by 40 CFR §52.21(o), and must describe air quality and related impacts due to associated growth and construction, as well as potential impacts of atmospheric emissions on soils, vegetation, and visibility impairment.

2.2 Emissions of Concern

Based on the requirements of K.A.R. 28-19-350, the AQIA evaluated the following pollutants:

- PM_{10}
- Direct $PM_{2.5}$
- NOx (as NO_2)
- SO_2
- CO

The AQIA did not evaluate the following pollutants and/or parameters, for the reasons cited below:

- <u>*Ozone*</u>

  There is currently no EPA approved methodology for evaluating the 8-hour ozone standard on a local scale, as ozone is a regional pollutant; therefore, no ambient air quality analysis modeling was performed for the ozone precursor, VOC. This determination is consistent with other nearby state agency modeling requirements, including Missouri Department of Natural Resources (MoDNR), Iowa Department of Natural Resources (IDNR) and Nebraska Department of Environmental Quality (NDEQ).

- *PM*

  PM_{10} is the regulated air pollutant indicator of total PM emissions; therefore total PM was not be evaluated.

- *Secondary Formation of $PM_{2.5}$ From Precusor Emissions*

  $PM_{2.5}$ consists of directly emitted particles, including those particles that are measurable (filterable) at stack or exhaust temperatures as well as those particles which quickly condense to fine particles, including aerosols, at ambient air conditions (PM_{cond}). $PM_{2.5}$ also includes secondary particulates that are formed in the complex interaction of gases, particles, and the atmosphere itself to form secondary particles. These include sulfates, nitrates, and complex organic chemicals.

  On May 16, 2008, EPA published the *Final Rule for Implementation of the New Source Review (NSR) Program for Particulate Matter Less Than 2.5 Micrometers* ($PM_{2.5}$ Rule). Based on this rule, PM_{cond} was included for both the PM_{10} and $PM_{2.5}$ NAAQS evaluations when the condensable fraction of particulate emissions can be estimated using published AP-42 emission factors. PM_{cond} was treated the same as direct PM_{10} and $PM_{2.5}$ filterable emissions in the AQIA for the purposes of demonstrating compliance with the applicable NAAQS.

  The $PM_{2.5}$ Rule also designates four pollutants as possible precursors to $PM_{2.5}$: SO_2, NOx, VOC and ammonia. SO_2 is considered a definite precursor to $PM_{2.5}$ formation, NOx is a presumed precursor and VOCs and ammonia as possible precursors to $PM_{2.5}$ formation. This means all states must regulate SO_2, and states must regulate NOx as a precursor unless it can be demonstrated that NOx does not significantly contribute to $PM_{2.5}$ formation. However, modeling of secondary particle formation is not currently regulated by KDHE and is not required under the PSD program as the tools for calculating and modeling those secondary emissions have not been developed.

  SO_2 and NOx ambient air quality impacts on a local scale were addressed independent of secondary formation issues in the AQIA, as required under 40 CFR §52.21(m). VOCs and ammonia impacts were not assessed in the AQIA.

Section 3.0
Modeling Parameters and Procedures

3.1 Model Selection

The proposed facility includes multiple sources, including point and fugitive (area and volume) sources that have a wide range of parameters that are too complex to merge into a single emission point (e.g. does not meet the Appendix W modeling guidance for modeling using the screening technique). Therefore, the emissions were modeled with the American Meteorological Society (AMS) and EPA Regulatory model (AERMOD).

For each pollutant and applicable averaging period modeled except 1-hour NO_2 NAAQS; PM_{10} Significant Impact Level (SIL), NAAQS and PSD; and $PM_{2.5}$ SIL, NAAQS and PSD; the U.S. EPA Fortran executable AERMOD Version 11103 was used to evaluate maximum predicted ground-level concentrations. The Oris Solutions, LLC, Bee-Line Software AERMOD 11103 Parallel modeling application (BEEST) and BeestXpress Remote Modeling System (BeestXpress) was used to evaluate the maximum predicted ground-level concentrations for 1-hour NO_2 NAAQS as this is the parallel modeling application proved to be the most efficient for calculating results. The BREEZE Remote Modeling System (BRMS) and BREEZE AERMOD 09292 Parallel modeling application was used to evaluate the maximum predicted ground-level concentrations for PM_{10} and $PM_{2.5}$ as this parallel modeling application has historically been the preferred software for the modeling conducted for the proposed facility and the changes from AERMOD 09292 to AERMOD 11103 did not impact the algorithms used to calculate concentrations when the regulatory modeling options (i.e. default model operations) are selected. The change from AERMOD 09292 to AERMOD 11103 that affected the 24-hour $PM_{2.5}$ averaging period was the method of calculating the 1st highest maximum daily 24-hour average over five years of meteorological data. This averaging calculation was performed manually using a spreadsheet program as part of this AQIA with the AERMOD 09292 results.

EPA and KDHE correspondences regarding the use of the AERMOD parallel modeling applications and the previous AERMOD Version 09292 are included in Appendix A along with a discussion regarding the results of the demonstration. Parallel demonstrations for 24-hour and annul PM_{10}, 24-hour and annual $PM_{2.5}$, and 1-hour NO_2 averaging periods are also provided in Appendix C with the modeling results.

The AERMOD parallel modeling applications and BeestXpress and BRMS operate on a massively parallel computer cluster that combines the processing power of multiple multi-core computers. Multi-core computers have more than one processing unit, or CPU, on a computer chip. Each core can be viewed as a separate computer capable of performing independent calculations. As air quality modeling software and associated preprocessing applications become more complex to address the physical and chemical processes occurring in the atmosphere, multi-core computers or clusters are necessary to complete extensive modeling analyses in a reasonable time period. The BeestXpress and BRMS execute the U.S. EPA AERMOD Fortran executable that has been parallelized for performance across multiple processors (AERMOD parallel modeling applications) by the individual software developers. No changes to Fortran algorithms are made and results generated by the AERMOD parallel modeling applications and BeestXpress and BRMS have been demonstrated to be identical to those generated by the U.S. EPA AERMOD Fortran executable.

3.2 Modeled Emission Sources and Labeling

There are two types of emissions associated with the proposed facility: point source emissions and fugitive emissions. Each emission source modeled was assigned an identification that is consistent between the modeling files and the permit application. The emission source types and identification are detailed in the following subsections.

3.2.1 Point Sources

Point source emissions are those emissions that are emitted from a stack or vent. Point sources modeled include the following:

- EP-11120 Floor Sweep System DC
- EP-11110 Bale Grinder DC
- EP-11170 Classifier Cyclone # 1 DC
- EP-11270 Classifier Cyclone # 2 DC
- EP-11711 Boiler Feed System DC
- EP-18185 EH Fermentation CO2 Scrubber
- EP-02710 Bulk Fly Ash Load-Out Silo
- EP-02711 Bulk Fly Ash Load-Out Silo Spout
- EP-04001 Cooling Water Tower
- EP-20001 Biomass-Fired Stoker Boiler #1

- EP-20512 Lime Handling DC #1
- EP-20514 Boiler Bottoms Ash Handling DC #1
- EP-20510 Boiler Fly Ash Handling DC #1
- EP-20520 Boiler Fly Ash Handling DC #2
- EP-09001 Flare
- EP-06001 Firewater Pump Engine

3.2.2 Fugitive Sources

Fugitive emissions are considered those emissions that are not emitted through a stack or vent and were treated as either area or volume sources. Fugitive sources modeled include the following:

- EP-01000FUG Paved Plant Roads
- EP-01050FUG Biomass Laydown Roads
- EP-11110FUG Crops Receiving, Grinding and Conveying

3.2.3 Emission Sources Not Modeled

Those emissions sources that are sources of VOC emissions only were not included in the model assessment as there is currently no U.S. EPA approved methodology for evaluating VOC. Also, completely closed systems designed with high velocity pickup of grains are assumed to have a capture efficiency of 100% or wet operations are assumed to have no fugitive emissions. Therefore, those systems with no potential for fugitive emissions during normal operations were not included in the AQIA. Sources excluded from the modeling include the following:

- EP-11110FUG Headhouse and Crop Residues/Energy Crops Handling (100% capture)
- EP-11110FUG Crop Residues Cleaning (100% capture)
- EP-11110FUG Crop Residues Grinding (100% capture)
- EP-19001FUG Lignin-Rich Stillage Storage (VOC emissions)
- EP-02000 Fugitive Leaks (VOC emissions)
- T-02107 EH Product Shift Tank #1 (VOC emissions)
- T-02108 EH Product Shift Tank #2 (VOC emissions)
- T-02102 EH Ethanol Product Storage Tank #1 (VOC emissions)
- T-02112 EH Ethanol Product Storage Tank #2 (VOC emissions)
- T-02105 EH Denaturant Storage Tank (VOC emissions)

- EP-02100 Vapor Recovery System (VOC emissions)
- EP-02100FUG Loading Losses (VOC emissions)
- EP-02711FUG Bulk Fly Ash Load-Out Silo Spout (100% capture)
- EP-08000 Circuit Breakers Fugitive Leaks (SF_6 emissions)

3.3 Source Coordinates and Elevations

The proposed facility was modeled using the Elevated Terrain Mode. In an email correspondence from KDHE on November 18, 2009, KDHE indicated that the National Elevation Dataset (NED) was preferred for terrain elevations. The NED is a new elevation product assembled by the U.S. Geological Survey (USGS). The development of NED began in the early 1990's and was completely assembled in 1999 by merging and processing the individual 7.5-minute Digital Elevation Model (DEM) (with 10 and 30 meter resolution at North American Vertical Datum of 1988, NAVD88). It was designed to provide national elevation data in a seamless form with a consistent datum, elevation unit, and projection.

Elevations for the facility were obtained for 100 km around the facility. The AERMAP Version 11103 processor was used to process the NED datasets and generate source, building and receptor heights and hill boundary heights.

3.4 Model Input Source Parameters

The following sections discuss in detail the model input source parameters. The summary spreadsheets of the model input source parameters are included in Appendix B.

3.4.1 Actual Point Sources Modeling Parameters

Point source parameters were based on vendor data or data from existing "same-type" sources. All of the point source stacks currently included in the proposed design are circular, vertical discharge stacks. The parameters: emission rate, stack release height above ground level, stack gas exit temperature, stack gas exit velocity, and stack inside diameter were input to the model as actual values. For those stacks whose stack gas exit temperature is ambient temperature, a value of "0.0 degrees Kelvin" was used as the exit temperature. AERMOD adjusts the exit temperature for each hour to match the ambient temperature.

3.4.2 Pseudo/Modified Point Source Modeling Parameters

3.4.2.1 Cooling Water Tower

For the cooling tower, the individual cells were modeled as point sources, mimicking individual stack emission points. The emissions from the cooling tower cells will be divided equally between each individual cell. The stack parameters to be used for modeling inputs were based on the characteristics of the cooling tower fan, which is assumed to behave like a "stack". Actual cooling tower exhaust parameters were used for each cell. The release height was based on the height of the cooling tower cell. The stack diameter was based on the area cross-section for the cooling tower exhaust fan.

3.4.2.2 Flare

Flares can be modeled in AERMOD different ways:

- As a standard point source (no modified stack parameters);
- As a modified point source (modified stack parameters); and
- As a flare (or pseudo-point source).

The flare at the proposed facility was modeled as a modified point source. Flare sources are treated in a similar way to point sources, except the thermal effects of the flame with its lift and expansion of the plume require an effective stack height and effective stack diameter to be calculated.

As a modified point source, the following stack parameters were entered into AERMOD for a "point" source type:

- Stack height (effective height)
- Stack diameter (effective diameter)
- Stack (flame) temperature (default temperature is 1,832°F)
- Exit velocity (set by flow rate from the IDNR flare tool spreadsheet)

The IDNR flare tool spreadsheet (http://www.iowadnr.gov/air/prof/progdev/files/Flares.xls) was utilized for estimating the effective stack height and diameter when the flare was

operational and in stand-by mode (pilot only). The following presents the IDNR flare guidance recommendations and flare tool spreadsheet calculations. The results from the IDNR flare tool spreadsheet and included in Appendix B with the summary spreadsheets of the model input source parameters.

Effective stack height:

Due to the high temperature associated with flares, the effective release height of the plume was calculated as follows:

$$H_{sl} = H_S + (4.56 \times 10^{-3}) * \left(\frac{H_r}{4.1868} \right)^{0.478} \text{; in meters (m)}$$

where:

H_{sl} = effective flare release height (m)

H_s = actual stack height above ground (m)

H_r = net heat release rate (J/s) = (1 - F)*H (for a single gas)

H = total heat (sensible + radiated) release rate (J/s)

F = radiative loss factor (%)

The value of the radiative heat loss factor depends on the burning conditions of the flare. SCREEN3 recommends a default radiative heat loss factor of 55%. This is over conservative as most gases have values about half of that. To avoid overestimating the plume rise, a conservative value of 30% is assumed for this application. The net heating value will be estimated based on the type of gas combusted.

Effective stack diameter:

The purpose of calculating an effective stack diameter is to adjust the stack diameter (holding other stack parameters constant, including the exit velocity) so that the point source (a virtual flare) will yield the same predicted ambient pollutant concentrations as a flare (modeled as a flare). The effective stack diameter was determined by equating the buoyancy flux from the flare (hot source—Brigg's equation 4.20, *Plume Rise*, 1969) to the general buoyancy flux equation. Equivalently, this is making the flare plume height equal to that associated with a conventional stack.

The buoyancy flux from the flare is:

$$F = \frac{(g * H_r)}{(\pi * \rho * T * C_p)} = \left(2.59 \times 10^{-3}\right) * \left(\frac{H_r}{T}\right)$$

where:

g = acceleration due to gravity = 9.81 m/s^2

ρ = density of air = 1.2 kg/m^3

T = air temperature (°K) = 294 °K ambient default

C_p = specific heat of dry air constant = 1004 J/Kg °K

H_r = net heat release rate (J/s) = (1 - F)*H (for a single gas)

The buoyancy flux for stack releases is:

$$F = \frac{\left[g * V_s * r_s^2 * (T_s - T)\right]}{T_s}$$

where:

V_s = exit velocity (m/s)

r_s = stack inner radius (m)

T_s = stack exit temperature (°K) = 1,273 °K default

Setting these two equations equal, solving for the stack diameter ($d_s = 2 * r_s$), substituting the above values for the constants, and converting from meters to feet:

$$d_s = 0.1066 * \left[\left(\frac{T_s}{T * (T_s - T)}\right) * \left(\frac{H_r}{V_s}\right)\right]^{0.5} \text{; in feet (ft)}$$

3.4.3 Fugitive Sources Modeling Parameters

Fugitive sources at the proposed facility were modeled as either volume or area sources.

3.4.3.1 Haul Roads Emissions

Haul road potential emissions were calculated using the methodology detailed in the January 2011, AP-42 Section 13.2.1, *Paved Haul Roads*. Distribution calculations were performed to account for traffic distribution variances on different segments of the haul roads.

The distribution calculations used the following methodology:

1. Identify the Vehicle Miles Traveled (VMT) for each group based on both daily and annual miles.
2. Calculate the percentage of truck traffic per group.
3. Multiply the percentage of truck traffic per group with the VMT for each group. This yields the percentage of facility-wide VMT traveled on each road segment.
4. Calculate the emissions per group by multiplying the emissions calculated using facility-wide VMT with the percentage of facility-wide VMT. This yields a "weighted" emission factor based on traffic traveling on the different groups.

3.4.3.2 *Haul Roads Parameters*

Haul roads were modeled in accordance with the EPA's *Haul Road Workgroup Recommendations,* dated February 9, 2011. The EPA's proposed recommendation is to model haul roads as adjacent volume sources. For the sources nearest to the fenceline, the sources were modeled as an area source since there was the potential for ambient air receptors within the volume sources exclusion zone.

Haul roads were characterized as follows:

For Volume Sources

1. Haul roads were represented as adjacent volume sources except for cases where ambient air receptors are within the volume's exclusion zone [i.e., (2.15 x sigma y) + 1 meter] from the center of the volume.
2. The adjusted width (AW), or width of plume, was based on actual vehicle width plus six meters for single lane roads, and actual road width plus six meters for two+ lane roadways. The actual road widths are designed for heavy truck traffic and are based on a 12-foot standard drive lane.
3. The maximum number of sources was calculated by dividing the length of the road (L) by the adjusted width (AW) to determine the number of adjacent volume sources.

4. The height of the volume, or plume height was equal to the actual vehicle height times 1.7. Actual height of vehicles will be based on 12 feet, which is the approximate average standard commercial truck height. The U.S. Department of Transportation (DOT) limits commercial vehicle heights to 13.5 feet (state height limits range from 13.6 feet to 14.6 feet).
5. The release height of the volume was equal to the plume height times 0.5.
6. The initial lateral dimension (sigma y) was based on adjacent volume sources and calculated by dividing the adjusted width by 2.15, in accordance with the AERMOD User's Guide, Table 3-1.
7. The initial vertical dimension (sigma z) was based on modeling multiple volume sources and calculated by dividing the height of the volume by 2.15, in accordance with the AERMOD User's Guide, Table 3-1.
8. Emissions were input as grams per second (g/s).

<u>For Area Sources</u>

1. Haul roads were represented as area source(s) where ambient air receptors were potentially within the volume's exclusion zone [i.e., (2.15 x sigma y) + 1 meter] from the center of the volume (near the fenceline).
2. The length of the area was equal to the length of the roadway segment potentially in the exclusion zone.
3. The width of the area was calculated the same as the AW for a volume source.
4. The height of the area, or plume height was calculated the same as for the volume source.
5. The release height of the area was calculated the same as for the volume source.
6. The initial vertical dimension (sigma z) was based on modeling multiple sources and calculated by dividing the height of the area by 2.15, in accordance with the AERMOD User's Guide, Table 3-1.
7. Emissions were input as grams per second per meter squared ($g/s/m^2$).

The emission rates for each volume and area source were calculated first by determining the distribution of emissions per haul road grouping and then dividing the group's emissions by the number of volume sources used to represent the road. For area source, the source's emissions were divided by the area.

3.4.3.3 *Truck Unloading (EP-11110 Fugitive, Crops Grinding and Handling)*

The haul trucks used to deliver material at the proposed facility have truck beds that lift up to dump material. The release heights for truck unloading were based on the height from the back end of the truck bed to the ground. For haul trucks at the proposed facility, a release height for the average haul truck was estimated to be 5 feet. The initial lateral dimensions were based on the width of the truck bed divided by 4.3 and the initial vertical dimensions were based on the maximum heights haul trucks divided by 2.15. For haul trucks at the proposed facility, a maximum height for the average haul truck with the bed fully tilted was assumed to be 25 feet.

3.4.4 Modeled Emission Rates

The emission rates modeled were consistent with the values submitted in the Prevention of Significant Deterioration, Air Quality Construction Permit Application for the 2011 Updated Facility Design. The emission rates take into account the maximum operating hours by process. Short-term emission rates may be higher than the annual emission rates since processes may operate continuously for short durations but may not operate continuously on an annual basis due to maintenance or process limitations. The maximum representative short-term emission rates were used as appropriate for determining the facility's impacts on NAAQS and PSD Class II area increments.

The facility's emissions input in AERMOD were based on the emission rate in grams per second (g/s), in accordance with the AERMOD User's Guide. Slight differences in the emission rates may be noticed when emissions inputs are recalculated as lb/hr or ton/yr values as the emissions inputs were in scientific notation with the coefficient rounded to the nearest hundredth.

The following equations were used to convert potential emissions presented in the application to g/s from lb/hr or ton/yr:

$$\frac{\text{pounds}}{\text{hour}} \times \frac{1\,\text{hour}}{3600\ \text{seconds}} \times \frac{453.6\ \text{grams}}{1\ \text{pound}} = \frac{\text{grams}}{\text{second}}$$

$$\frac{\text{tons}}{\text{year}} \times \frac{1\,\text{year}}{\text{no. operating hours}} \times \frac{1\,\text{hour}}{3600\,\text{seconds}} \times \frac{2000\,\text{pounds}}{1\,\text{ton}} \times \frac{453.6\,\text{grams}}{1\,\text{pound}} = \frac{\text{grams}}{\text{second}}$$

For those emission sources that do not operate continuously, the emissions input value was normalized over the model averaging period. This normalizing of emissions inputs was performed for the Firewater Pump Engine (EP-06001) and the Flare (EP-09001). The following equations were used to normalize emissions inputs in g/s:

$$\frac{\text{grams}}{\text{second}} \times \frac{\text{no. of hours source operated during averaging period}}{\text{no. of hours in averaging period}} = \text{normalized}\ \frac{\text{grams}}{\text{second}}$$

3.5 Modeling Scenarios

The following sections discuss in detail the modeling scenario variables. A list of the model modeling scenarios and associated model file names are included in Appendix C.

3.5.1 Variable Emission Rates

Variable emission rates will be used to determine the worst-case scenario for multiple sources. The following sections discuss each source or group of sources in which variable emission rates will be applied and the reasoning for the application of variable emission rates.

3.5.1.1 Haul Roads

24-hour $PM_{10}/PM_{2.5}$ emissions from paved haul roads were modeled based on a "typical scenario", which assumed all truck traffic associated with shipping and receiving occurs from 6:00 AM to 6:00 PM only, or 12-hours per day. 24-hour $PM_{10}/PM_{2.5}$ emissions from paved haul roads were also modeled based on "alternate scenarios", which evaluated the following:

- 90% of the truck traffic associated with shipping and receiving occurs from 6:00 AM to 6:00 PM and 10% of the truck traffic occurs from 6:00 PM to 6:00 AM;
- 80% of the truck traffic associated with shipping and receiving occurs from 6:00 AM to 6:00 PM and 20% of the truck traffic occurs from 6:00 PM to 6:00 AM; and
- 70% of the truck traffic associated with shipping and receiving occurs from 6:00 AM to 6:00 PM and 30% of the truck traffic occurs from 6:00 PM to 6:00 AM.

Based on the 24-hour $PM_{10}/PM_{2.5}$ averaging period modeling results, the worst-case paved haul road traffic scenario was identified as the scenario in which 70% of the truck traffic associated with shipping and receiving occurs from 6:00 AM to 6:00 PM and 30% of the truck traffic occurs from 6:00 PM to 6:00 AM. This modeling scenario was based on a maximum truck count of 148 trucks per day; therefore, the facility will be limited daily to not more than 44 trucks onsite for shipping and receiving operations from 6:00 PM to 6:00 AM.

24-hour $PM_{10}/PM_{2.5}$ emissions from biomass storage area roads and the biomass staging area were modeled based on the areas being active constantly.

Annual $PM_{10}/PM_{2.5}$ emissions from all haul roads were modeled based on the scenario in which 70% of the truck traffic associated with shipping and receiving occurs from 6:00 AM to 6:00 PM and 30% of the truck traffic occurs from 6:00 PM to 6:00 AM, which was the worst-case paved haul road traffic scenario identified during the 24-hour averaging period. This modeling scenario was based on a maximum truck count of 47,852 trucks per year; therefore, the facility will be limited annually to not more than 14,356 trucks onsite for shipping and receiving operations from 6:00 PM to 6:00 AM.

The proposed facility has committed to paving plant haul roads, performing frequent washing, vacuuming and sweeping, and enforcing a

speed limit to reduce fugitive emissions from the paved plant haul roads. Further, unpaved haul roads will be frequently sprayed with water and/or chemical dust suppressants to reduce fugitive dust emissions and a biomass staging area immediately adjacent to the biomass grinding lines will be utilized to reduce traffic traveling in the biomass storage field.

3.5.1.2 *Shipping and Receiving*

Because the facility will maintain onsite enough biomass to operate the facility continuously and because shipping and receiving operations may also be performed by rail car, truck shipping and receiving operations will not affect the emission rates for other modeled emission sources. All other modeled emission sources were assumed to operate continuously, except for the Firewater Pump Engine (EP-06001) and the Flare (EP-09001).

3.5.2 Emergency Facility Operations

The Firewater Pump Engine (EP-06001) is an emergency unit which normally operates a maximum of 1 hour per day for testing purposes, not more than 100 hours per year to comply with the NSPS, 40 CFR Part 60, Subpart IIII, *Compression Ignition Internal Combustion Engines*. The NSPS rule does not limit the unit's operation during an emergency.

As clarified in the EPA Memorandum, *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 NAAQS,* published March 1, 2011, modeling of emergency equipment such as the firewater pump engine is not required. Specifically, the memo "[r]ecommends that compliance demonstrations for the 1-hour NO_2 NAAQS address 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 based on existing modeling guidelines, which provide sufficient discretion for reviewing authorities to not include intermittent emissions from emergency generators or startup/shutdown operations from compliance demonstrations for the 1-hour NO_2 standard under appropriate circumstances.

Because this memo indicates that modeling for 1-hour NO_2 does not need to include this intermittent emissions source, the same methodology was applied to

the 1-hour SO_2 averaging period. The Firewater Pump Engine was included in the SIL modeling analysis for both 1-hour NO_2 and 1-hour SO_2 to allow for KDHE to review the additional potential worst-case impacts from this source; although, as clearly stated in the memo, the inclusion of a an intermittent emission source potentially overestimates the impacts due to the assumption that worst-case emissions will coincide with worst-case meteorological conditions. For all other pollutants and averaging periods, the Firewater Pump Engine was included in the SIL, and if necessary, NAAQS and PSD Class II Increment analyses.

As part of the facility's commitment to minimize 1-hour NO_2 and 1-hour SO_2 impacts to ambient air, the facility proposes to limit the Firewater Pump Engine operations such that the Firewater Pump Engine will not be operated at any time that the Flare is operating except in the event of a facility emergency. In the event of an emergency when the Firewater Pump Engine may operate for periods longer than those necessary for testing purposes, operations at the facility will be shutdown at all of the major processes during the event. An emergency event was not modeled (see Section 3.5.5, Malfunction and Emergency Periods, regarding the exclusion of the emergency scenario from modeling).

3.5.3 Flaring Operations

The Flare (EP-09001) is proposed to be permitted to operate up to 3,960 hours per year to support the boiler during shutdown or malfunction, or when the boiler is not operating at full capacity. For modeling purposes, the flare was operated concurrent with boiler operations at all loads to ensure the worst case scenario was evaluated. The boiler emissions were not adjusted to account for the diverted biogas, process vent streams and loadout vapors to the flare; therefore, the biogas, process vent streams and loadout vapors emissions are being double-counted since it may be possible for only one vent stream to be diverted at any given time.

As part of the facility's commitment to minimize 1-hour NO_2 and 1-hour SO_2 impacts to ambient air, the facility proposes to limit the Firewater Pump Engine operations such that the Firewater Pump Engine will not be operated at any time that the Flare is operating except in the event of a facility emergency. In the event of an emergency, operations at the facility will be shutdown at all of the major processes during the event. An emergency event was not modeled (see Section

3.5.5, Malfunction and Emergency Periods, regarding the exclusion of the emergency scenario from modeling).

3.5.4 Reduced Operating Loads Scenarios

Reduced operating loads will not affect most emission sources at the proposed facility since the majority of the units will not have variable speeds. Additionally, the dust collectors cannot be operated at lower flow velocities than proposed since these units must maintain speeds to ensure high velocity pickup of grains.

The biomass-fired boiler will be capable of operating at reduced loads based on the facility's steam needs. The range of operations will be guaranteed by the vendor to ensure compliance with the emission limits at reduced rates. The boiler will be operated during normal operation within the vendor's specified operating ranges to maximize fuel-to-energy conversion and control efficiencies. For the purposes of the modeling the boiler at various loads, the following was applied:

- Normal operations were assumed to include the boiler operating at 353 MMBtu/hr to the maximum 500 MMBtu/hr heat input rating. There were three scenarios evaluated for the normal operations:
  - 353 MMBtu/hr (or 75% load);
  - 471 MMBtu/hr (or 100% load); and
  - 500 MMBtu/hr (or 120% load).
- Start-up and shutdown operations were assumed to include the boiler operating below 353 MMBtu/hr. There were two scenarios evaluated for the start-up and shutdown operations:
  - 236 MMBtu/hr (or 50%load); and
  - 141 MMBtu/hr (or 30% load).

The five boiler load scenarios were selected based on the boiler's start-up procedure detailed in the potential to emit calculations presented in the Prevention of Significant Deterioration, Air Quality Construction Permit Application for the 2011 Updated Facility Design. Because the boiler cannot operate continuously at loads less than 353 MMBtu/hr, only the three boiler loads classified as normal operations were evaluated in the annual averaging period model runs. Start-up and shutdown operations (reduced load operations) and

normal operations were all evaluated in the short-term 1-hour, 3-hour, 8-hour and 24-hour averaging periods.

3.5.5 Malfunction and Emergency Periods

According to Appendix W, Section 8.1.2(a), for point source applications, the load or operating condition that causes maximum ground-level concentrations should be established and included in the modeling analysis. Appendix W specifies that malfunctions which may result in excess emissions are not considered to be a "normal operating condition". Appendix W further states that abnormal operating conditions generally should not be considered in determining allowable emissions, unless the excess emissions are the result of poor maintenance, careless operation, or other preventable conditions, then it may be necessary to consider them in determining source impact.

EPA has determined that any emissions that exceed any emission limit is a violation, regardless of mitigating circumstances, such as start-up and shutdown (S&S) periods that occurred despite preventative maintenance. EPA relied on several EPA guidance memoranda from 1982 and 1983 that indicated that S&S emissions should be evaluated on a case-by-case basis. The 1982 memo stated S&S periods were part of normal operations. Thus, excess emissions during S&S periods were only excusable if a malfunction occurred during the S&S period; or as clarified in the subsequent memo in 1983.

In 1982, EPA developed the following criteria to help determine if a malfunction had occurred:

- Equipment must be maintained and operated in a manner consistent with minimizing emissions.
- Repairs must be made rapidly, using off-shift labor or overtime if necessary.
- The amount and duration of emissions must be minimized.
- The impact on ambient air quality must be minimized.
- The event must not be part of a recurring pattern that is indicative of inadequate design, operation, or maintenance.

Because EPA has determined that S&S periods are part of normal operations, the S&S periods were included in the AQIA to establish that the load or operating condition that caused maximum ground-level concentrations for compliance purposes. Section 3.5.4 discusses the boiler loads that were included in the modeling demonstration for S&S periods. S&S periods can affect emissions from the biomass-fired boiler because the boiler's emissions and exhaust parameters are affected by different fuels, variable loads and control equipment efficiencies.

Emergency and malfunction periods were not evaluated in the AQIA as these periods are abnormal operating conditions. The Flare (EP-09001) was included in the AQIA as part of normal operations.

3.6 Building Downwash

Based on the proposed facility design, buildings and/or structures may cause potential influences on normal atmospheric flow and plume dispersion in the immediate vicinity of the emission sources due to stack heights. This phenomenon, known as structure-induced downwash, generally results in higher model-predicted ground-level concentrations in the vicinity of the influencing structure. Sources included in the application are subject to Good Engineering Practice (GEP) stack height requirements in K.A.R. 28-19-18, *Stack Heights*. GEP stack height for stacks constructed after January 12, 1979 is defined as the greater of:

- 65 meters, measured from the base of the stack, and
- Stack height calculated from the following formula:

  $Hg = H + 1.5L$

  where:

  Hg = the GEP stack height

  H = the height of the nearby structure

  L = the lesser of the building height or the greater crosswind distance of the building (also known as the maximum projected width)

None of the stacks had design heights above 65 meters; therefore all stacks used in the model will be based on design/actual stack heights.

For the AQIA, the effects of building downwash will be included for all emission points due to stack heights that are less than the GEP heights in relation to adjacent buildings. This will be completed using the Building Profile Input Program (BPIP) with the Plume Rise Modeling Enhancement (PRIME) algorithm to calculate projected building widths for use in the AERMOD program.

3.7 Meteorological Data

Five consecutive years of meteorological data considered representative of the climatology and topography for the proposed facility location were used in the AQIA, as provided by KDHE. The model guidance requires the most recent five years of sequential hourly meteorological data be utilized to account for annual variability.

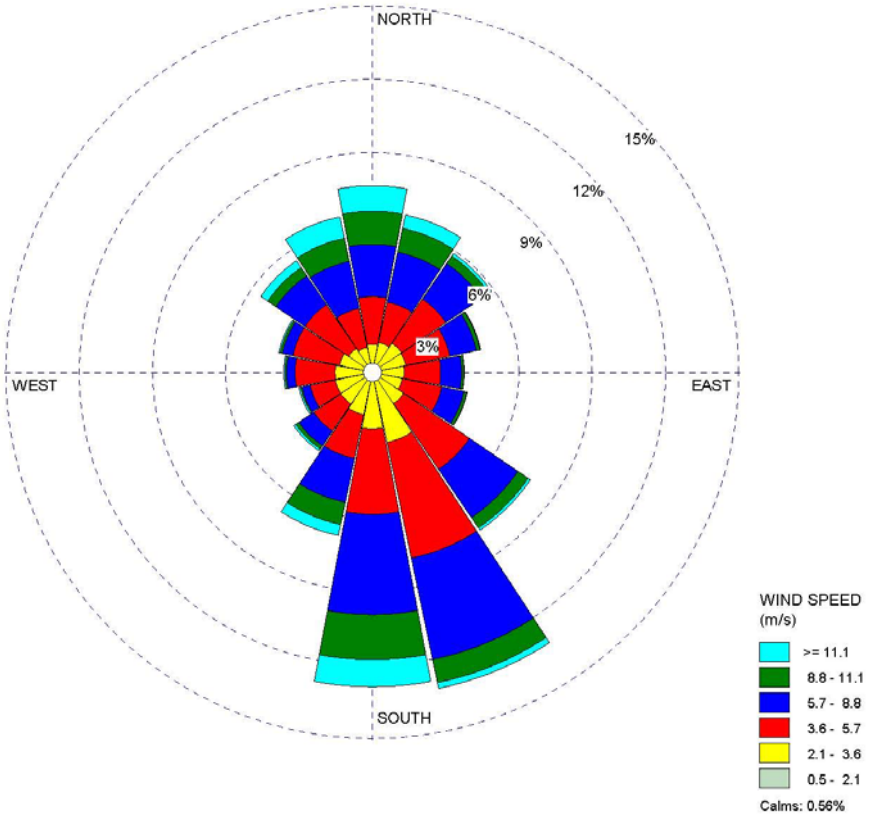
AERMOD Version 11103 requires meteorological data to be used that has been processed using AERMET 11059. AERMET, the meteorological data pre-processor for the AERMOD modeling system, extracts and processes data in order to calculate the boundary layer parameters that area ultimately necessary for the calculation of pollutant concentrations within the atmosphere.

The upper air data was obtained from the Dodge City station, WBAN# 13985 and the surface air data was obtained from the Garden City National Weather Station (NWS), WBAN #23064. Information on these stations is shown in Table 3-1. A wind rose for the cumulative five-year period is provided in Figure 3-1.

Table 3–1
Meteorological Data Sites

Station Type	Station Name	WBAN Number	Latitude/ Longitude	Elevation (m)	Years of Data
Surface Air	Garden City (GCK)	23064	37.933 -100.733	878.4	2006 to 2010
Upper Air	Dodge City (DDC)	13985	37.767 -99.967	787.0	2006 to 2010

Figure 3–1
Wind Rose for Years 2006 to 2010



The meteorological files were processed such that they were suitable for use with the non-regulatory NO_2 – Plume Volume Molar Ratio Method (PVMRM) option and new output file options such as MAXDCONT. This output file option required all hours to be accounted for. For the AQIA, the meteorological data was processed such that all missing hours were flagged as missing. The 24-hour PM_{10} radius of impacts (ROI) was skewed by missing meteorological data. Of the 10,900 receptors modeled for the 24-hour PM_{10} SIL analysis, 3,258 receptors (or approximately 30%) were flagged indicating missing meteorological data ("m" flag) during the calculation of the high first high (H1H) impact at that receptor. For the purposes of this AQIA, the same ROI distance for $PM_{2.5}$ was applied to PM_{10}.

Thirty days in the five year period from 2006 to 2010 were observed to have greater than 10% (2.4 hours) missing data. Table 3-2 summarizes the days and number of hours missing.

Table 3–2
Missing Meteorological Data

Date	Hours	Number of Hours Missing	Date	Hours	Number of Hours Missing
2/13/2006	3, 13, 18	3 hrs	5/4/2008	22-23	2 hrs
3/4/2006	9, 18	2 hrs	5/23/2008	21-24	4 hrs
3/5/2006	16, 18	2 hrs	5/24/2008	1-5	5 hrs
3/9/2006	10-12	3 hrs	6/11/2008	17-18, 24	3 hrs
3/11/2006	11, 13, 15, 18	4 hrs	6/12/2008	13-14, 17	3 hrs
5/13/2006	16-18	3 hrs	8/27/2008	4-10	7 hrs
7/22/2006	11-12, 14, 16-17	5 hrs	9/29/2008	11-12	2 hrs
7/23/2006	3, 17	2 hrs	10/21/2008	23-24	2 hrs
10/23/2006	12, 14, 16, 18	4 hrs	10/22/2008	1-6	6 hrs
12/30/2006	4-5, 11-14, 22-24	9 hrs	10/24/2008	20-24	5 hrs
12/31/2006	1-7, 19-24	13 hrs	10/25/2008	1-5, 20-24	10 hrs
1/1/2007	1-6, 20, 22-24	10 hrs	10/26/2008	1-6, 20-24	11 hrs
1/2/2007	1-7	7 hrs	10/27/2008	1-5, 7, 14, 21-24	11 hrs
2/21/2007	16, 18	2 hrs	10/28/2008	1-5	5 hrs
5/7/2007	12, 18	2 hrs	12/31/2008	21-24	4 hrs
8/5/2007	13, 15	2 hrs	6/27/2009	5, 8-13, 22-23	9 hrs
11/22/2007	12-13	2 hrs	8/5/2009	2-9	8 hrs
11/25/2007	13, 15-18	5 hrs	12/31/2009	22-24	3 hrs
11/26/2007	2-3, 9	3 hrs	4/16/2010	3-6	4 hrs
12/31/2007	20-24	5 hrs	6/3/2010	10-12	3 hrs

3.8 Receptor Grids

AERMOD estimates ambient concentrations using a network of points, called receptors, through the region of interest. The model uses emissions and weather information to estimate ambient pollutant concentrations at each receptor location. The goal of developing a receptor grid is to ensure that the maximum impact points are identified, as well as to delineate the furthest extent of impacts greater than the SILs. For assessing the criteria pollutants against the significance levels, a fenceline and up to five grids was developed. An initial fenceline along the facility boundary was established with 50 meter spacing. The remaining receptors for the facility consisted of a multi-tiered grid as shown in Table 3-2.

Table 3–3
Receptor Spacing for Significant Impact Modeling

Receptor Grid Type	Distance from Facility Boundary	Receptor Spacing
Extra Fine	Fenceline to 200+ m	50 m
Fine	200 m to 2,000 m	100 m
Medium	2,000m to 5,000 m	250 m
Coarse	5,000 m to 10,000 m	500 m
Extra Coarse	10,000 m to 50,000 m	1,000 m

Because AERMOD is intended for estimating impacts from short-range transport (distances less than 50 km from the source), the receptor grid did not extend beyond 50 km.

For the 1-hour NO_2 cumulative analysis, fine grids, or hot spot grids, were placed around the H1H receptors from each scenario (Receptor No. 1 Easting: 254557.00 and Northing: 4119082.00 from AB-500; Receptor No. 2 Easting: 256557.00 and Northing: 4122082.00 from AB-471 and AB-353; Receptor No. 3 Easting: 257557.00 and Northing: 4122082.00 from AB-236 and AB-141). For all other pollutants and averaging periods, the maximum concentrations were observed within the extra fine grid.

Lastly, as approved by KDHE, the receptors in the 1-hour NO_2 and 1-hour SO_2 cumulative impact analysis were limited to only those receptors that have shown to have significant impacts from the proposed new source based on the SIL analysis. For all other pollutants and averaging periods, the receptors in the cumulative impact analysis were limited to only those receptors contained with the ROI.

3.9 Regulatory Model Options

Since AERMOD is designed to support the U.S. EPA's regulatory modeling program, the regulatory modeling options are considered the default model operations for the model. These options include the use of stack-tip downwash and a routine for processing averages when calm winds or missing meteorological data occurs. For all pollutants and averaging periods modeled, except 1-hour NO_2, the regulatory modeling options will be used.

3.10 Non-Regulatory Model Options

While the 1-hour NO_2 NAAQS is defined relative to ambient concentrations of NO_2, the majority of NOx emissions from combustions sources are in the form of nitric oxide (NO) rather than NO_2. Appendix W notes that the impacts of an individual source on ambient NO_2 depends, in part, "on the chemical environment into which the source's plume is to be emitted". Appendix W recommends the following three-tiered screening approach for NO_2 modeling for annual averages:

- Tier 1 – Assumes full conversion of NO to NO_2;
- Tier 2 – Multiplies the Tier 1 result by a NO_2/NOx ambient equilibrium ratio, with 75 percent (0.75) as the annual national default ratio; and
- Tier 3 – Uses case-by-case detailed screening methods, with the Ozone Limiting Method (OLM) identified as a detailed screening technique for point sources.

Given the stringency of the 1-hour NO_2 NAAQS relative to the annual standard, the non-regulatory NO_2 –PVMRM option was used to demonstrate compliance with the standard. According to EPA, while Appendix W specifically mentions the OLM as a detailed screening method under Tier 3 for NO_2 modeling, PVMRM is also considered to be in this category. A formal request to use PVMRM was provided prior to the completion of this AQIA and all correspondence with EPA and KDHE regarding PVMRM are included in Appendix A.

The PVMRM determines the conversion rate for NOx to NO_2 based on a calculation of the NOx moles emitted into the plume, and the amount of O_3 moles contained within the volume of the plume between the source and receptor. The PVMRM allows the model to take into account background ozone concentrations and apply these concentrations to determine the amount of NO converted to NO_2.

The PVMRM also requires a value to be entered to estimate the amount of NO_2 present in the stack exhaust gases (in-stack NO_2/NOx ratio). The source emission data input is entered in terms of total NOx. The PVMRM then requires an in-stack NO_2/NOx ratio, which is the fraction of NO_2 in the stack gases. Each source of combustion gases can have a different ratio of NO_2 to total NOx based on the source's size, type of combustion and fuel combusted.

From the nearby source inventories, was determined that 10 types of emission sources are present:

- Wood/Biomass-Fired Boilers
- Combustion Turbines
- Coal-Fired Boilers
- Natural Gas-Fired Boilers/Heaters
- Oil-Fired Boilers/Heaters
- Diesel Engines
- Gasoline Engines
- Natural Gas-Fired Engines
- Flares
- Carbon Black Production

A review of available literature and references was conducted to determine an appropriate in-stack NO_2/NOx ratio for each type of emission source. NO_2/NOx ratios were obtained from the following sources:

- EPA Memorandum, *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 NAAQS*, published March 1, 2011.
- AP-42, Section 1.1, *Bituminous and Subbituminous Coal Combustion*.
- AP-42, Section 1.3, *Fuel Oil Combustion*.
- *Evaluation of Bias in AERMOD-PVMRM*, Final Report, MACTEC, 2005 (referred to as the Brode bias report).
- *Portable Combustion Gas Analyzer Technical Guidance Document – BAR 1998-01*, Kansas Department of Health and Environment, Revised January 25, 2010.
- Texas Administrative Code (TAC); Title 30, Environmental Quality; Part 1, Texas Commission on Environmental Quality (TCEQ); Chapter 106, Permits By Rule; Subchapter W, Turbines and Engines; Section 106.512(6)(A), Stationary Engines and Turbines, amended June 13, 2001.

The default value in AERMOD is 10 percent (0.10); however, the EPA memorandum, *Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 NAAQS*, published June 28, 2010, does not allow for the use of a "default" in-stack NO_2/NOx ratio. EPA specifically states that for in-stack NO_2/NOx ratios, the specific application must be justified and further detailed recommendations in the EPA March 1, 2011 memorandum.

For the NO_2/NOx in-stack ratio, technical resources were reviewed for justification of the source specific in-stack ratios selected and this information was provided as part of the formal request to use PVMRM. The in-stack ratio of 0.05 is consistently used for all types of boilers whether combusting wood, coal, natural gas or liquid fuels; therefore, the NO_2/NOx in-stack ratio previously proposed was still considered appropriate for the purposes of this AQIA. As requested by EPA, confirmation testing of the NO_2/NOx in-stack ratio will be performed in conjunction with the performance testing requirements on the proposed boiler upon start-up. Table 3-4 presents the in-stack NO_2/NOx ratios used with the PVMRM option and the references relied upon to support their use.

Table 3–4
In-Stack NO_2/NOx Ratios for Use with PVMRM Option

Emission Source	NO_2/NOx Ratio	Reference
Wood-Fired Boilers	0.05	Brode's Bias Report
Combustion Turbines	0.25[1]	30 TAC 106.512(6)(A)
Coal-Fired Boilers	0.05	AP-42 Section 1.1
Natural Gas-Fired Boilers/Heaters	0.05	AP-42 Section 1.3
Oil-Fired Boilers/Heaters	0.05	AP-42 Section 1.3
Diesel Engines	Varies[1]	30 TAC 106.512(6)(A)
Gasoline Engines	Varies[1]	30 TAC 106.512(6)(A)
Natural Gas-Fired Engines	0.10	KDHE Guidance: BAR 1998-01
Flares	0.5	EPA March 1, 2011 Memo
Carbon Black Production	0.5	EPA March 1, 2011 Memo

Note 1: A review of the regulations promulgated by the TCEQ indicates that the agency has set NO_2/NOx ratios for turbines and engines that are to be used unless test data us available for the unit. This data taken from Figure 1 in 30 TAC 106.512(6)(A) is as follows:

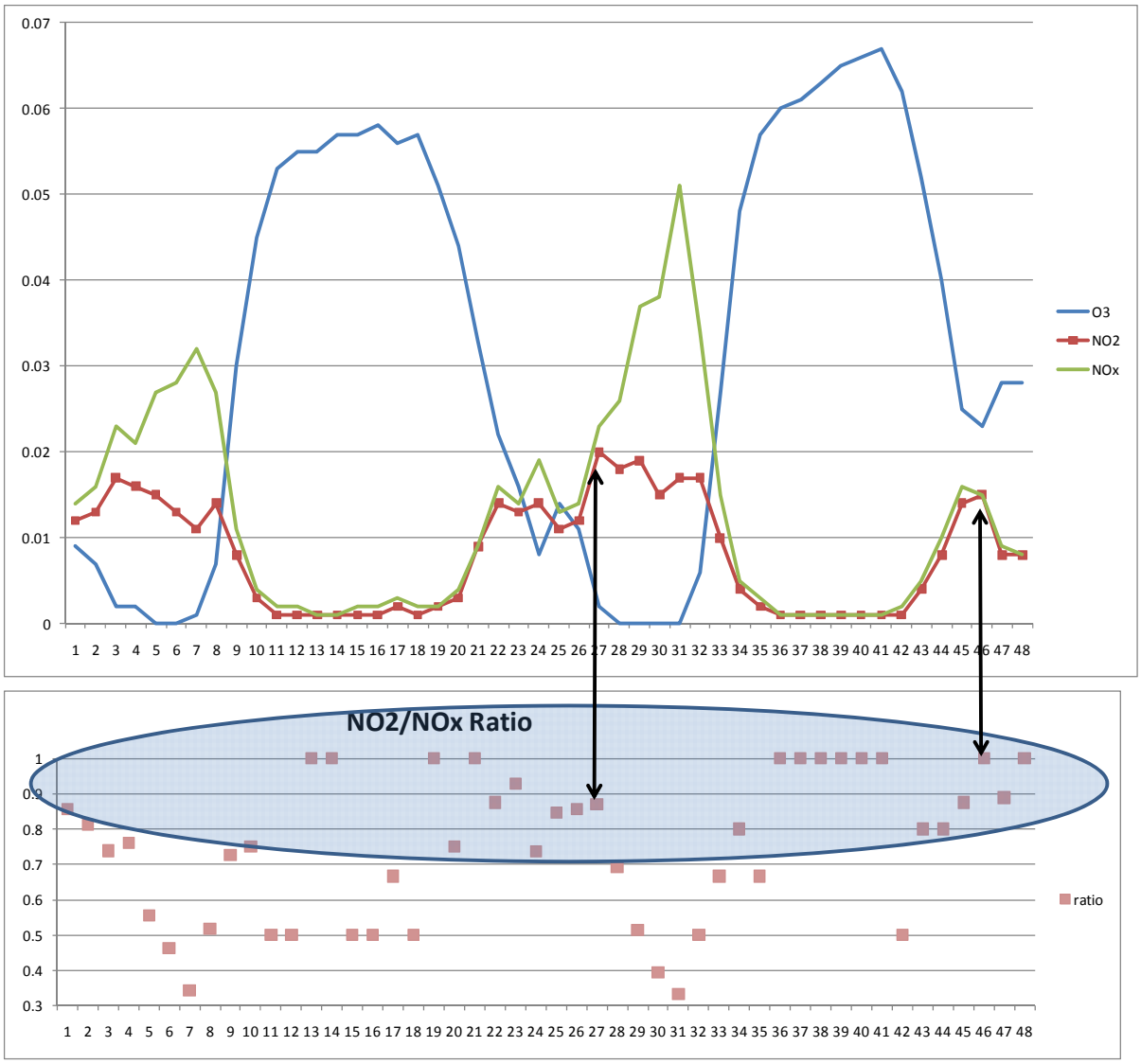
Device	NOx Emission Rate (Q) (g/Hp-hr)	NO_2/NOx Ratio
IC Engine	Less than 2.0	0.4
IC Engine	2.0 thru 10.0	0.15 + (0.5/Q)
IC Engine	Greater than 10.0	0.2
Turbines	--	0.25
IC Engine with Catalytic Converter	--	0.85

Lastly, with the PVMRM, the ambient equilibrium ratio between NO_2 and NOx must be entered. The AERMOD default value is 90 percent (0.90). The Tier 2 (ARM) approach in Appendix W recommends the use of an NO_2/NOx ambient equilibrium ratio of 75 percent (0.75) on an annual basis and the EPA March 1, 2011 memorandum indicated that an NO_2/NOx ambient equilibrium ratio of 80 percent (0.80) is appropriate on an hourly basis. Because EPA does not specifically state in the March 1, 2011 memorandum that the use of an NO_2/NOx ambient equilibrium ratio of 80 percent (0.80) is appropriate on an hourly

basis when PVMRM is used, the AERMOD default value of 90 percent (0.90) is assumed to be more appropriate for Tier 3 based on the following discussion.

To understand the importance of the NO_2/NOx ambient equilibrium ratio and how it works the actual monitoring data at Peck monitoring station located in the city of Wichita, Kansas was reviewed. An example of the NO_2/NOx ambient equilibrium ratio is presented in Figure 3-2.

Figure 3–2
NO_2/NOx Ambient Equilibrium Ratio Example

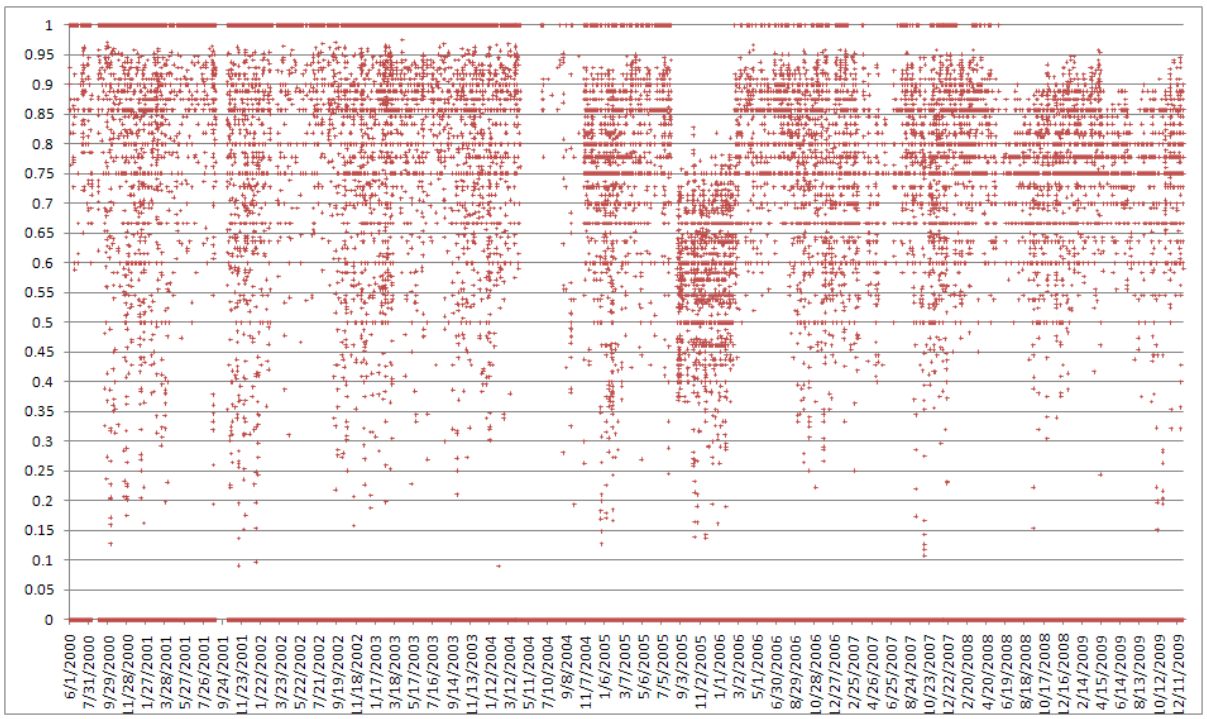


In Figure 3-2, 48 hours of the ambient monitoring data: ozone, NO_2, and NOx, are plotted together with the corresponding NO_2/NOx ratios. As depicted in the figure, the monitored

values of ozone and NO_2 change as NO is converted to NO_2. During the day, ozone is being produced; and at night, ozone is used consumed the NO to NO_2 reaction.

Figure 3-3 depicts the NO_2/NOx ambient equilibrium ratios for the years 2000 to 2009 when the NO_2 concentrations are 0.005 ppm or higher. As illustrated in Figure 3-3, many of the NO_2/NOx ambient equilibrium ratios are above 0.80. The monitoring data indicates that the NO_2/NOx ambient equilibrium ratios routinely go above 0.80, thus the default 0.9 equilibrium ratio was used in AERMOD when evaluating the 1-hour NO_2 NAAQS.

Figure 3–3
NO_2/NOx Ambient Equilibrium Ratios for Peck Monitoring Station, Years 2000 to 2009



3.11 Nearby Source Information

Contributions from nearby major and minor sources will be obtained from KDHE, Oklahoma Department of Environmental Quality (ODEQ), Colorado Department of Public Health and Environment (CDPHE) and Texas Commission on Environmental Quality (TCEQ). The nearby source inventories are included in Appendix D.

The Screening Threshold Method, or "10D" Method, for screening of sources for the NAAQS nearby source inventory dataset was used. The 10D screening typically compares the emissions in tons per year of a nearby source to the distance in km that the nearby

source is outside of the modeled ROI. This procedure was used by the regulatory agencies providing nearby source inventory data, along with professional judgment, to eliminate nearby sources that are not "expected to cause a significant concentration gradient in the vicinity of the source or sources under consideration for emission limit(s)", as detailed in 40 CFR Part 51, Appendix W, Section 9.2.3, based on their emissions and distance from the modeled source. It is impractical and overly time-consuming to include every possible NAAQS consumer regardless of size/distance in the modeling analysis, which is why the 10D screening method has been established.

3.12 Background Concentrations

Background ambient concentrations will be added to the model-predicted concentrations from the proposed facility for comparison to the NAAQS. Background concentrations for the criteria pollutants modeled (excluding ozone) were provided in tabular form by KDHE. Annual background concentrations from the Cedar Bluff monitoring station located in Trego County, Kansas and the Peck monitoring station located in the city of Wichita, Kansas were averaged for years 2006 through 2010, and the average concentration for each pollutant and averaging period was then recommended by KDHE to be used as the background concentration. The background ambient concentrations as provided by KDHE are included in Appendix D.

Hourly background ozone concentrations from the Cedar Bluff monitoring station located in Trego County, Kansas were also provided by KDHE for use in the model. Hourly readings were included for years 2006 to 2010. For periods of missing data, the missing flag (999) was added and a default value of 34 parts per billion (ppb) was used, as recommended by KDHE.

Section 4.0
Preliminary Modeling Analysis

4.1 Preliminary Modeling Analysis (aka Significant Impact Analysis) Results

The first component of the AQIA consists of a preliminary modeling analysis of those pollutants above the PSD significant emission rate which require a PSD review. The preliminary modeling analysis is used to determine if the emissions from the proposed facility would cause ambient pollutant concentrations in excess of the significance levels, which indicate refined modeling is required on a pollutant-by-pollutant basis. Sources with impacts less than the significance levels are considered to have negligible impacts on the ambient air quality and will not be included in the cumulative impact analysis. However, if a significance level is exceeded, a cumulative impact analysis is required for that pollutant and corresponding averaging period. The significant modeling analysis was completed for the following criteria pollutants: PM_{10}, Direct $PM_{2.5}$, NOx (as NO_2), SO_2 and CO.

The significance levels and *Pre-application Ambient Monitoring Thresholds* per 40 CFR 52.21(m) for the pollutants of interest are summarized in Table 4-1. Significance levels for the $PM_{2.5}$ averaging periods are based on the EPA final rule, *Prevention of Significant Deterioration (PSD) for Particulate Matter Less Than 2.5 Micrometers ($PM_{2.5}$)—Increments, Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC),* published October 20, 2010 (75 Federal Register 64864). The significance level for the 1-hour NO_2 averaging period is based on the EPA memorandum, *General Guidelines for Implementing the 1-Hour NO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-Hour NO_2 Significant Impact Level*, published June 28, 2010. The significance level for the 1-hour SO_2 averaging period is based on the EPA memorandum, *Guidance Concerning the Implementing the 1-Hour SO_2 NAAQS for the Prevention of Significant Deterioration Program*, published August 23, 2010.

Table 4–1
Pollutants and Averaging Periods To Be Modeled, Significance Levels for Pollutants and Pre-application Monitoring Thresholds

Pollutant	Period	Significance Level	Pre-application Monitoring Threshold Concentration	Compared to…
PM_{10}	24-Hour	5 μg/m^3	10 μg/m^3	the highest modeled concentration predicted across all receptors
$PM_{2.5}$	Annual	0.3 μg/m^3	N/A	the highest average of the modeled annual averages across the 5 years met data
	24-Hour	1.2 μg/m^3	4 μg/m^3	the highest average of the maximum modeled 24-hour averages across the 5 years met
NO_2	Annual	1 μg/m^3	14 μg/m^3	the highest modeled concentration predicted across all receptors
	1-Hour	0.004 ppm (7.53 μg/m^3)	N/A	the highest of the 5 year averages of the maximum modeled concentrations predicted each year at each receptor
SO_2	Annual	1	N/A	the highest modeled concentration predicted across all receptors
	24-Hour	5	13 μg/m^3	the highest modeled concentration predicted across all receptors
	1-Hour	0.003 ppm (7.86 μg/m^3)	N/A	the highest of the 5 year averages of the maximum modeled concentrations predicted each year at each receptor
CO	8-Hour	500 μg/m^3	575 μg/m^3	the highest modeled concentration predicted across all receptors
	1-Hour	2,000 μg/m^3	N/A	the highest modeled concentration predicted across all receptors

4.2 Cumulative Impact Analysis for NAAQS and PSD Increment Compliance

The second component of the AQIA consists of a cumulative impact analysis to demonstrate that the proposed facility will not cause or contribute to any violations of applicable NAAQS or PSD Class II area increment for those pollutants with concentrations above the respective significance level.

4.2.1 NAAQS

To address NAAQS for those impacts that are greater than the significance levels, the cumulative impact analysis will include the facility impacts plus nearby NAAQS sources in the vicinity of the proposed facility. Background ambient concentrations will be added to the model-predicted concentrations from the proposed facility for comparison to the NAAQS.

The conversion of concentrations in micrograms per cubic meter ($\mu g/m^3$) for the gaseous pollutants (NO_2, SO_2 and CO) to concentrations in parts per million by volume (ppmv) for comparison to the NAAQS will be performed using the following equation:

$$C_{ppm} = C_{\mu g/m^3} \times 0.02445 / MW$$

where:

C = Concentration of the contaminant, in ppm or $\mu g/m^3$

MW = Molecular weight of contaminant

MW NO_2 = 46.01 grams/mole (g/mol)

MW SO_2 = 64.06 g/mol

MW CO = 28.01 g/mol

0.02445 = Constant representing the volume, in liters, of one mole of a gas at standard temperature (25°C) and pressure (1 atmosphere).

4.2.2 PSD Class II Area Increments

To address PSD increments, for those proposed facility impacts that are greater than the significance levels, the cumulative impact analysis will include the proposed facility's impacts plus PSD increment consuming sources in the vicinity of the proposed facility. The model-predicted concentrations from the proposed facility and increment consuming sources will be compared to the PSD Class II area increment levels.

Section 5.0
Preliminary Modeling Analysis

5.1 Preliminary Modeling Analysis (aka Significant Impact Analysis) Results

The significant modeling analysis was completed for the following criteria pollutants: PM_{10}, Direct $PM_{2.5}$, NOx (as NO_2), SO_2 and CO. Table 5-1 details the predicted facility impacts compared to the SILs and *Pre-application Ambient Monitoring Thresholds* per 40 CFR § 52.21(m).

The modeled impacts for the proposed facility fall below the *Pre-application Ambient Monitoring Thresholds* for all pollutants modeled, except for the 24-hour PM_{10} and 24-hour $PM_{2.5}$ averaging periods. KDHE has indicated that in lieu of pre-application monitoring data, the facility will use representative data from the Dodge City, KS monitoring station.

Modeled concentrations less than the SILs are considered to have negligible impacts on the ambient air quality. For each pollutant the model predicts the H1H concentration to be below the SIL threshold, no further analysis is necessary for that pollutant even if there is a PSD Class II increment or NAAQS exceedance due to contributions from nearby facilities. The results indicate that the proposed facility will not cause a significant impact in the modeled area for the 3-hour SO_2, or the 1-hour and 8-hour CO averaging periods.

The ROI distances for each pollutant and averaging period are summarized in Table 5-2. The predicted impacts are based on the H1H for comparison to the SILs. The ROI was calculated based on the facility's approximate center UTM coordinates:
Easting: 2883551.05, Northing: 4117494.00.

Table 5–1
Predicted Facility Impacts Compared to Significance Levels and Pre-application Monitoring Thresholds

Pollutant	Avg. Period	Maximum Predicted Facility Impacts ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Exceeds SIL (Yes/No)	Pre-application Monitoring Threshold Concentration ($\mu g/m^3$)	Exceeds Monitoring Threshold (Yes/No)
PM_{10}	24-Hour	32.61(m)	5	**Yes**	10	**Yes**
	Annual	7.05	1	**Yes**	N/A	N/A
$PM_{2.5}$	24-Hour	8.31	1.2	**Yes**	4	**Yes**
	Annual	2.18	0.3	**Yes**	N/A	N/A
NO_2	1-Hour	19.51	10/7.53 Note 1	**Yes**	N/A	N/A
	Annual	2.33	1	**Yes**	14	No
SO_2	1-Hour	23.77	10/7.86 Note 1	**Yes**	N/A	N/A
	3-Hour	24.15	25	No	N/A	N/A
	24-Hour	11.70	5	**Yes**	13	No
	Annual	1.24	1	**Yes**	N/A	N/A
CO	1-Hour	37.00	2,000	No	N/A	N/A
	8-Hour	22.33	500	No	575	No

Note 1: Interim SILs established by KDHE until EPA publishes final SILs, and recommended SILs per EPA memoranda.

Table 5–2
Radius of Impacts Summary

Pollutant	ROI Based on H1H	ROI + 50 km
24-Hour $PM_{2.5}$	5,350 m	55.35 km
Annual $PM_{2.5}$	2,350 m	52.35 km
24-Hour PM_{10}	Note 1	55 km, Note 1
Annual PM_{10}	2,250 m	52.25 km
1-Hour NO_2	50,000 m	100 km, Note 2
Annual NO_2	2,000 m	52.00 km
1-Hour SO_2	50,000 m	100 km, Note 2
24-Hour SO_2	3,250 m	53.25 km
Annual SO_2	1,200 m	51.20 km

Note 1: 24-hour PM_{10} ROI skewed by missing meteorological data. Of the 10,900 receptors modeled, 3,258 receptors (or approximately 30%) were flagged indicating missing meteorological data ("m" flag) during the calculation of the H1H impact at that receptor. For the purposes of this AQIA, the same ROI distance for $PM_{2.5}$ was applied to PM_{10}.

Note 2: Distance reviewed for 1-hour NO_2 and 1-hour SO_2 refined modeling analysis was based on a total of 100 km, per KDHE recommendation.

Figures 5-1 through 5-37 depict the isopleths where the respective SIL is exceeded for each pollutant and averaging period evaluated in the refined modeling analysis.

Figure 5–1
$PM_{2.5}$ 24-Hour H1H Isopleth and ROI When Haul Roads 100%/0% (Source: Run 1, FWP-471)

Plot Based on 5 Year Average (1st High 8.21 μg/m³)

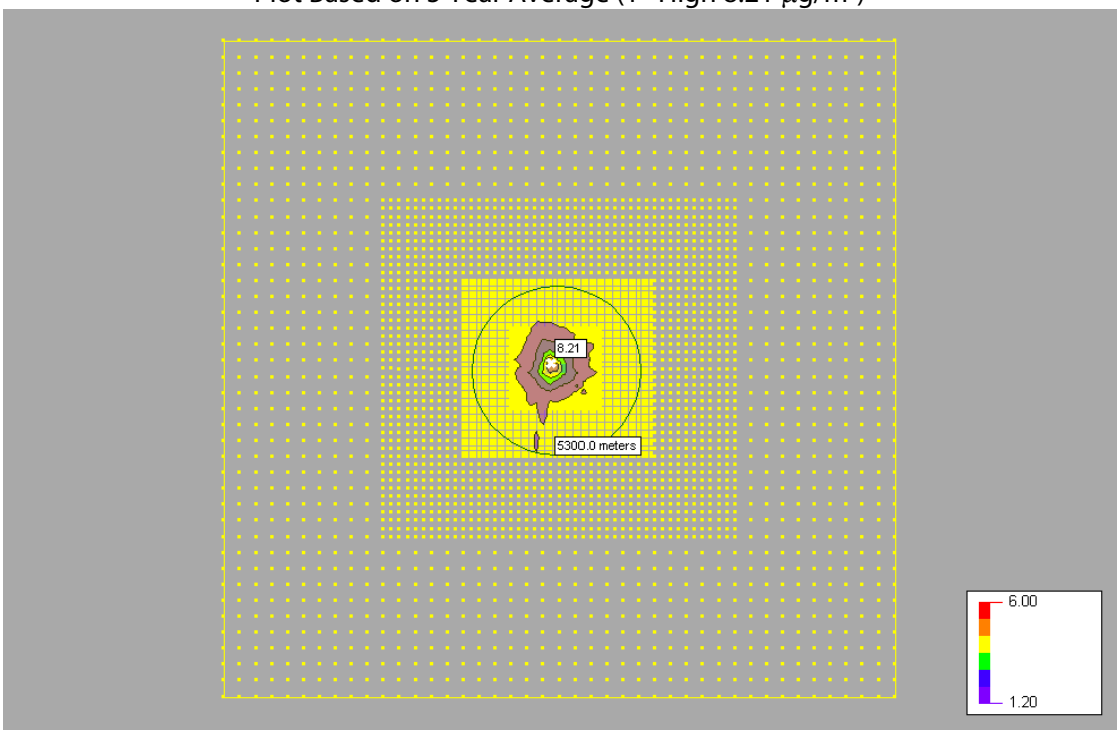


Figure 5–2
$PM_{2.5}$ 24-Hour H1H Isopleth and ROI When Haul Roads 90%/10% (Source: Run 2, FWP-471)

Plot Based on 5 Year Average (1st High 8.23 μg/m³)

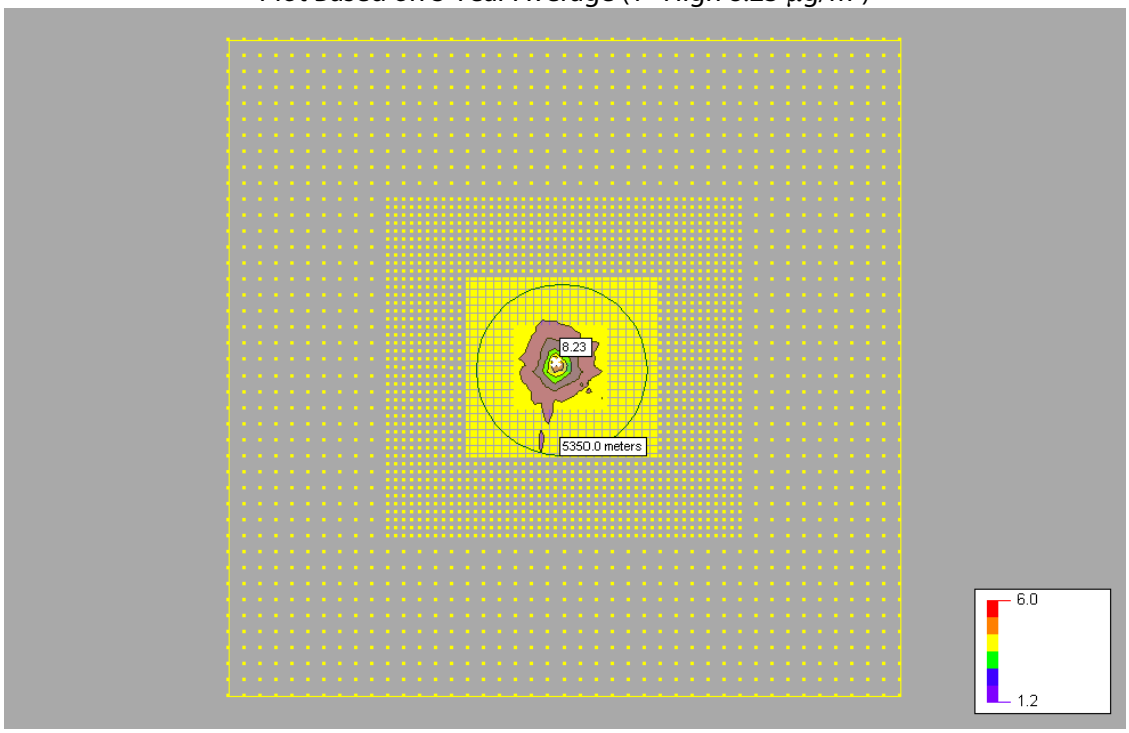


Figure 5–3
$PM_{2.5}$ 24-Hour H1H Isopleth and ROI When Haul Roads 80%/20% (Source: Run 3, FWP-471)

Plot Based on 5 Year Average (1st High 8.26 µg/m³)

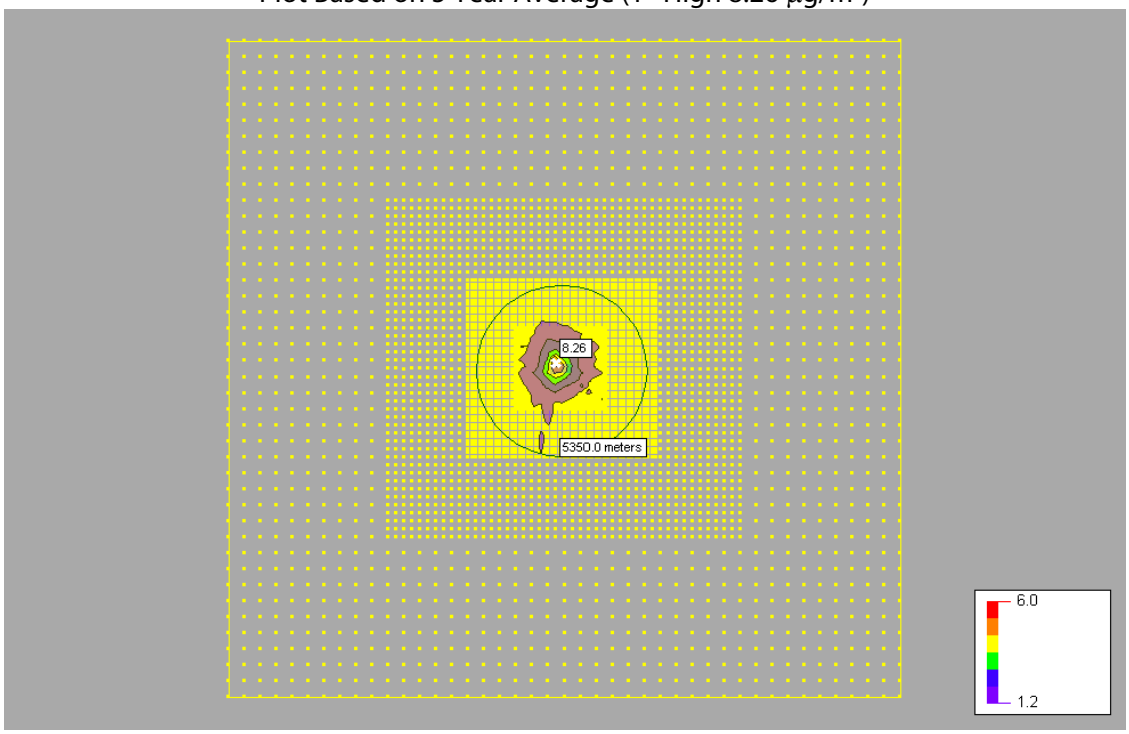


Figure 5–4
$PM_{2.5}$ 24-Hour H1H Isopleth and ROI When Haul Roads 70%/30% (Source: Run 4, FWP-471)

Plot Based on 5 Year Average (1st High 8.29 µg/m³)

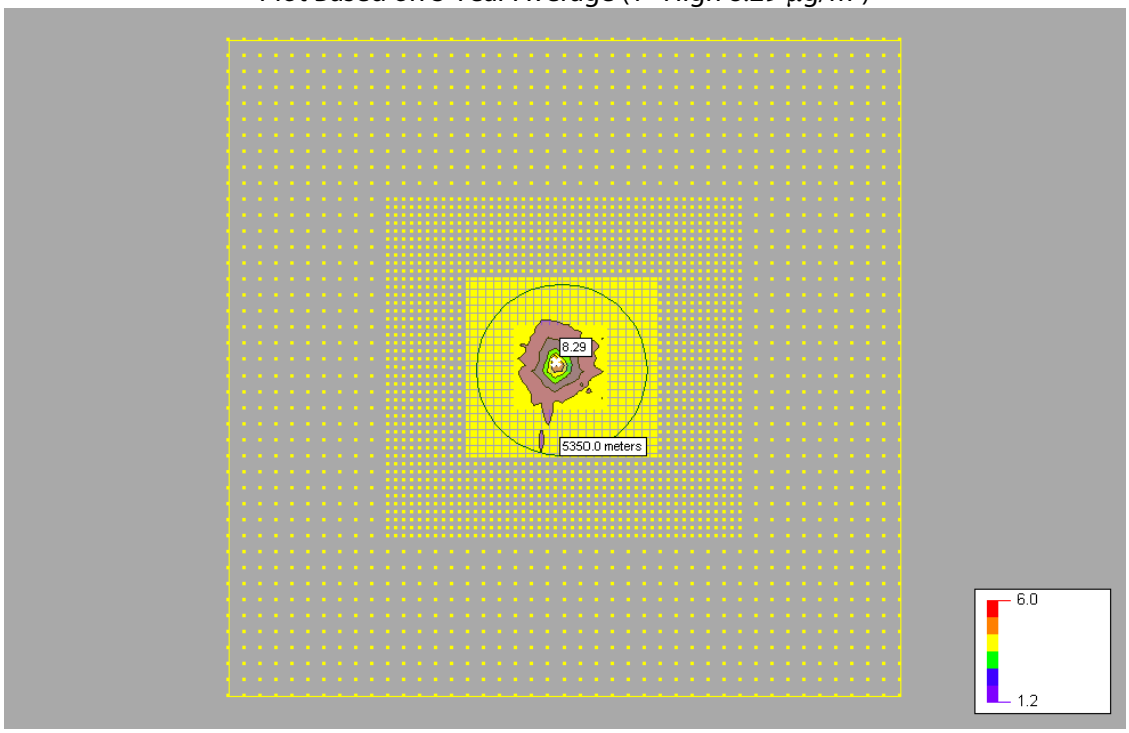


Figure 5–5
$PM_{2.5}$ Annual H1H Isopleth When Haul Roads 70%/30% (Source: Run 4, FWP-471)

Plot Based on Max Year 2007 (1st High 2.18 µg/m³)

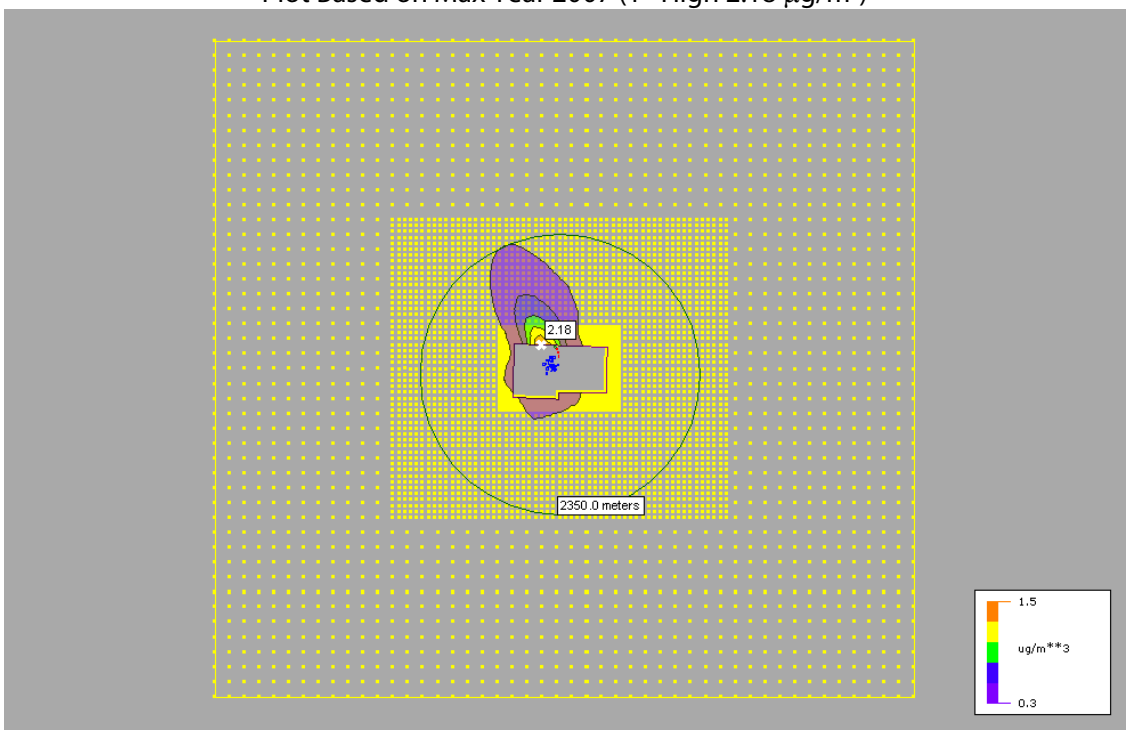


Figure 5–6
PM_{10} 24-Hour H1H Isopleth When Haul Roads 100%/0% (Source: Run 1, FWP-471)

Plot Based on 5 Year Average (1st High 28.13 µg/m³)

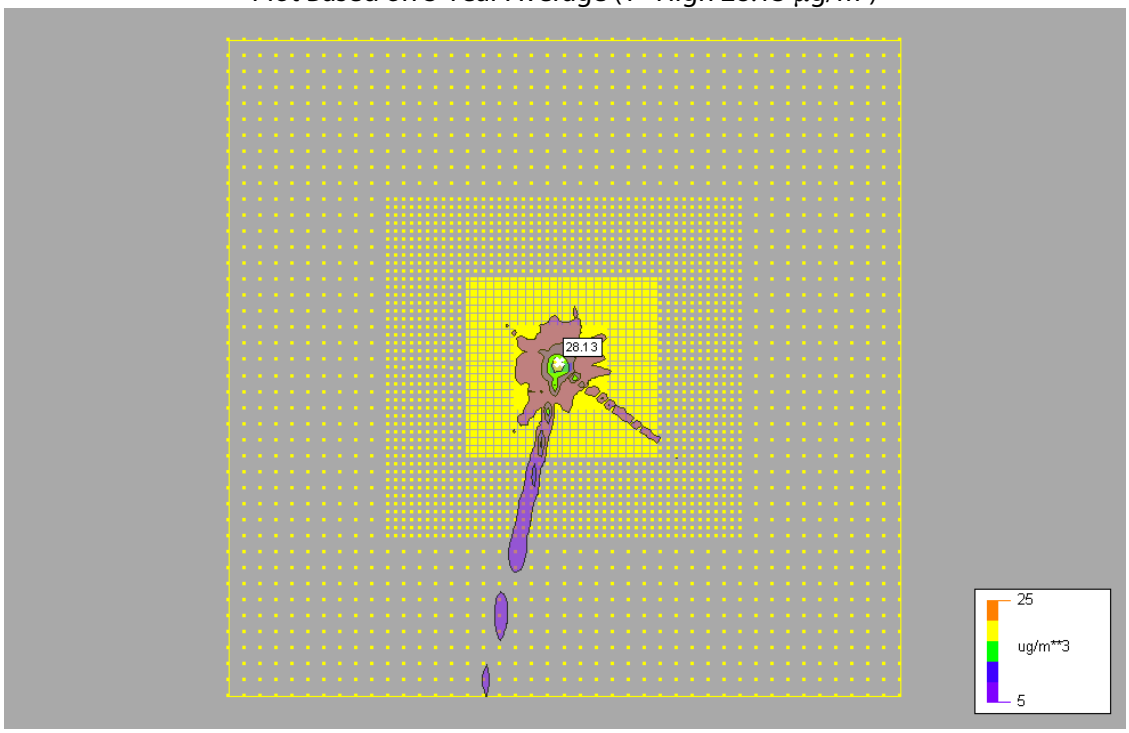


Figure 5–7
$PM_{2.5}$ 24-Hour H1H Isopleth When Haul Roads 90%/10% (Source: Run 2, FWP-471)

Plot Based on 5 Year Average (1st High 29.28 μg/m³)

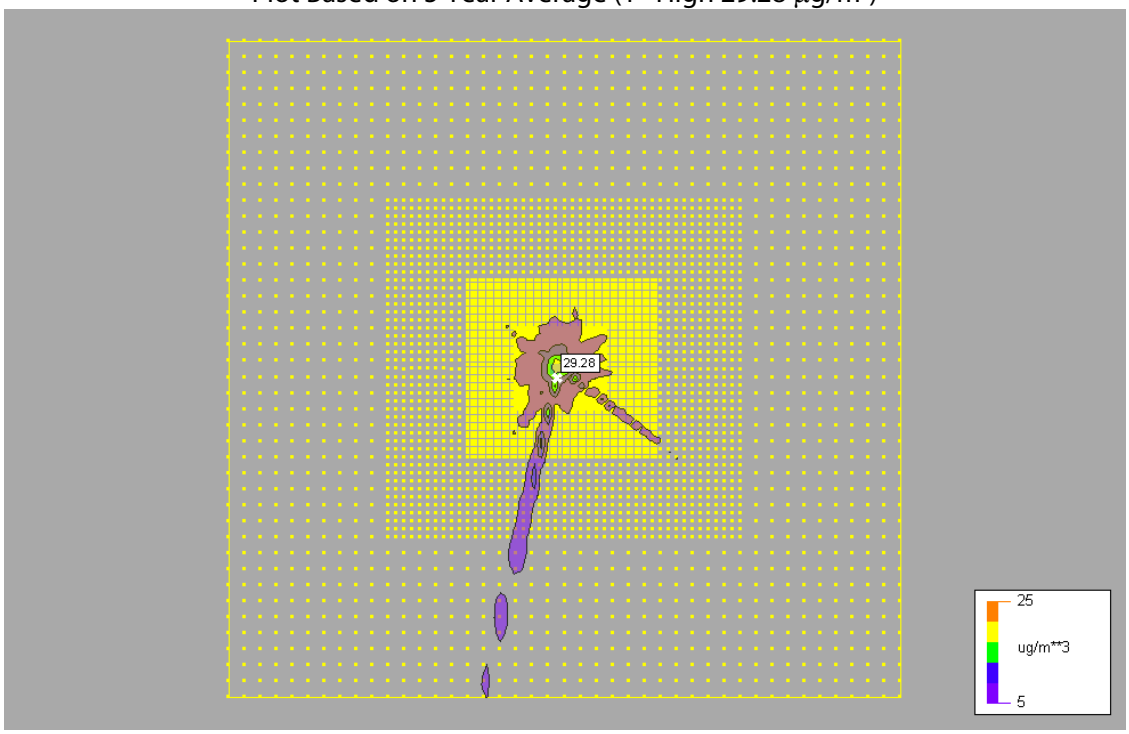


Figure 5–8
$PM_{2.5}$ 24-Hour H1H Isopleth When Haul Roads 80%/20% (Source: Run 3, FWP-471)

Plot Based on 5 Year Average (1st High 30.95 μg/m³)

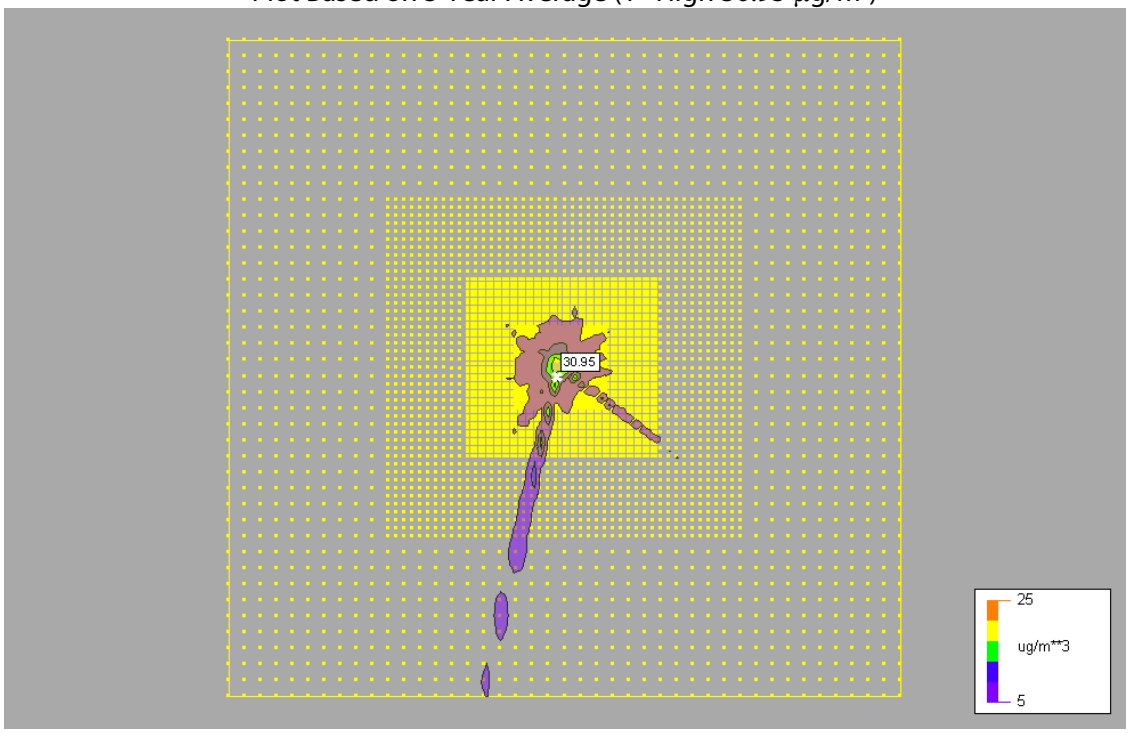


Figure 5–9
PM_{10} 24-Hour H1H Isopleth When Haul Roads 70%/30% (Source: Run 4, FWP-471)

Plot Based on 5 Year Average (1st High 32.61 μg/m³)

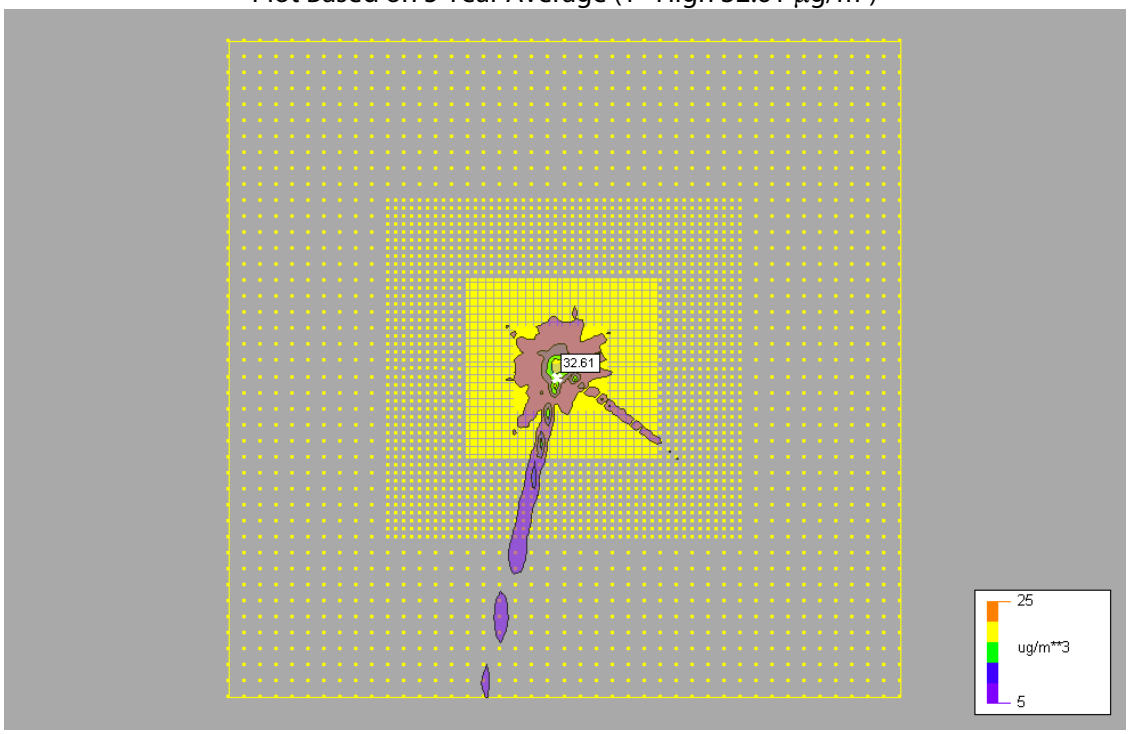


Figure 5–10
PM_{10} Annual H1H Isopleth When Haul Roads 70%/30% (Source: Run 4, FWP-471)

Plot Based on Max Year 2007 (1st High 7.058 μg/m³)

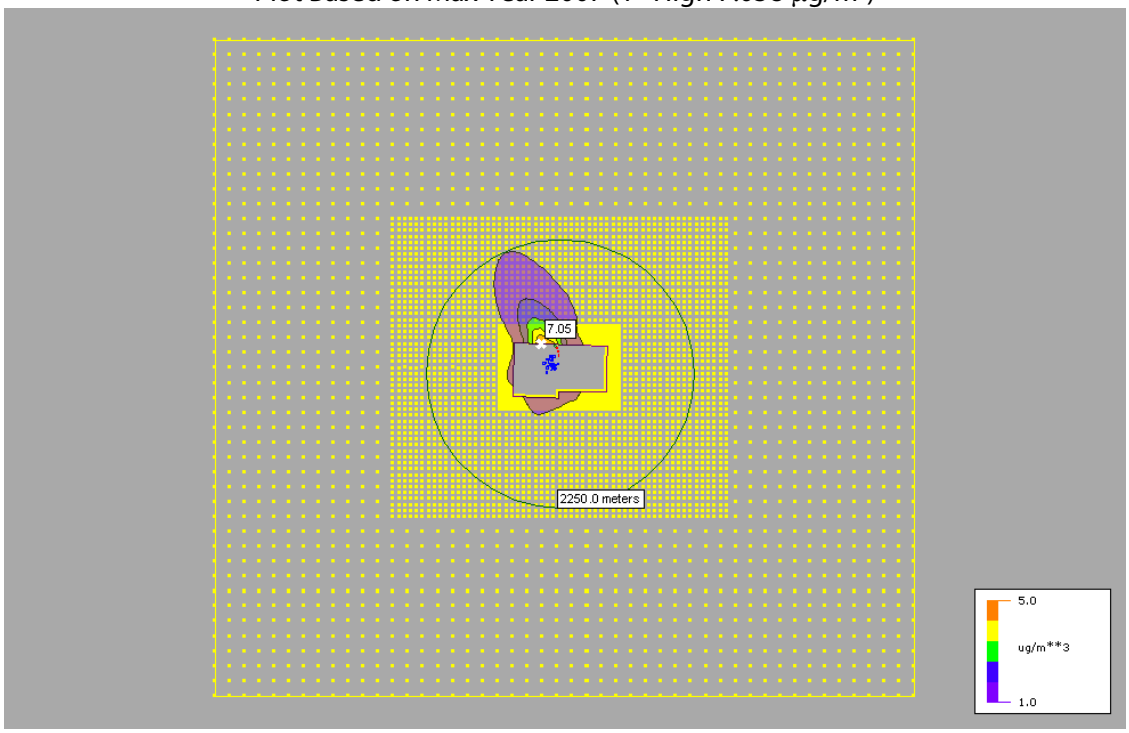


Figure 5–11
NO_2 PVMRM 1-Hour SIL Isopleth (EPA Interim SIL = 7.53 μg/m³; Source: ALL-500)

Plot Based on 100th Percentile (1st High 19.33 μg/m³)

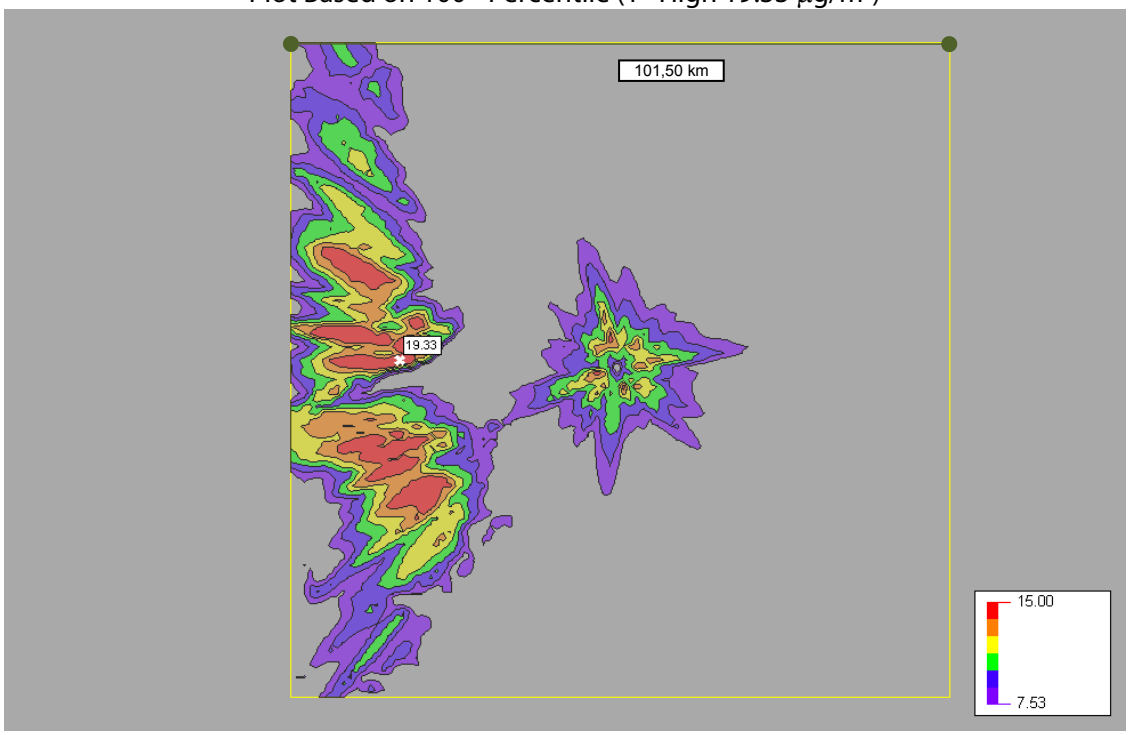


Figure 5–12
NO_2 PVMRM 1-Hour SIL Isopleth (KDHE Interim SIL = 10 μg/m³; Source: ALL-500)

Plot Based on 100th Percentile (1st High 19.33 μg/m³)

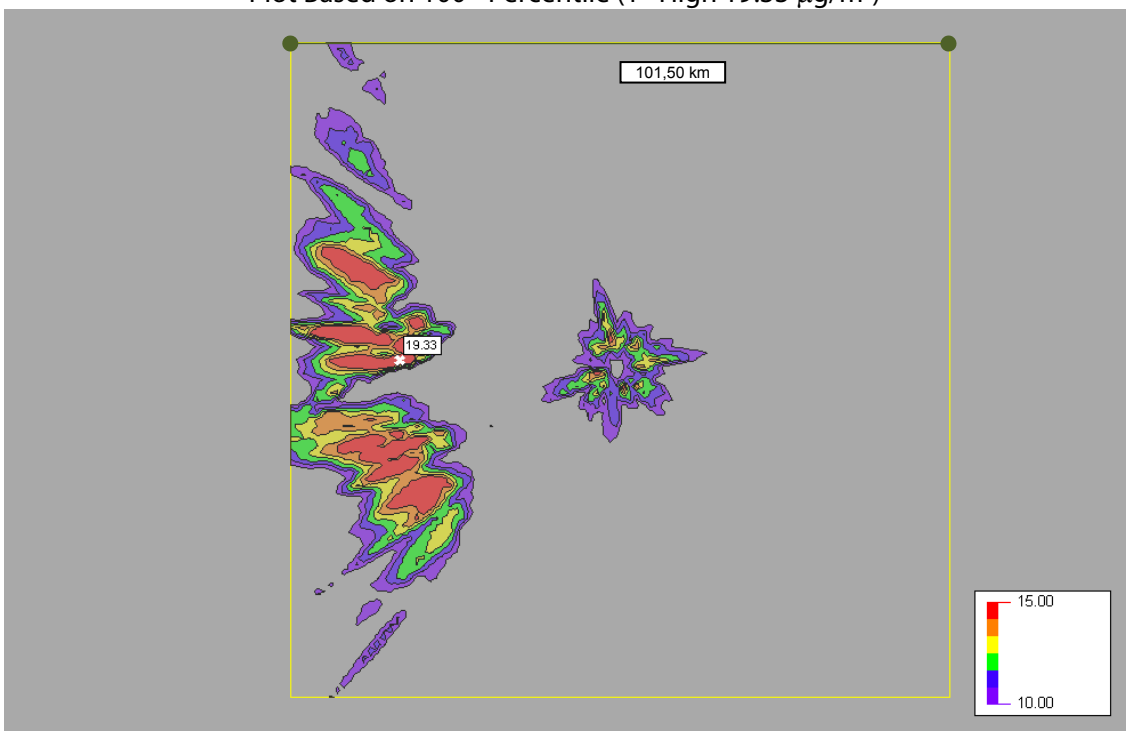


Figure 5–13
NO_2 PVMRM 1-Hour SIL Isopleth (EPA Interim SIL = 7.53 μg/m³; Source: ALL-471)

Plot Based on 100th Percentile (1st High 19.51 μg/m³)

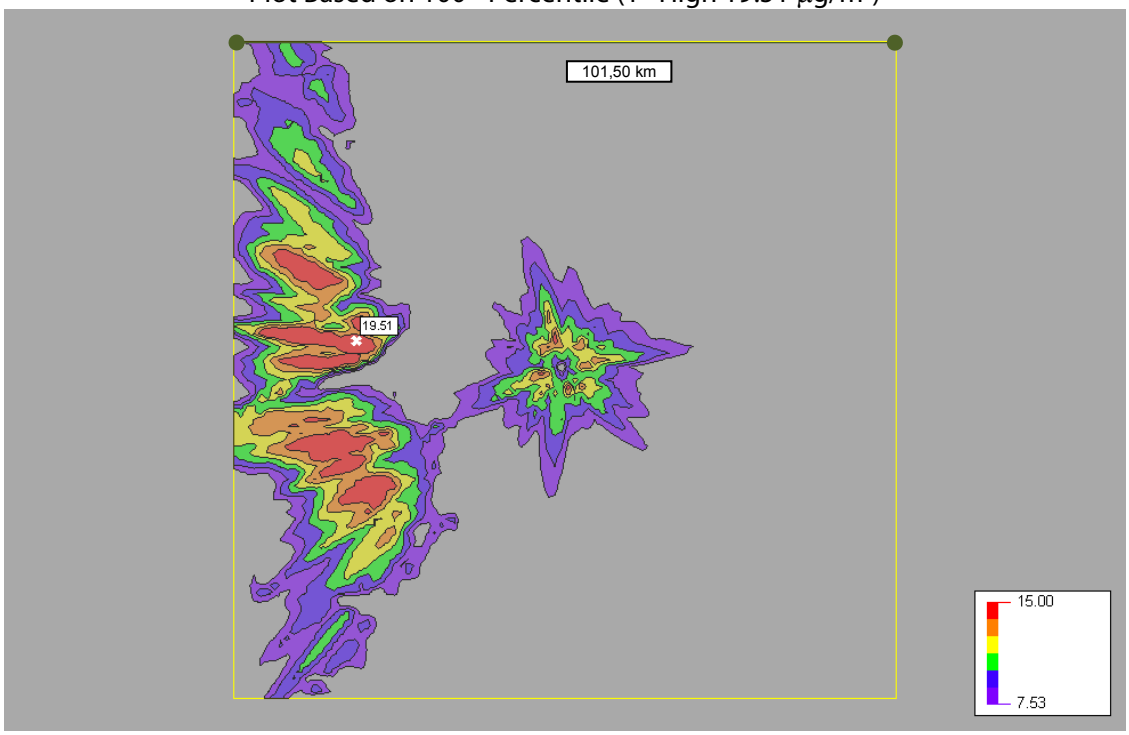


Figure 5–14
NO_2 PVMRM 1-Hour SIL Isopleth (KDHE Interim SIL = 10 μg/m³; Source: ALL-471)

Plot Based on 100th Percentile (1st High 45.86 μg/m³)

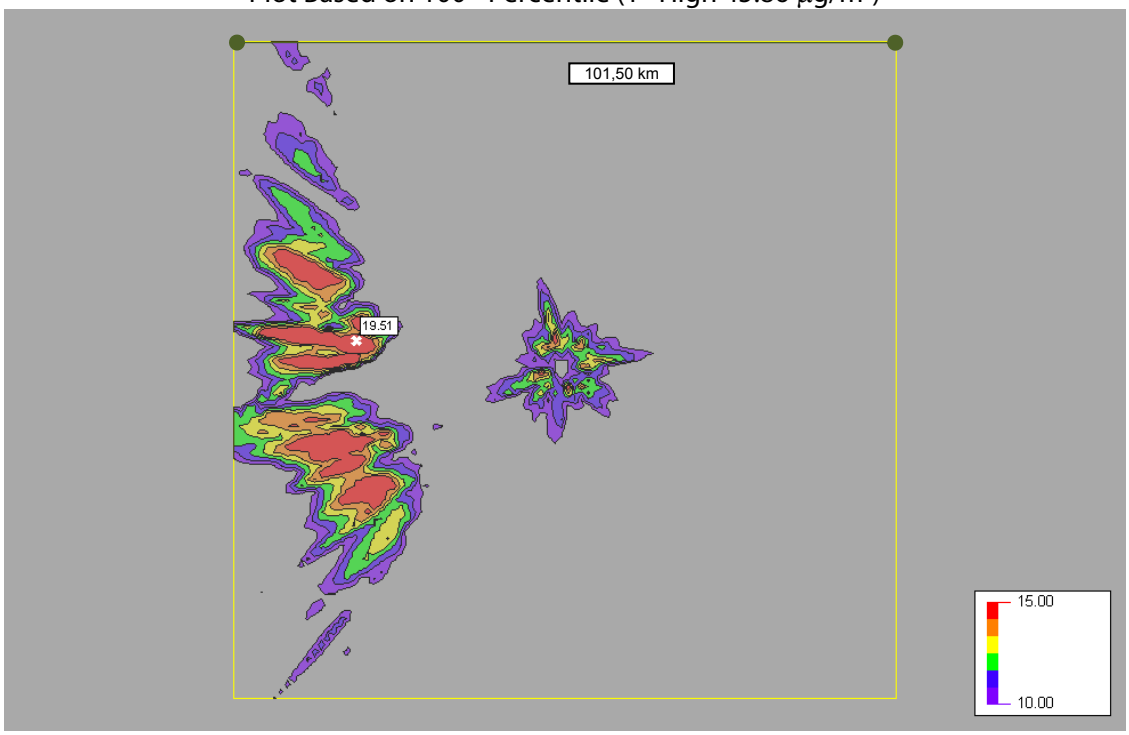


Figure 5–15
NO_2 PVMRM 1-Hour SIL Isopleth (EPA Interim SIL = 7.53 μg/m³; Source: ALL-353)

Plot Based on 100th Percentile (1st High 16.56 μg/m³)

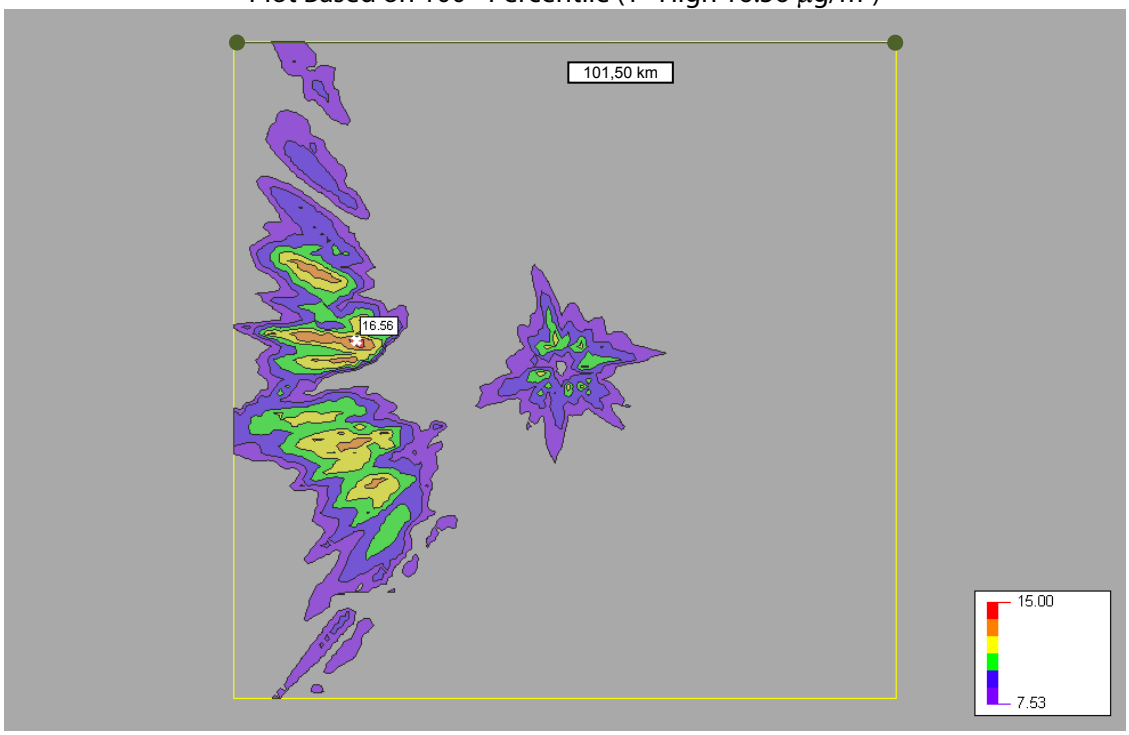


Figure 5–16
NO_2 PVMRM 1-Hour SIL Isopleth (KDHE Interim SIL = 10 μg/m³; Source: ALL-353)

Plot Based on 100th Percentile (1st High 16.56 μg/m³)

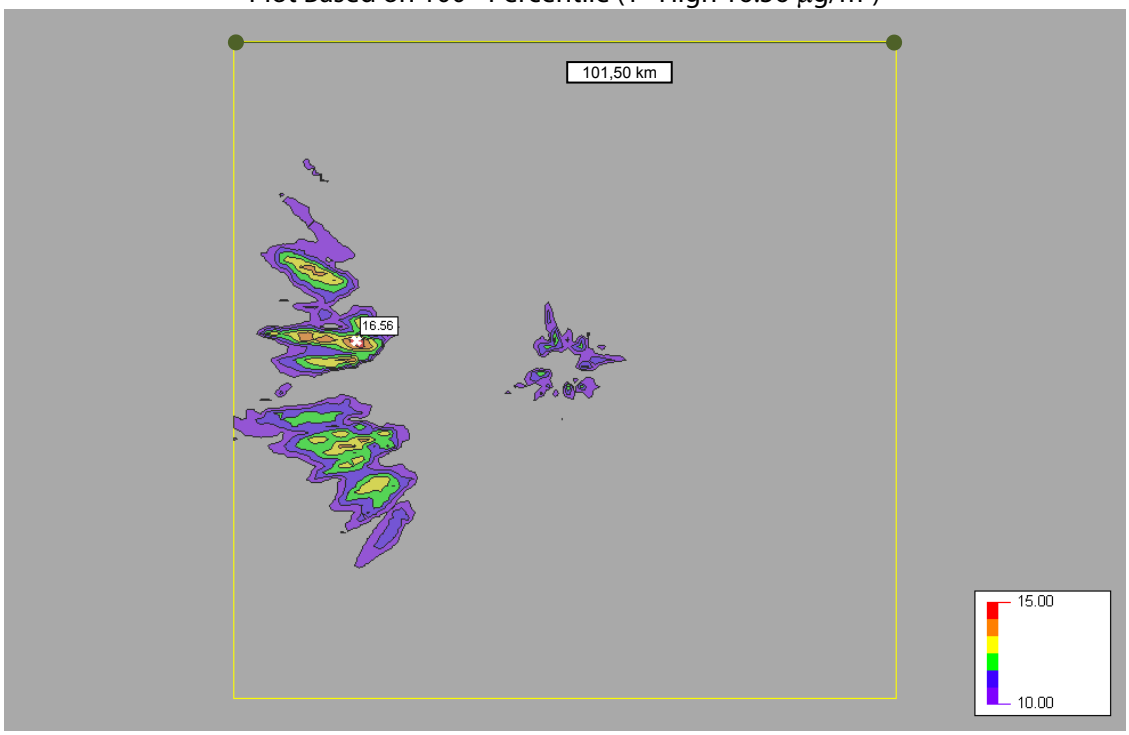


Figure 5–17
NO_2 PVMRM 1-Hour SIL Isopleth (EPA Interim SIL = 7.53 μg/m³; Source: ALL-236)

Plot Based on 100th Percentile (1st High 12.48 μg/m³)

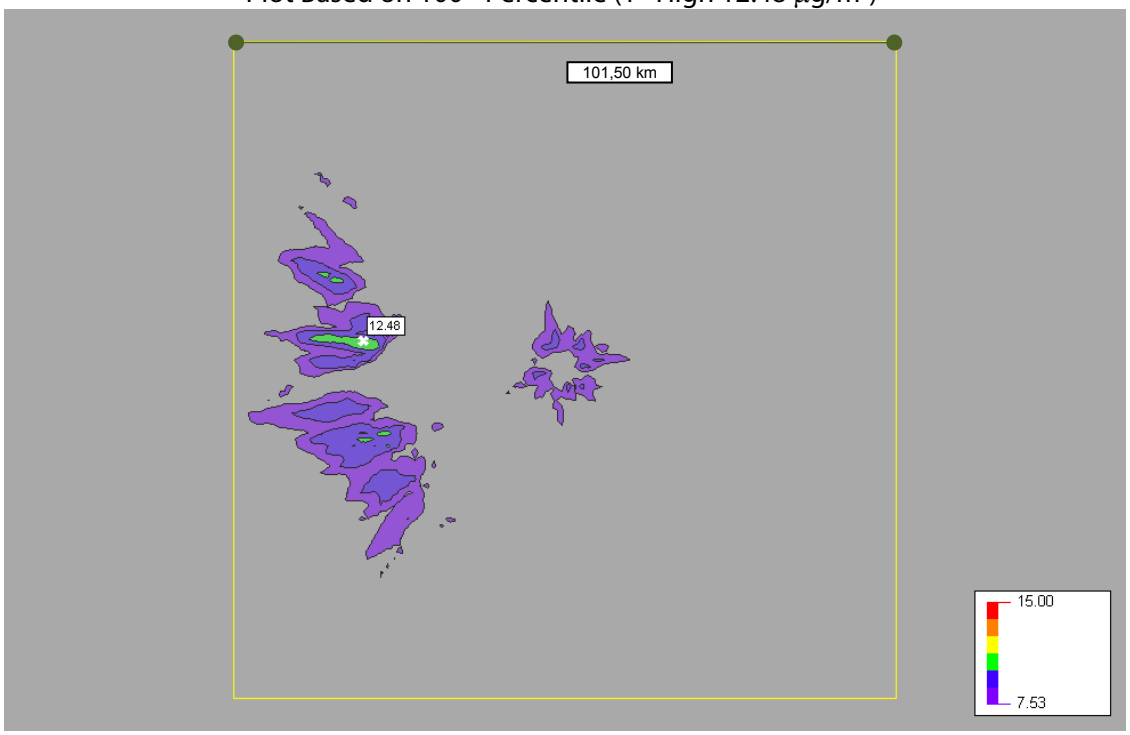


Figure 5–18
NO_2 PVMRM 1-Hour SIL Isopleth (KDHE Interim SIL = 10 μg/m³; Source: ALL-236)

Plot Based on 100th Percentile (1st High 12.48 μg/m³)

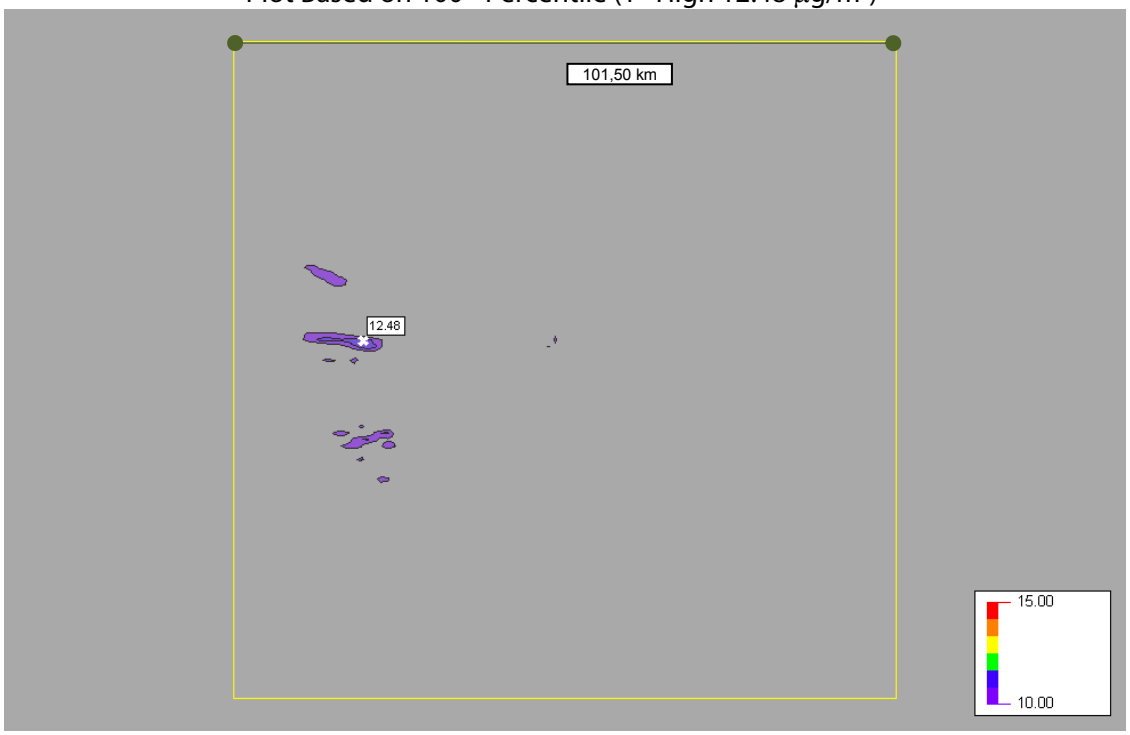


Figure 5–19
NO_2 PVMRM 1-Hour SIL Isopleth (EPA Interim SIL = 7.53 μg/m³; Source: ALL-141)

Plot Based on 100th Percentile (1st High 15.04 μg/m³)

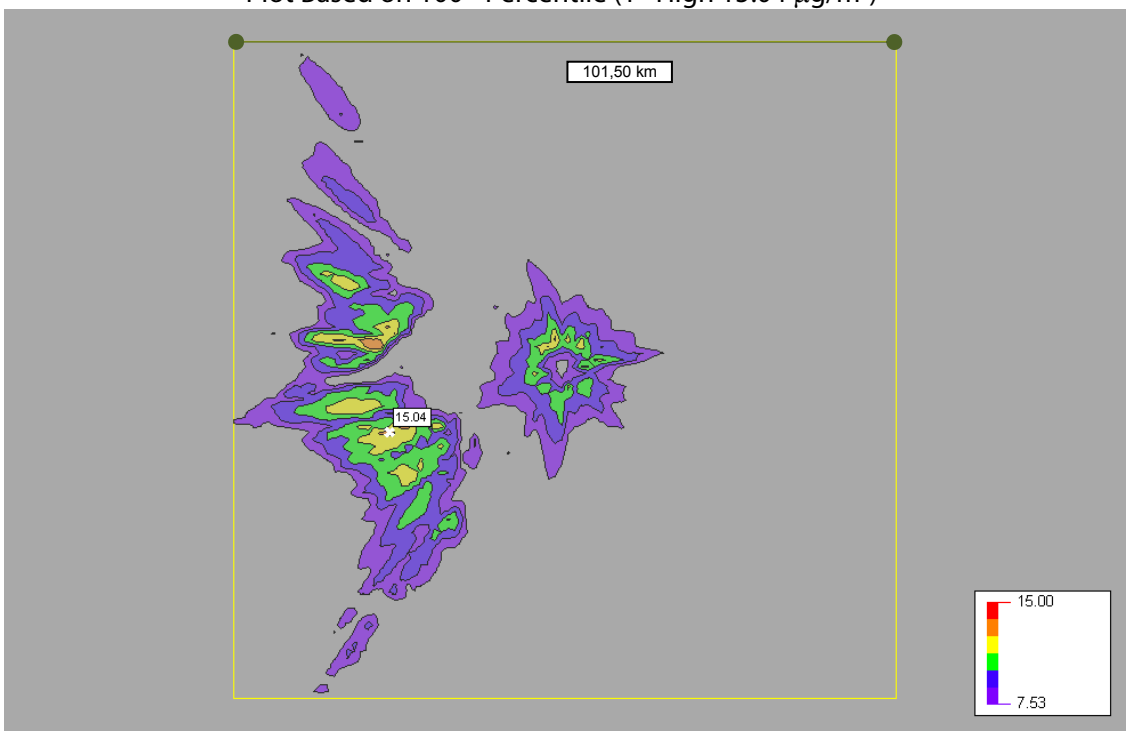


Figure 5–20
NO_2 PVMRM 1-Hour SIL Isopleth (KDHE Interim SIL = 10 μg/m³; Source: ALL-141)

Plot Based on 100th Percentile (1st High 15.04 μg/m³)

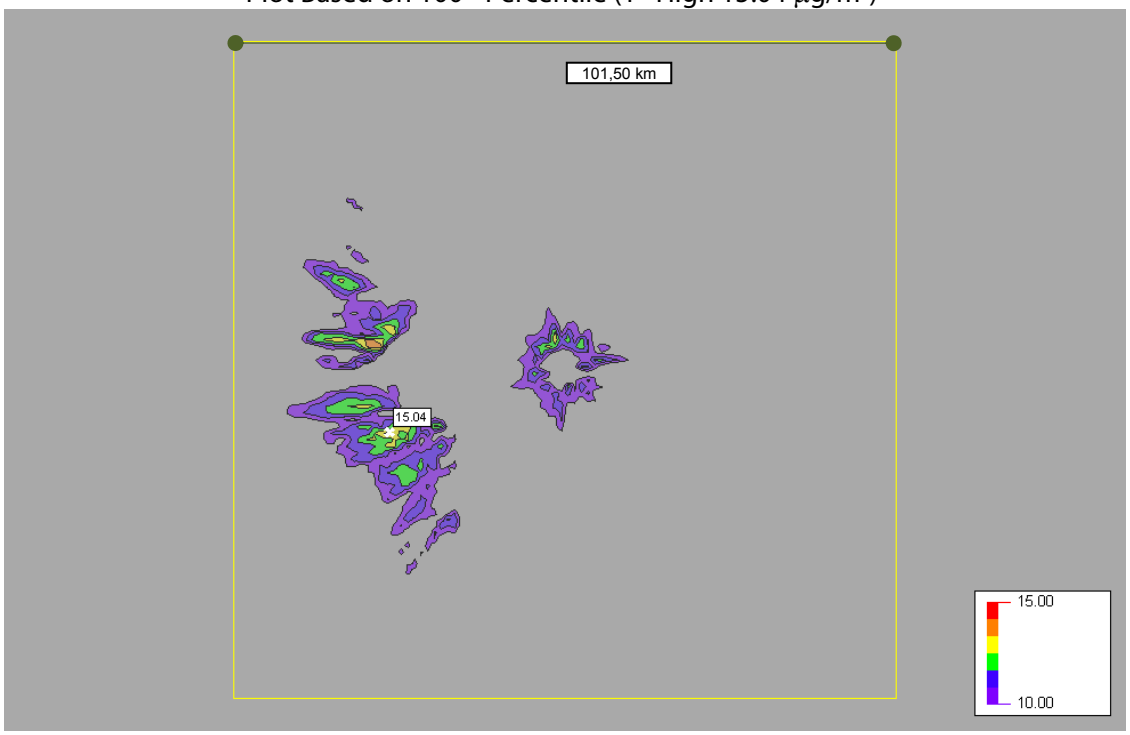


Figure 5–21
Tier 1 NO_2 Annual SIL Isopleth and ROI (Year 2006, Source: ALL-471)

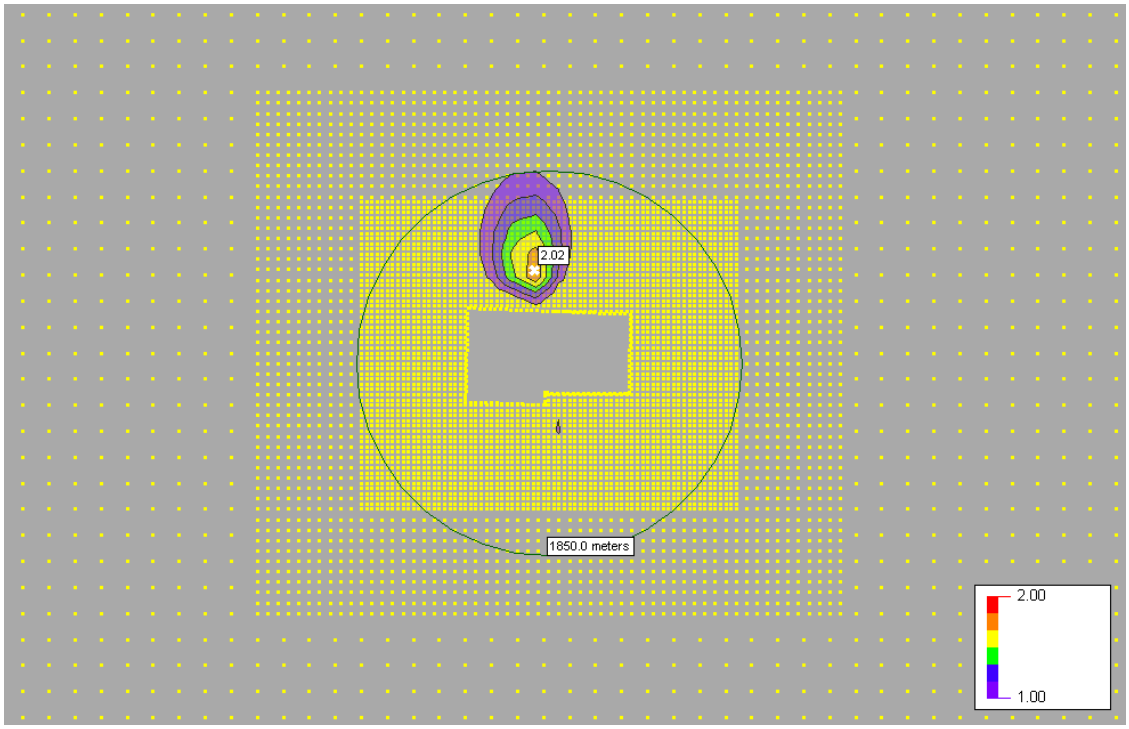


Figure 5–22
Tier 1 NO_2 Annual SIL Isopleth and ROI (Year 2007, Source: ALL-471)

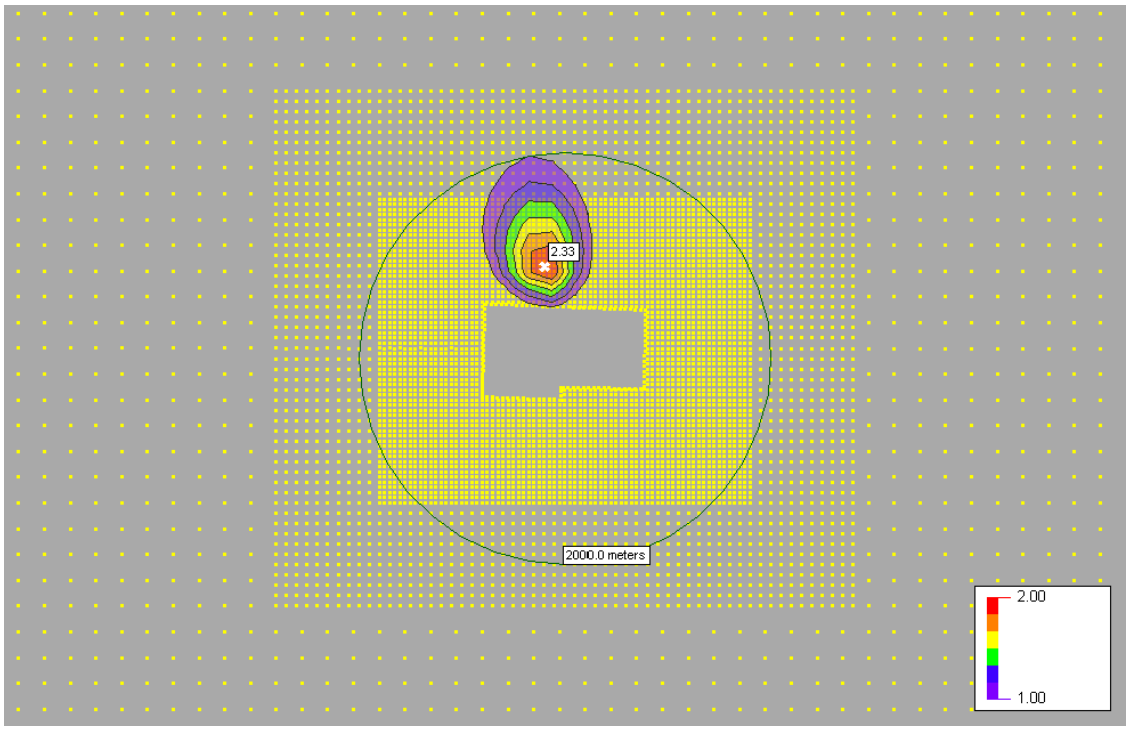


Figure 5–23
Tier 1 NO_2 Annual SIL Isopleth and ROI (Year 2008, Source: ALL-471)

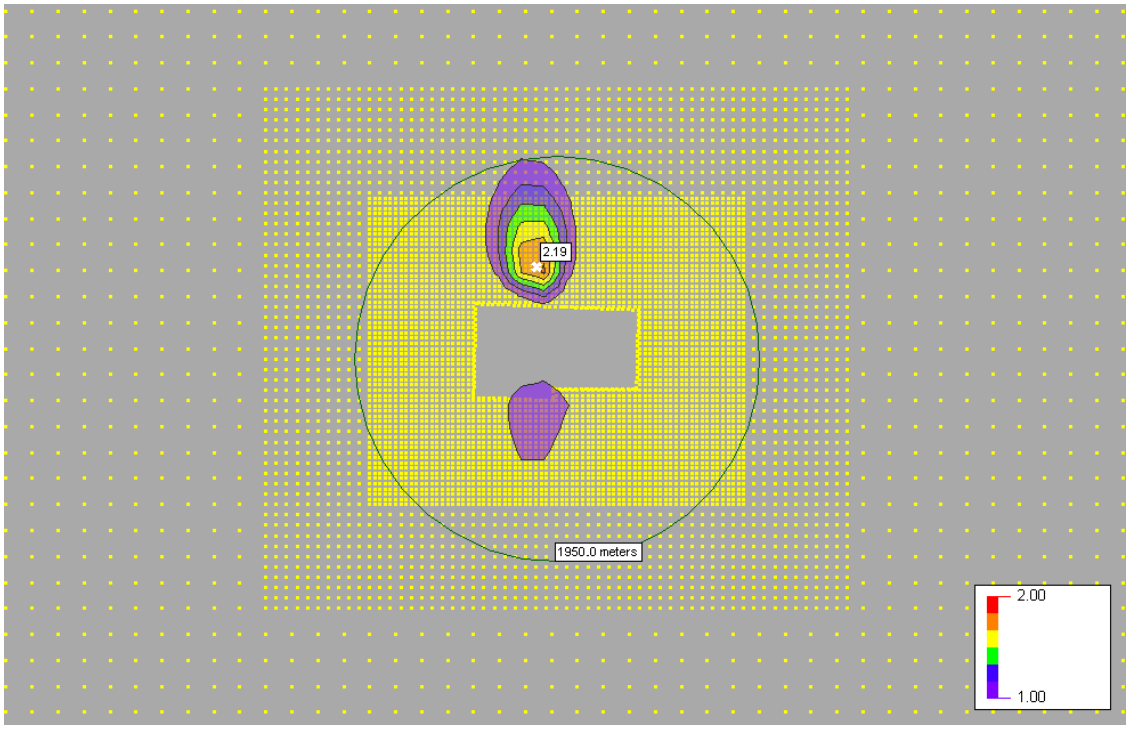


Figure 5–24
Tier 1 NO_2 Annual SIL Isopleth and ROI (Year 2009, Source: ALL-471)

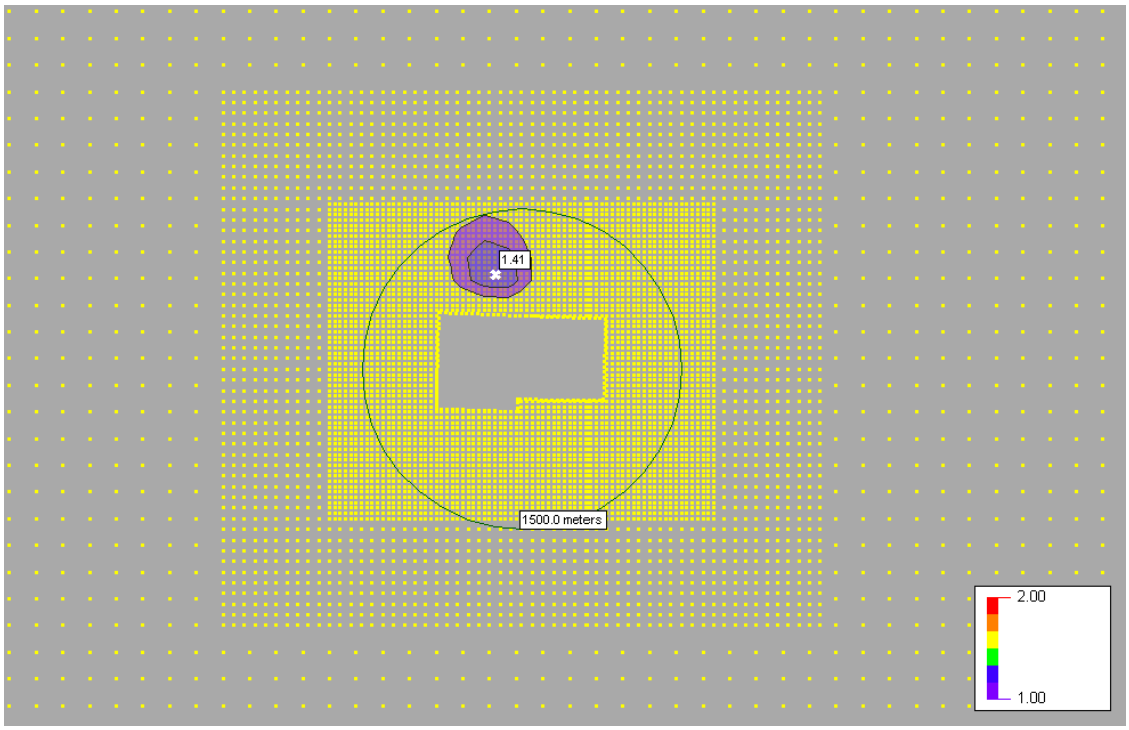


Figure 5–25
Tier 1 NO_2 Annual SIL Isopleth and ROI (Year 2010, Source: ALL-471)

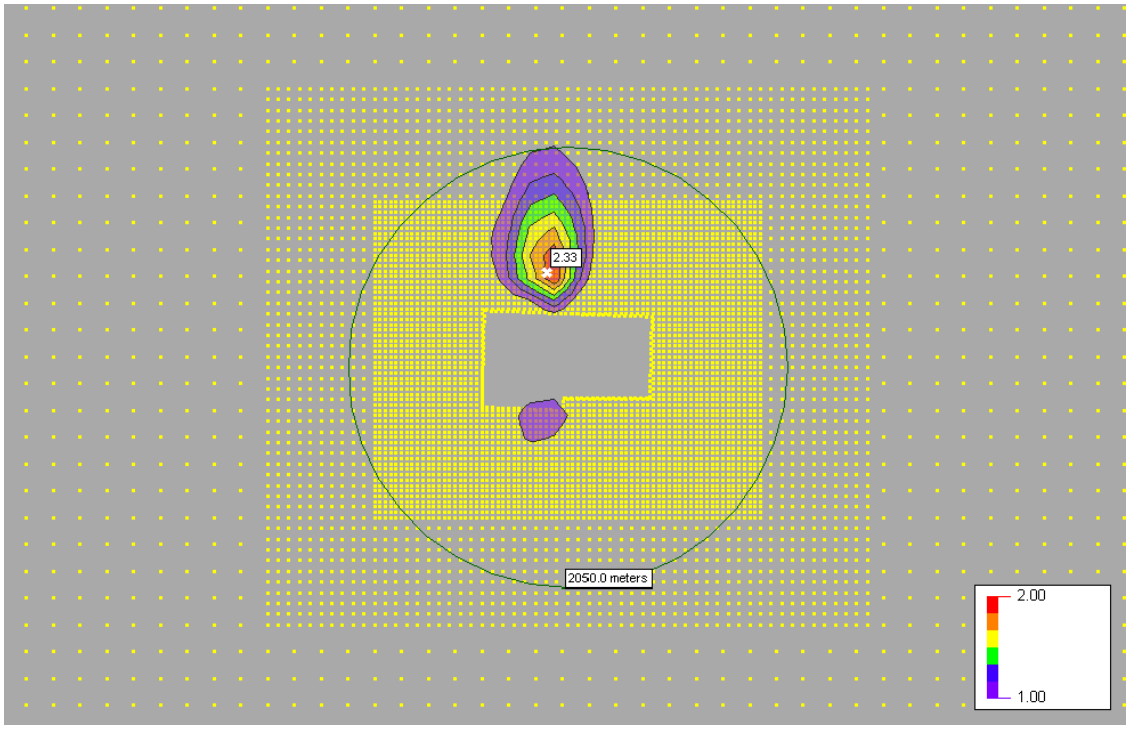


Figure 5–26
SO_2 1-Hour SIL Isopleth (EPA Interim SIL = 7.86 μg/m³; Source: ALL-500)

Plot Based on 100th Percentile (1st High 23.77 μg/m³)

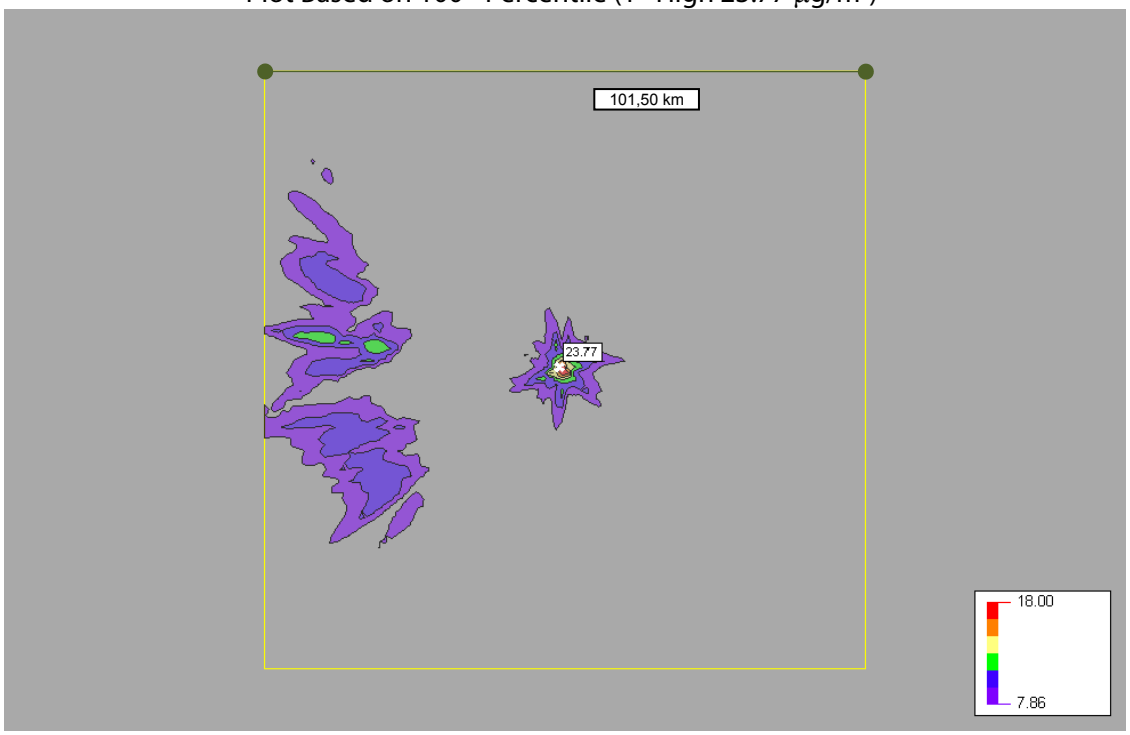


Figure 5–27
SO_2 1-Hour SIL Isopleth (KDHE Interim SIL = 10 μg/m³; Source: ALL-500)

Plot Based on 100th Percentile (1st High 19.33 μg/m³)

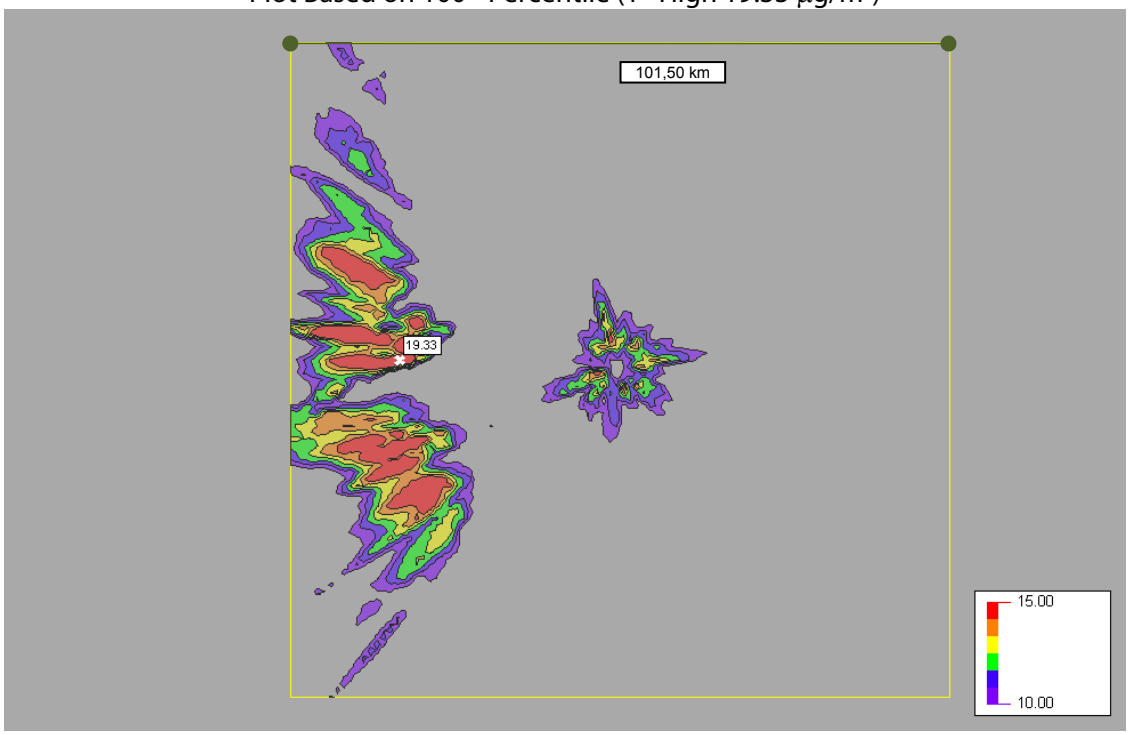


Figure 5–28
SO_2 1-Hour SIL Isopleth (EPA Interim SIL = 7.86 μg/m³; Source: ALL-471)

Plot Based on 100th Percentile (1st High 23.77 μg/m³)

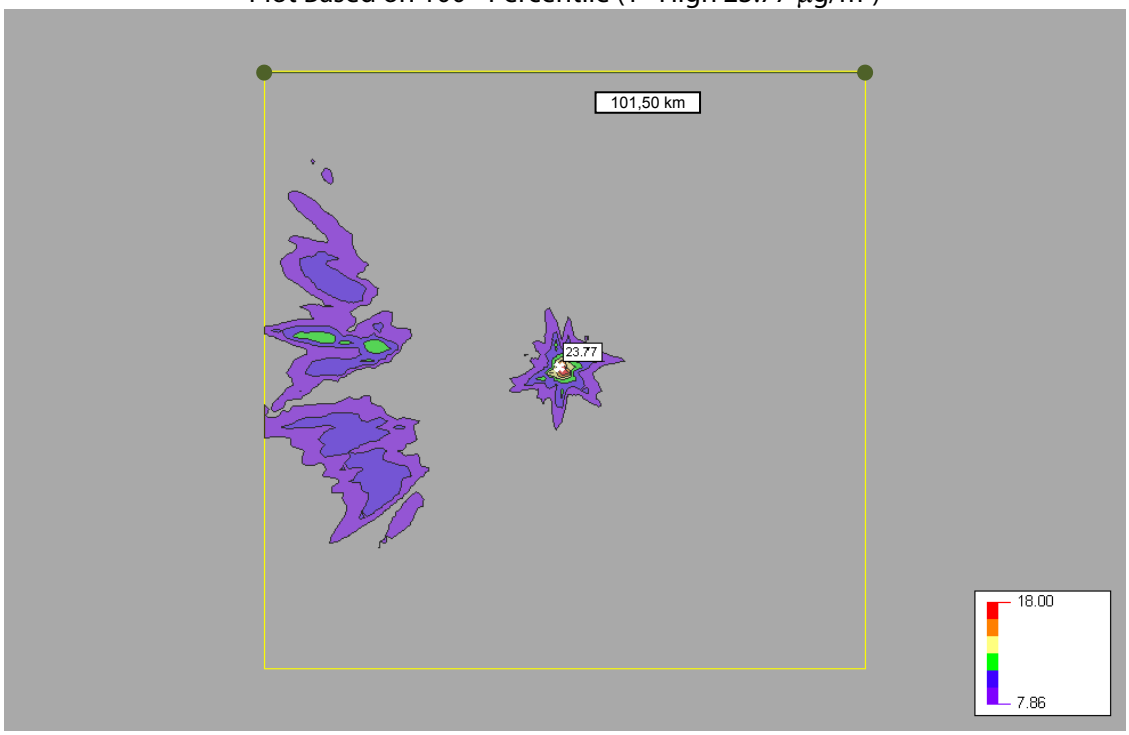


Figure 5–29
SO_2 1-Hour SIL Isopleth (KDHE Interim SIL = 10 μg/m³; Source: ALL-471)

Plot Based on 100th Percentile (1st High 45.86 μg/m³)

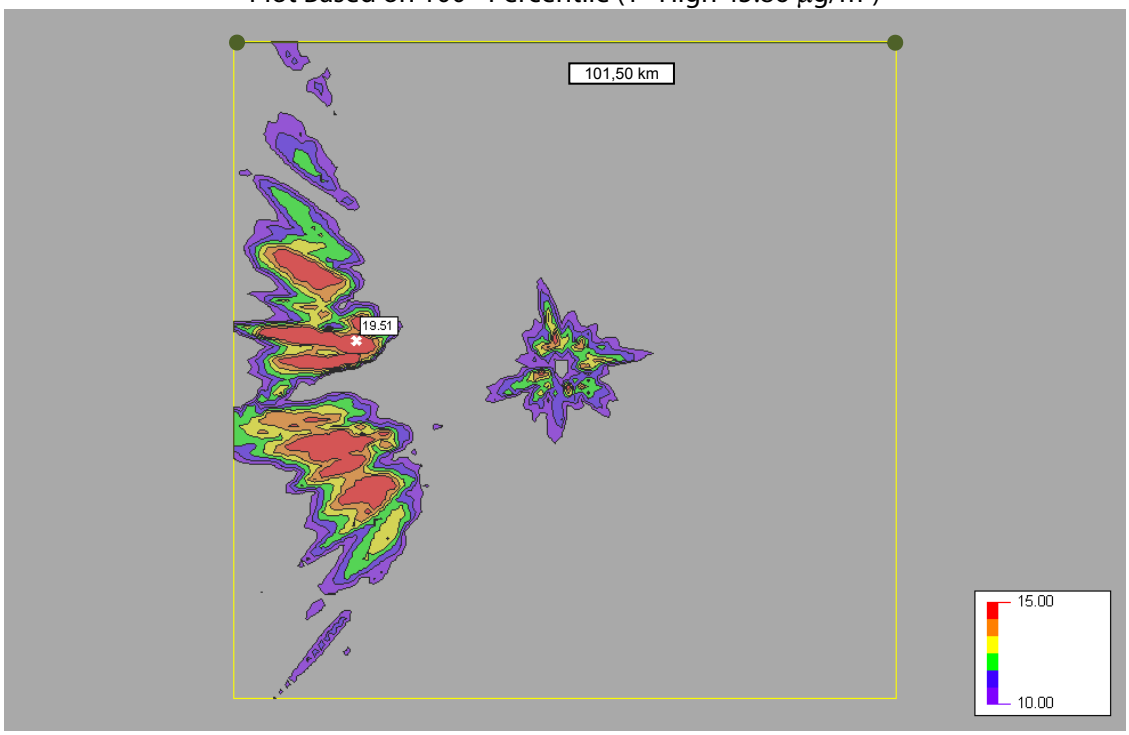


Figure 5–30
SO_2 1-Hour SIL Isopleth (EPA Interim SIL = 7.86 μg/m³; Source: ALL-353)

Plot Based on 100th Percentile (1st High 16.56 μg/m³)

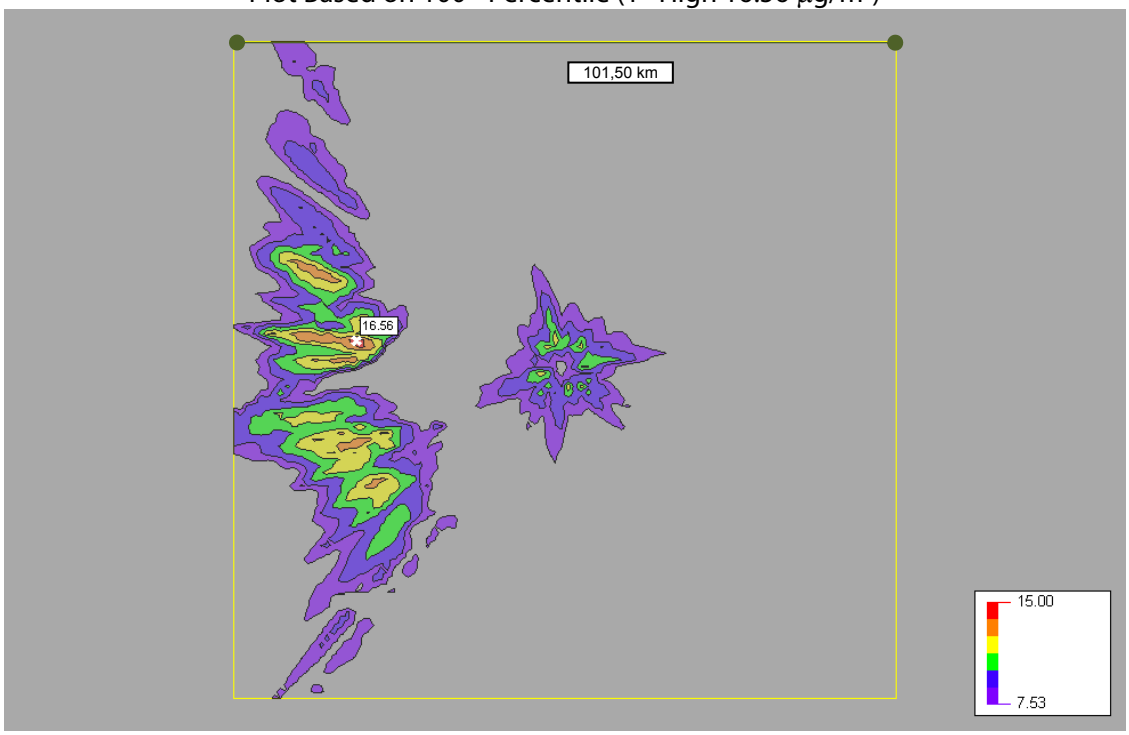


Figure 5–31
SO_2 1-Hour SIL Isopleth (KDHE Interim SIL = 10 μg/m³; Source: ALL-353)

Plot Based on 100th Percentile (1st High 16.56 μg/m³)

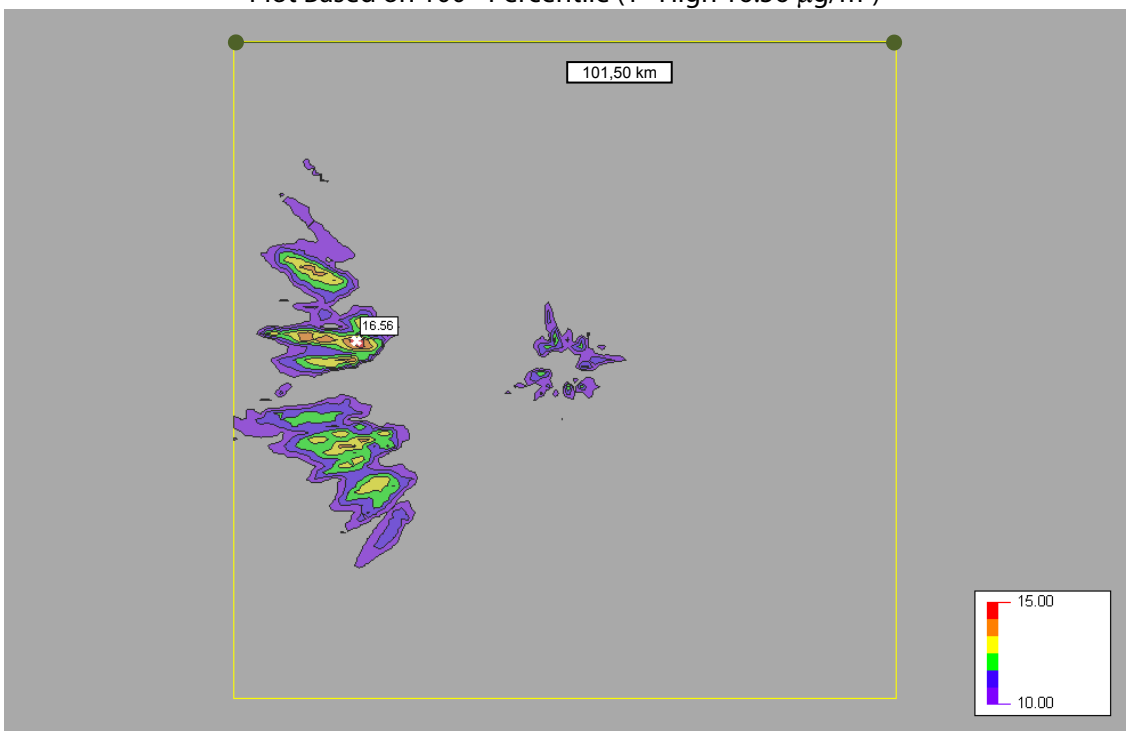


Figure 5–32
SO_2 1-Hour SIL Isopleth (EPA Interim SIL = 7.86 μg/m³; Source: ALL-236)

Plot Based on 100th Percentile (1st High 12.48 μg/m³)

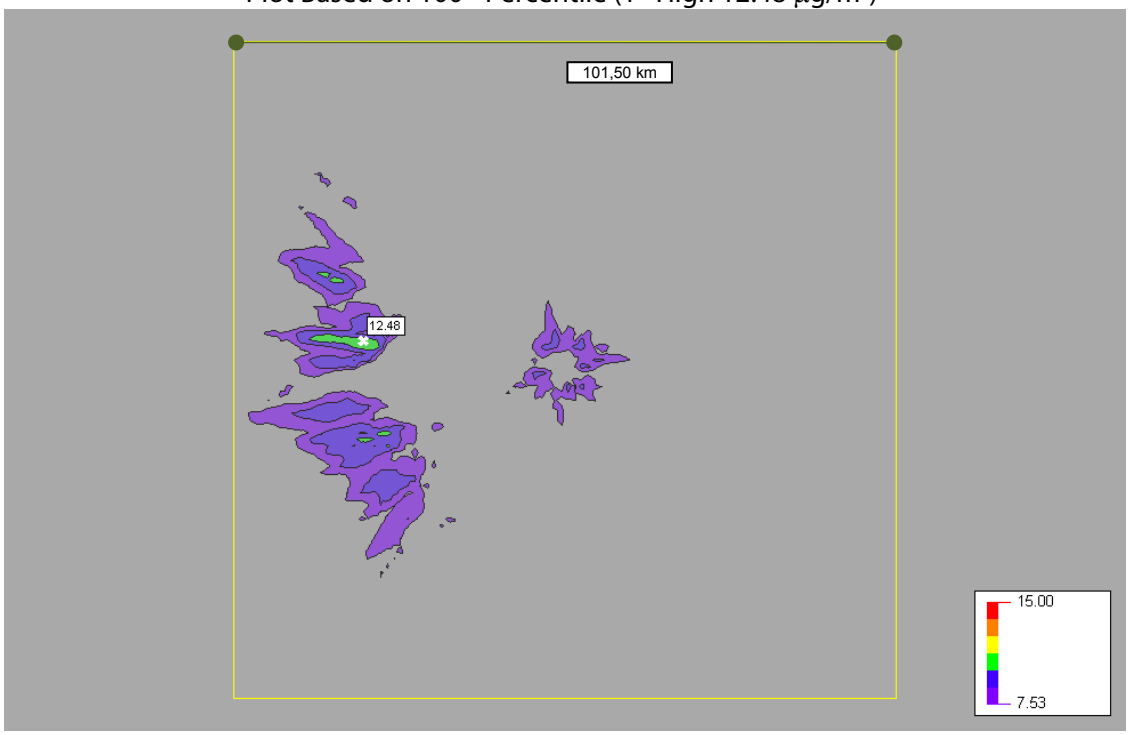


Figure 5–33
SO_2 1-Hour SIL Isopleth (KDHE Interim SIL = 10 μg/m³; Source: ALL-236)

Plot Based on 100th Percentile (1st High 12.48 μg/m³)

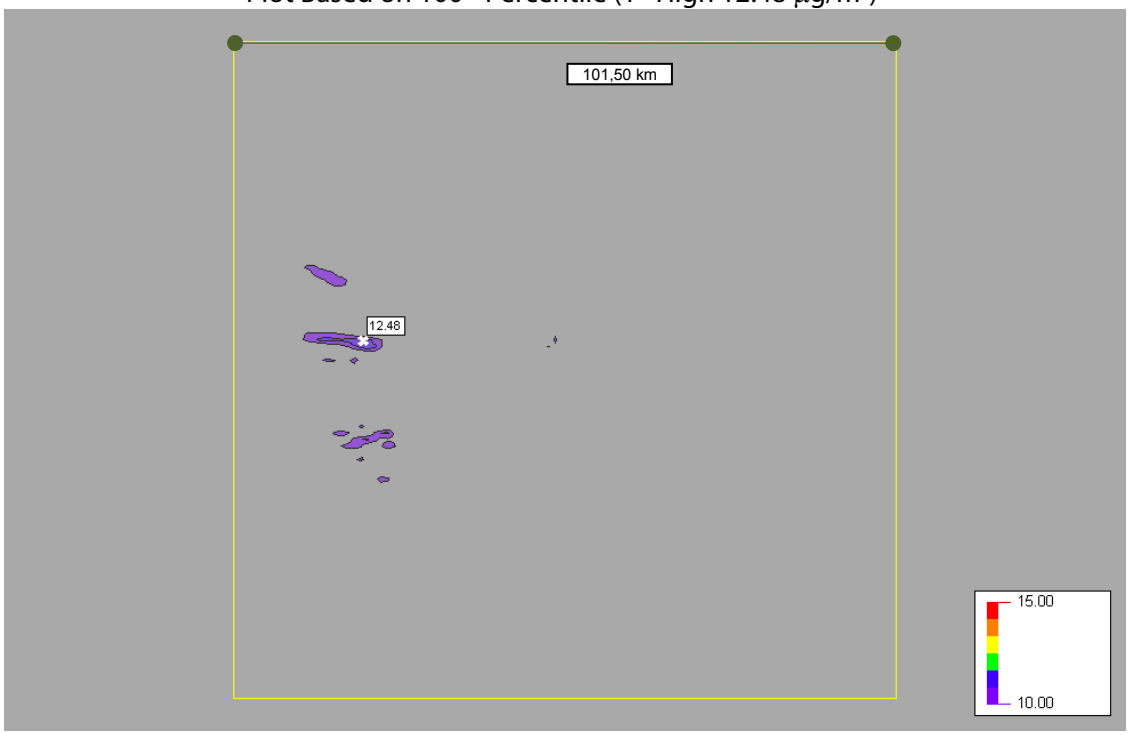


Figure 5–34
SO_2 1-Hour SIL Isopleth (EPA Interim SIL = 7.86 μg/m³; Source: ALL-141)

Plot Based on 100th Percentile (1st High 15.04 μg/m³)

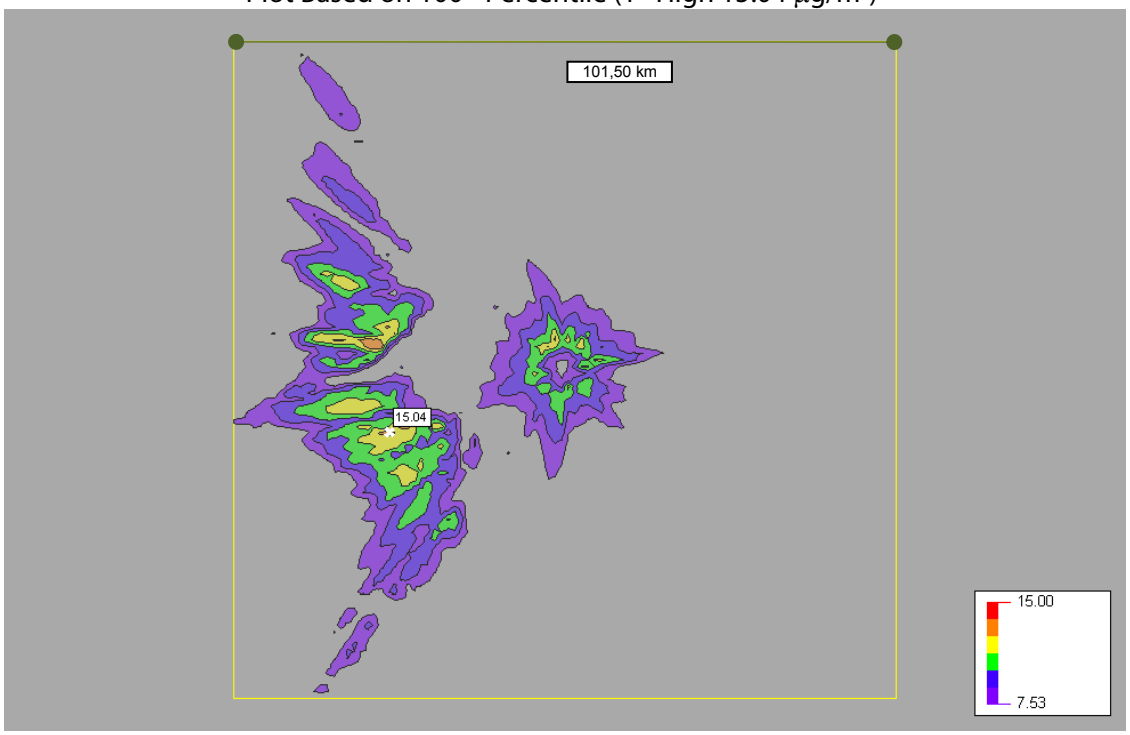


Figure 5–35
SO_2 1-Hour SIL Isopleth (KDHE Interim SIL = 10 μg/m³; Source: ALL-141)

Plot Based on 100th Percentile (1st High 15.04 μg/m³)

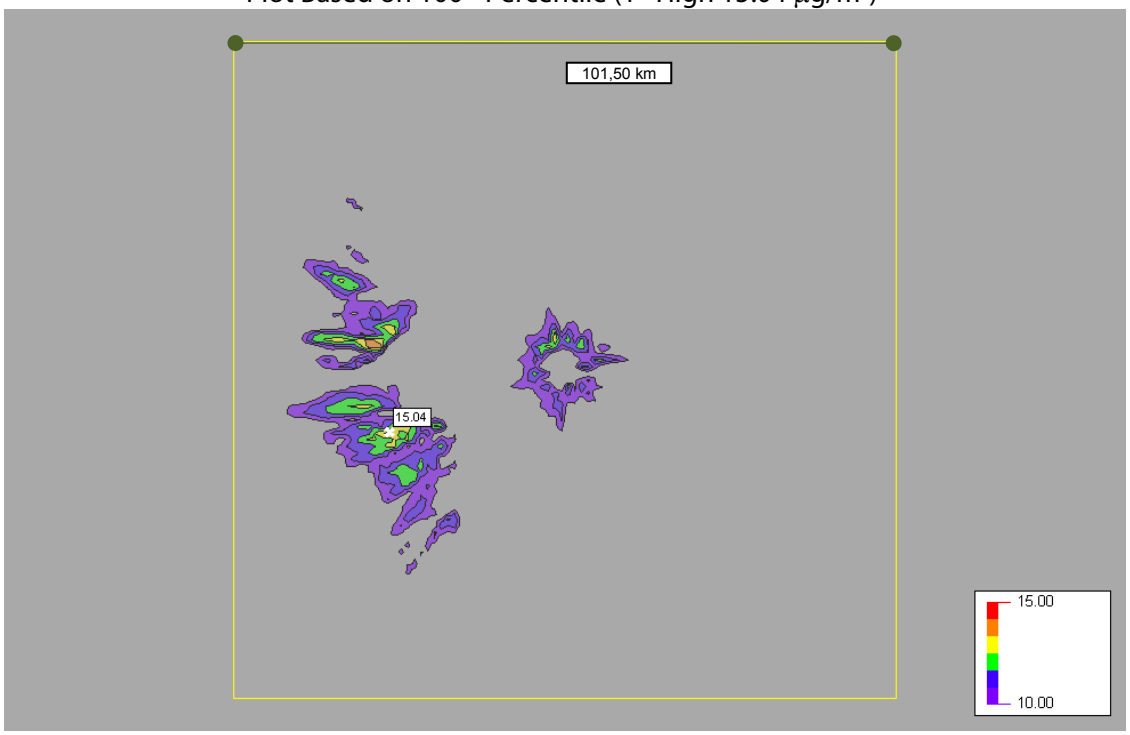


Figure 5–36
SO_2 24-Hour H1H Isopleth and ROI (Source: ALL-471)

Plot Based on 5 Year Average (1st High 11.70 μg/m³)

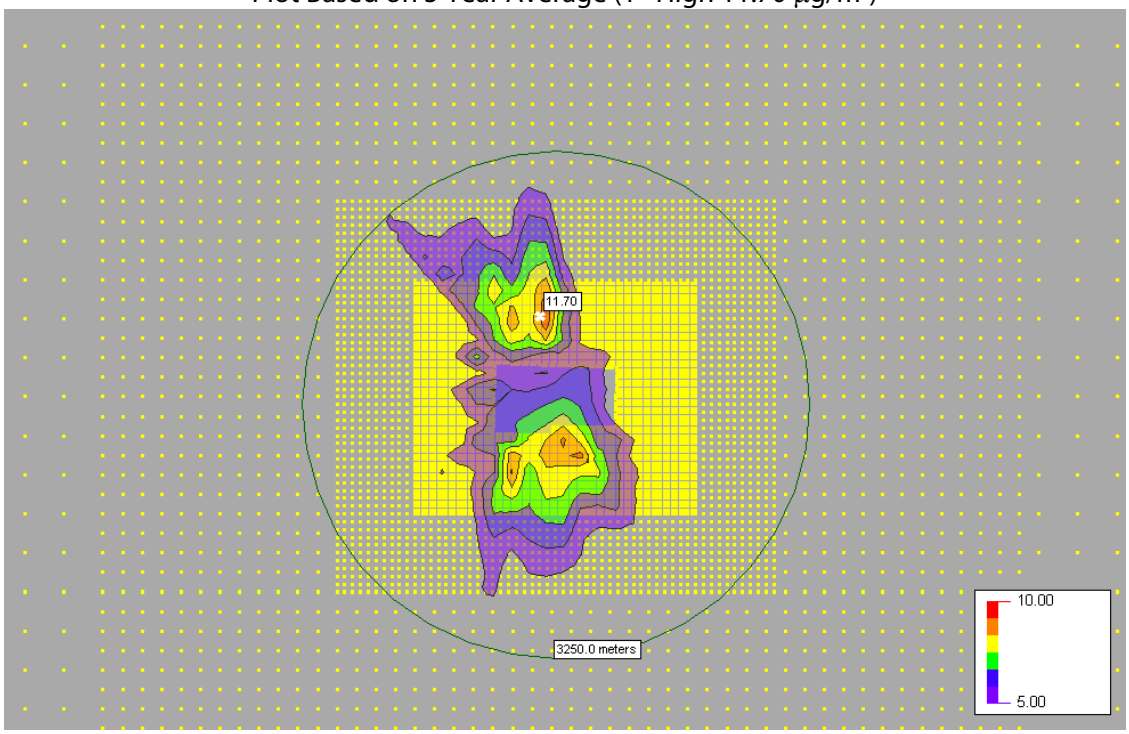
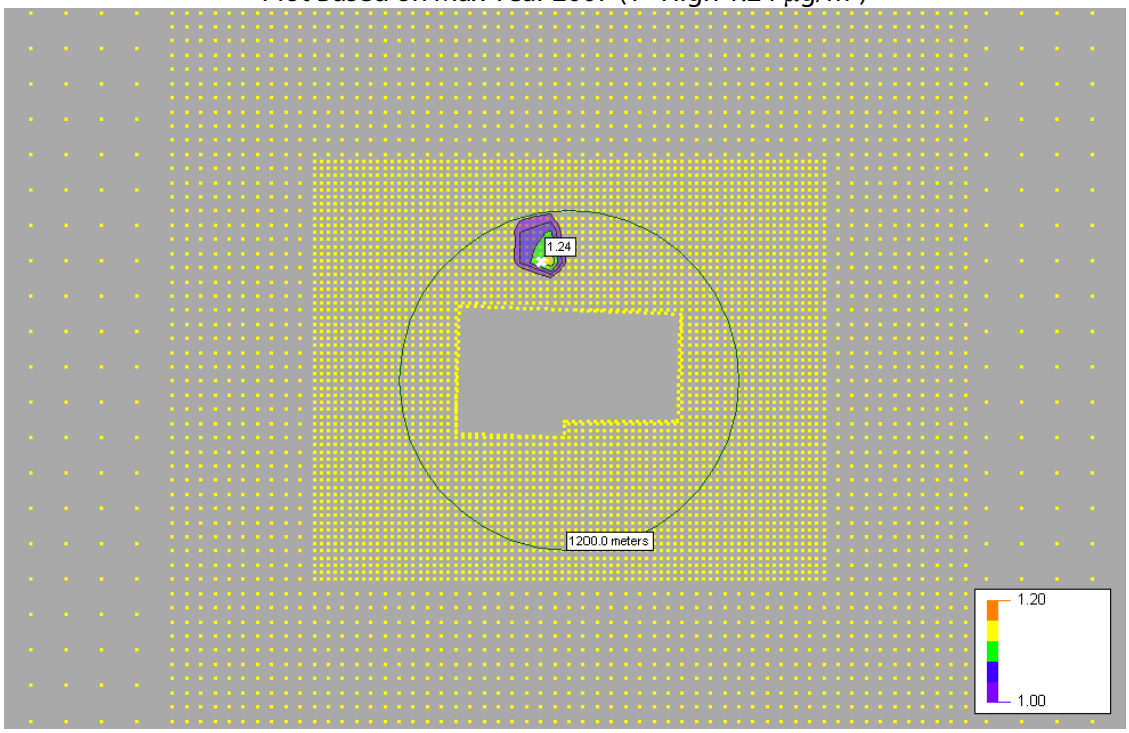


Figure 5–37
SO_2 Annual SIL Isopleth and ROI (Source: ALL-471)

Plot Based on Max Year 2007 (1st High 1.24 μg/m³)



5.2 Refined Modeling Analysis for NAAQS and PSD Increment Compliance

The second component of the AQIA consisted of a refined modeling analysis to demonstrate that the proposed facility will not cause or contribute to any violations of applicable NAAQS or PSD Class II area increment for those pollutants with concentrations above the respective SILs. The refined modeling analysis, including all appropriate regional emission sources (other nearby facilities), was completed for the following criteria pollutants and averaging periods: 24-hour and annual PM_{10}; 24-hour and annual $PM_{2.5}$; 1-hour and annual NO_2; and 1-hour, 24-hour and annual SO_2.

The refined modeling analysis takes into account the combined impacts of emissions from the proposed facility, contributions from nearby major and minor sources and background concentrations due to distant major and minor sources and natural sources. Sections 3.11 and 3.12 discuss in detail the nearby source inventories and background concentrations used for the refined modeling analysis.

5.2.1 PM_{10} Results

The PM_{10} results for PSD Class II area increment consumption and NAAQS compliance demonstration are described in the following sections.

5.2.1.1 PSD Increment Analysis

The modeling results for the PM_{10} increment consumption analysis indicated that the maximum predicted PM_{10} concentrations for both the 24-hour and annual periods will not exceed the PSD increment allowable concentrations using the model parameters presented in Appendix B. Results of the PM_{10} increment analysis are summarized in Tables 5-3 and 5-4. The predicted cumulative 24-hour PM_{10} impacts are based on the high second high (H2H) for comparison to the PSD increment in accordance with the methodology recommended in Section 7.2.1.1 of the EPA guideline, *Guideline on Air Quality Models,* incorporated as 40 CFR Part 51, Appendix W. The predicted cumulative annual PM_{10} impacts are based on the H1H for comparison to the PSD increment as the increment can never be exceeded.

Table 5–3
Predicted Cumulative 24-Hour PM_{10} Increment Consumption for PSD Evaluation

PM10 24-HOUR AERMOD 09292	RUN 4 Operating Scenarios	Predicted H1H & H2H ALL Impacts	Date	UTM Easting (m)	UTM Northing (m)
PSD-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Pilot Only FWP Operational	29.38639 27.49997	10021724 10013124	288343.20 288043.40	4117984.00 4117995.20
PSD-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Pilot Only FWP Operational	29.40727 27.50282	10021724 10013124	288343.20 288043.40	4117984.00 4117995.20
PSD-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Pilot Only FWP Operational	29.37966 27.50589	10021724 10013124	288343.20 288043.40	4117984.00 4117995.20
PSD-236 Includes Nearby Sources	Boiler at 236 MMBtu/hr Flare Pilot Only FWP Operational	29.35052 27.51268	10021724 10013124	288343.20 288043.40	4117984.00 4117995.20
PSD-141 Includes Nearby Sources	Boiler at 141 MMBtu/hr Flare Pilot Only FWP Operational	29.33442 **27.52180**	10021724 10013124	288343.20 288043.40	4117984.00 4117995.20

Table 5–4
Predicted Cumulative Annual PM_{10} Increment Consumption for PSD Evaluation

PM10 ANNUAL	RUN4	Predicted H1H ALL Impacts				
AERMOD 09292	Operating Scenarios	2006	2007	2008	2009	2010
PSD-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Pilot Only FWP Operational	5.71551	7.16048	6.01591	5.49427	6.93593
PSD-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Pilot Only FWP Operational	5.71814	**7.16401**	6.01914	5.49675	6.93871
PSD-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Pilot Only FWP Operational	5.71766	7.16244	6.01849	5.49644	6.93756

The allowable PSD increment for 24-hour PM_{10} is 30 $\mu g/m^3$. The allowable PSD increment for annual PM_{10} is 17 $\mu g/m^3$. Based on the results detailed in Tables 5-3 and 5-4, the proposed facility will not cause or significantly contribute to a violation of the PSD Class II area increment for 24-hour and annual PM_{10}.

5.2.1.2 NAAQS Analysis

The modeling results for the PM_{10} NAAQS analysis indicate that the maximum predicted PM_{10} concentrations for both the 24-hour and annual periods will not exceed the NAAQS using the model parameters presented in Appendix B. Results of the PM_{10} NAAQS are summarized in Tables 5-5 and 5-6. The background concentrations used for comparison to the NAAQS were 89 $\mu g/m^3$ for the 24-hour averaging period, and 22 $\mu g/m^3$ for the annual averaging period.

The predicted cumulative 24-hour PM_{10} impacts are based on the high sixth high (H6H) for comparison to the NAAQS, in accordance with the methodology recommended in Section 7.2.1.1 of the EPA guideline, *Guideline on Air Quality Models,* incorporated as 40 CFR Part 51, Appendix W. The predicted cumulative annual PM_{10} impacts are based on the H1H for comparison to the NAAQS as the standard can never be exceeded.

Table 5–5
Predicted Cumulative 24-Hour PM_{10} Concentration for NAAQS Evaluation

PM10 24-HOUR AERMOD 09292	RUN 4 Operating Scenarios	Predicted H6H ALL Impacts (Plus Background)	Date	UTM Easting (m)	UTM Northing (m)
NAQ-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Pilot Only FWP Operational	31.43884 (120.43884)	07072624	288043.40	4117995.20
NAQ-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Pilot Only FWP Operational	31.44555 (120.44555)	07072624	288043.40	4117995.20
NAQ-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Pilot Only FWP Operational	31.44623 (120.44623)	07062524	288043.40	4117995.20
NAQ-236 Includes Nearby Sources	Boiler at 236 MMBtu/hr Flare Pilot Only FWP Operational	31.46634 (120.46634)	07062524	288043.40	4117995.20
NAQ-141 Includes Nearby Sources	Boiler at 141 MMBtu/hr Flare Pilot Only FWP Operational	**31.47343 (120.47343)**	07062524	288043.40	4117995.20

The 24-hour PM_{10} H6H predicted impact for the worst-case scenario is 31.47343 μg/m³. The predicted impact plus background is 120.47343 μg/m³.

Table 5–6
Predicted Cumulative Annual PM_{10} Concentration for NAAQS Evaluation

PM10 ANNUAL	RUN4	Predicted H1H ALL Impacts (Plus Background)				
AERMOD 09292	**Operating Scenarios**	**2006**	**2007**	**2008**	**2009**	**2010**
NAQ-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Pilot Only FWP Operational	6.80506	8.56401	7.26383	6.39917	8.28807
NAQ-500	3-Year Averages	7.54430 (28.29730)				
			7.40900 (28.22355)			
				7.31702 (28.14870)		
NAQ-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Pilot Only FWP Operational	6.80769	8.56754	7.26706	6.40165	8.29084
NAQ-471	3-Year Averages	**7.54743 (28.30043)**				
			7.41208 (28.22663)			
				7.31985 (28.15153)		
NAQ-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Pilot Only FWP Operational	6.80721	8.56596	7.26640	6.40134	8.28969
NAQ-353	3-Year Averages	7.54652 (28.29953)				
			7.41123 (28.22579)			
				7.31914 (28.15083)		

The NAAQS for 24-hour PM_{10} is 150 μg/m³. The NAAQS for annual PM_{10} is 50 μg/m³. Based on the results detailed in Tables 5-5 and 5-6, the proposed facility will not cause or significantly contribute to a violation of the NAAQS for 24-hour and annual PM_{10}.

5.2.2 $PM_{2.5}$ Results

The $PM_{2.5}$ results for PSD Class II area increment consumption and NAAQS compliance demonstration are described in the following sections. The EPA published the *Prevention of Significant Deterioration (PSD) for Particulate Matter Less Than 2.5 Micrometers ($PM_{2.5}$)—Increments, Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC)* rule on October 20, 2010 (75 Federal Register 64864). This rule established $PM_{2.5}$ PSD program elements that were relied upon for the compliance demonstration below.

5.2.2.1 *PSD Increment Analysis*

The modeling results for the $PM_{2.5}$ increment consumption analysis indicated that the maximum predicted $PM_{2.5}$ concentrations for both the 24-hour and annual periods will not exceed the PSD increment allowable concentrations using the model parameters presented in Appendix B. Results of the $PM_{2.5}$ increment analysis are summarized in Tables 5-7 and 5-9. The "major source baseline date" for $PM_{2.5}$ was set as October 20, 2010, the date of publication of the final rule. Only those sources permitted after the baseline date should be included as nearby sources in the PSD increment analysis for $PM_{2.5}$; however, for the purposes of this analysis, all nearby sources included in the PM_{10} PSD analysis was included in the $PM_{2.5}$ analysis, with the exception of the Seaboard Foods, LLC feed mill located immediately adjacent to and south of the proposed facility. The predicted cumulative 24-hour and annual $PM_{2.5}$ impacts are based on the H1H for comparison to the PSD increment in accordance with the EPA October 20, 2010 $PM_{2.5}$ memo.

Table 5–7
Predicted Cumulative 24-Hour $PM_{2.5}$ Increment Consumption for PSD Evaluation

PM2.5 24-HOUR AERMOD 09292	RUN 4 Operating Scenarios	Predicted H1H ALL Impacts	ABBK Contribution	UTM Easting (m)	UTM Northing (m)
PSD-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Pilot Only FWP Operational	22.87291	0.00907	293307.00	4115082.00
PSD-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Pilot Only FWP Operational	22.87308	0.00924	293307.00	4115082.00
PSD-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Pilot Only FWP Operational	22.87309	0.00925	293307.00	4115082.00
PSD-236 Includes Nearby Sources	Boiler at 236 MMBtu/hr Flare Pilot Only FWP Operational	22.87320	0.00936	293307.00	4115082.00
PSD-141 Includes Nearby Sources	Boiler at 141 MMBtu/hr Flare Pilot Only FWP Operational	**22.87380**	0.00996	293307.00	4115082.00

A review of the 24-hour $PM_{2.5}$ cumulative results indicated ten (10) receptors exceeded the increment. The exceedances were due to the

nearby source: Anadarko Gathering Company, Facility ID No. 1890015. Those impacted receptors were evaluated to determine the contribution from the proposed facility when the PSD increment exceedance occurred. Table 5-8 summarizes the results of the H1H contribution analysis. The contribution analysis reviewed all ranks until there was no longer an exceedance of the increment (high 28th high rank). There was no exceedance of the SIL when an exceedance of the increment occurred.

Table 5–8
24-Hour $PM_{2.5}$ Increment H1H Contribution Analysis Summary

UTM Easting	UTM Northing	H1H Contribution Based on Operating Scenario					
(m)	(m)	PSD-500	FWP-500	PSD-471	FWP-471	PSD-353	FWP-353
293307	4115082	22.87291	0.00907	22.87308	0.00924	22.87309	0.00925
293057	4115582	20.04209	0.0019	20.04212	0.00193	20.04194	0.00175
293057	4115082	18.00056	0.00106	18.00057	0.00107	18.00055	0.00105
293057	4114832	14.73053	0.00412	14.73055	0.00414	14.73054	0.00412
293307	4115582	12.76244	0.00603	12.76272	0.00631	12.76242	0.006
293307	4114832	12.55781	0.02068	12.55819	0.02106	12.55882	0.02169
293057	4115832	11.11259	0.00069	11.11261	0.00071	11.11257	0.00068
292557	4115082	10.85916	0.01555	10.85982	0.01622	10.85951	0.0159
293557	4114832	10.07642	0.01249	10.0767	0.01277	10.07641	0.01247
293057	4115332	9.675	0.00161	9.67499	0.0016	9.67489	0.0015

UTM Easting	UTM Northing	H1H Contribution Based on Operating Scenario			
(m)	(m)	PSD-236	FWP-236	PSD-141	FWP-141
293307	4115082	22.8732	0.00936	22.8738	0.00996
293057	4115582	20.04172	0.00152	20.04148	0.00129
293057	4115082	18.00052	0.00102	18.00048	0.00098
293057	4114832	14.73068	0.00426	14.73116	0.00475
293307	4115582	12.76183	0.00541	12.76106	0.00465
293307	4114832	12.55987	0.02273	12.56113	0.02399
293057	4115832	11.11252	0.00062	11.11245	0.00055
292557	4115082	10.85879	0.01518	10.8574	0.01379
293557	4114832	10.07603	0.0121	10.07543	0.0115
293057	4115332	9.67478	0.00139	9.67469	0.0013

Table 5–9
Predicted Cumulative Annual $PM_{2.5}$ Increment Consumption for PSD Evaluation

PM2.5 ANNUAL	RUN4	Predicted H1H ALL Impacts				
AERMOD 09292	**Operating Scenarios**	**2006**	**2007**	**2008**	**2009**	**2010**
PSD-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Pilot Only FWP Operational	1.82141	2.29526	1.96886	1.74400	2.17878
PSD-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Pilot Only FWP Operational	1.82391	**2.29864**	1.97194	1.74637	2.18144
PSD-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Pilot Only FWP Operational	1.82351	2.29723	1.97138	1.74612	2.18041

The allowable PSD increment for 24-hour $PM_{2.5}$ is 9 $\mu g/m^3$. The allowable PSD increment for annual $PM_{2.5}$ is 4 $\mu g/m^3$. Based on the results detailed in Tables 5-7, 5-8 and 5-9, the proposed facility will not cause or significantly contribute to a violation of the PSD Class II area increment for 24-hour and annual $PM_{2.5}$.

5.2.2.2 *NAAQS Analysis*

The modeling results for the $PM_{2.5}$ NAAQS analysis indicate that the maximum predicted $PM_{2.5}$concentrations for both the 24-hour and annual periods will not exceed the NAAQS using the model parameters presented in Appendix B. Results of the $PM_{2.5}$ NAAQS are summarized in Tables 5-10 and 5-12. The background concentrations used for comparison to the NAAQS were 17 $\mu g/m^3$ for the 24-hour averaging period, and 7 $\mu g/m^3$ for the annual averaging period.

The predicted cumulative 24-hour and annual $PM_{2.5}$ impacts are based on the H1H for comparison to the PSD increment in accordance with the EPA October 20, 2010 $PM_{2.5}$ memo.

Table 5–10
Predicted Cumulative 24-Hour $PM_{2.5}$ Concentration for NAAQS Evaluation

PM10 24-HOUR AERMOD 09292	RUN 4 Operating Scenarios	Predicted H1H ALL Impacts (Plus Background)	ABBK Contribution	UTM Easting (m)	UTM Northing (m)
NAQ-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Pilot Only FWP Operational	22.87409 (39.87409)	0.00907	293307.00	4115082.00
NAQ-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Pilot Only FWP Operational	22.87426 (39.87426)	0.00924	293307.00	4115082.00
NAQ-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Pilot Only FWP Operational	22.87427 (39.87427)	0.00925	293307.00	4115082.00
NAQ-236 Includes Nearby Sources	Boiler at 236 MMBtu/hr Flare Pilot Only FWP Operational	22.87437 (39.87437)	0.00936	293307.00	4115082.00
NAQ-141 Includes Nearby Sources	Boiler at 141 MMBtu/hr Flare Pilot Only FWP Operational	**22.87498** (39.87498)	0.00996	293307.00	4115082.00

The 24-hour $PM_{2.5}$ H1H predicted impact for the worst-case scenario is 22.87498 $\mu g/m^3$. The predicted impact plus background is 39.87498 $\mu g/m^3$. A review of the 24-hour $PM_{2.5}$ cumulative results indicated three (3) receptors exceeded the NAAQS. The exceedances were due to the nearby source: Anadarko Gathering Company, Facility ID No. 1890015. Those impacted receptors were evaluated to determine the contribution from the proposed facility when the NAAQS exceedance occurred. Table 5-11 summarizes the results of the H1H contribution analysis. The contribution analysis reviewed all ranks until there was no longer an exceedance of the NAAQS (high 3rd high rank). There was no exceedance of the SIL when an exceedance of the NAAQS occurred.

Table 5–11
24-Hour $PM_{2.5}$ NAAQS H1H Contribution Analysis Summary

UTM Easting	UTM Northing	H1H Contribution Based on Operating Scenario					
(m)	(m)	NAQ-500	FWP-500	NAQ-471	FWP-471	NAQ-353	FWP-353
293057	4115582	20.04258	0.00190	20.04261	0.00193	20.04243	0.00175
293307	4115082	22.87409	0.00907	22.87426	0.00924	22.87427	0.00925
293057	4115082	18.00114	0.00106	18.00116	0.00107	18.00113	0.00105

UTM Easting	UTM Northing	H1H Contribution Based on Operating Scenario			
(m)	(m)	NAQ-236	FWP-236	NAQ-141	FWP-141
293057	4115582	20.04221	0.00152	20.04198	0.00129
293307	4115082	22.87437	0.00936	22.87498	0.00996
293057	4115082	18.00110	0.00102	18.00106	0.00098

Table 5–12
Predicted Cumulative Annual $PM_{2.5}$ Concentration for NAAQS Evaluation

PM2.5 ANNUAL	RUN4	Predicted H1H ALL Impacts (Plus Background)				
AERMOD 09292	Operating Scenarios	2006	2007	2008	2009	2010
NAQ-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Pilot Only FWP Operational	2.06795	2.61694	2.24935	1.95123	2.48772
NAQ-500	3-Year Averages	2.31141 (9.31141)				
			2.27251 (9.27251)			
				2.22943 (9.22943)		
NAQ-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Pilot Only FWP Operational	2.07046	2.62032	2.25243	1.95360	2.49037
NAQ-471	3-Year Averages	**2.31440 (9.31440)**				
			2.27545 (9.27545)			
				2.23213 (9.23213)		
NAQ-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Pilot Only FWP Operational	2.07005	2.61891	2.25187	1.95335	2.48935
NAQ-353	3-Year Averages	2.31361 (9.31361)				
			2.27471 (9.27471)			
				2.23152 (9.23152)		

The NAAQS for 24-hour $PM_{2.5}$ is 35 $\mu g/m^3$. The NAAQS for annual $PM_{2.5}$ is 15 $\mu g/m^3$. Based on the results detailed in Tables 5-10, 5-11 and 5-12, the proposed facility will not cause or significantly contribute to a violation of the NAAQS for 24-hour and annual PM_{10}.

5.2.3 NO_2 Results

The NO_2 results for PSD Class II area increment consumption and NAAQS compliance demonstration are described in the following sections.

5.2.3.1 PSD Increment Analysis

The modeling results for the NO_2 increment analysis indicate that the maximum predicted NO_2 concentrations for the annual periods will not exceed the PSD increment allowable concentrations using the model parameters presented in Appendix B. Results of the NO_2 increment analysis are summarized in Table 5-13.

The predicted cumulative annual NO_2 impacts are based on the H1H for comparison to the PSD increment as the increment can never be exceeded. Annual impacts were obtained by using the regulatory model options and the Tier 1 screening approach.

Table 5–13
Predicted Cumulative Annual NO_2 Increment Consumption for PSD Evaluation

NO2 ANNUAL		Predicted H1H ALL Impacts				
AERMOD 11103	**Operating Scenarios**	**2006**	**2007**	**2008**	**2009**	**2010**
ALL-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	22.45504	24.84256	21.76681	22.80867	25.95087
ALL-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	22.45701	24.84347	21.76771	22.81006	**25.95271**
ALL-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	22.43702	24.82130	21.74715	22.78729	25.93359

A review of the annual NO_2 cumulative results indicated twelve (12) receptors exceeded the increment. Those impacted receptors were evaluated to determine the contribution from the proposed facility when the increment exceedance occurred. Table 5-14 summarizes the results of the contribution analysis. The contribution analysis reviewed until there was no longer an exceedance of the increment (H12H on annual basis). There was no exceedance of the SIL when an exceedance of the increment occurred.

Table 5–14
Annual NO_2 PSD Increment Contribution Analysis Summary

UTM Easting	UTM Northing	H1H Contribution Based on Operating Scenario					
(m)	(m)	ALL-500	AB-500	ALL-471	AB-471	ALL-353	AB-353
290257	4118882	25.03259	0.12164	25.03452	0.12358	25.01449	0.10354
290357	4118482	25.05014	0.11484	25.05181	0.11651	25.03266	0.09736
290357	4118682	25.68992	0.11735	25.69182	0.11924	25.67250	0.09992
290357	4118882	25.95087	0.11638	25.95271	0.11822	25.93359	0.09910
290357	4119082	25.61235	0.11262	25.61385	0.11412	25.59506	0.09533
290357	4119282	25.37972	0.10963	25.38097	0.11087	25.36250	0.09240
290357	4119482	25.32344	0.10922	25.32470	0.11048	25.30649	0.09227
290357	4118582	25.37486	0.11639	25.37665	0.11819	25.35736	0.09889
290357	4118782	25.90767	0.11737	25.90959	0.11929	25.89034	0.10004
290357	4118982	25.82173	0.11462	25.82341	0.11631	25.80446	0.09735
290357	4119182	25.45507	0.11083	25.45640	0.11216	25.43778	0.09354
290357	4119382	25.37666	0.10912	25.37788	0.11035	25.35955	0.09202

The allowable PSD increment for annualNO_2 is 25 $\mu g/m^3$. Based on the results detailed in Tables 5-13 and 5-14, the proposed facility will not cause or significantly contribute to a violation of the PSD Class II area increment for annual NO_2.

5.2.3.2 *NAAQS Analysis*

The modeling results for the NO_2 NAAQS analysis indicate that the maximum predicted NO_2 concentrations for both the 1-hour and annual periods will not exceed the NAAQS using the model parameters presented in Appendix B and modeling methodology presented in Section 3.

The predicted cumulative 1-hour NO_2 impacts are based on the 5-year average of the 98th percentile of 1-hour average concentrations at each receptor for comparison to the NAAQS, in accordance with the EPA memo, *General Guidelines for Implementing the 1-Hour NO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-Hour NO_2 Significant Impact Level,* dated June 28, 2010. Impacts were obtained by using the non-regulatory NO_2 – Plume Volume Molar Ratio Method (PVMRM) option. An NO_2 contribution analysis was performed to demonstrate that the facility's contributions were below the

SIL when a NAAQS exceedance was indicated at a given receptor using MAXDCONT output file option in AERMOD.

The predicted cumulative annual NO_2 impacts are based on the H1H for comparison to the NAAQS as the standard can never be exceeded. Annual impacts were obtained by using the regulatory model options and the Tier 1 screening approach. Results of the NO_2 NAAQS analysis are summarized in Tables 5-15 and 5-21. The background concentrations used for comparison to the NAAQS were 49 $\mu g/m^3$ for the 1-hour averaging period, and 7.5 $\mu g/m^3$ for the annual averaging period.

Table 5–15
Predicted Cumulative 1-Hour NO_2 Concentration for NAAQS Evaluation

NO2 1-HOUR		Predicted H8H ALL Impacts (Plus Background)	ABBK Contribution	UTM Easting	UTM Northing
AERMOD 11103	Operating Scenarios			(m)	(m)
NAQ-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	471.53816 (520.53816)	0.00007	289557.00	4123082.00
NAQ-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	471.53816 (520.53816)	0.00007	289557.00	4123082.00
NAQ-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	471.53816 (520.53816)	0.00008	289557.00	4123082.00
NAQ-236 Includes Nearby Sources	Boiler at 236 MMBtu/hr Flare Operational No Firewater Pump	471.53817 (520.53817)	0.00009	289557.00	4123082.00
NAQ-141 Includes Nearby Sources	Boiler at 141 MMBtu/hr Flare Operational No Firewater Pump	**471.53830 (520.53830)**	0.00022	289557.00	4123082.00

The 1-hour NO_2 H1H predicted impact for the worst-case scenario is 471.53830 $\mu g/m^3$. The predicted impact plus background is 520.53830 $\mu g/m^3$. A review of the 1-hour NO_2 cumulative results indicated over 8,000 receptors exceeded the NAAQS. The MAXDCONT output option was used to determine the contribution from the proposed facility when the NAAQS exceedance occurred. Tables 5-16 through 5-20 summarizes the results of the contribution analysis where a SIL

exceedance was identified concurrent with a NAAQS exceedance based on a maximum concentration of 139.7 mg/m$_3$ (188.7 mg/m^3 minus background). There was no SIL exceedance past the H4H. The contribution analysis reviewed all ranks until there was no longer an exceedance of the NAAQS (high 153RD high rank) based on a maximum concentration of 139.7 μg/m$_3$ (188.7 μg/m^3 minus background).

Table 5–16
1-Hour NO_2 NAAQS Contribution Analysis Summary for NAQ-500 Scenario

UTM Easting (m)	UTM Northing (m)	Rank	Scenario	
			NAQ-500	AB-500
240557	4082082	1ST	178.84852	7.74281
243557	4084082	1ST	207.96088	7.72174
252557	4125082	1ST	161.486	7.5691
252557	4126082	1ST	176.5526	9.16861
252557	4128082	1ST	146.87531	7.59175
253557	4125082	1ST	150.25837	7.79518
254557	4125082	1ST	170.91257	9.5229
255557	4125082	1ST	176.31917	8.89246
256557	4126082	1ST	194.9618	7.57957
257557	4126082	1ST	178.40315	11.3723
258557	4125082	1ST	218.36124	8.01941
260557	4124082	1ST	248.21638	9.93629
252557	4125082	2ND	147.26566	7.55593
254557	4125082	2ND	149.44535	10.09188
255557	4126082	2ND	172.41658	9.19793
257557	4126082	2ND	156.02591	7.86523
258557	4124082	2ND	152.45306	8.92502
259557	4124082	2ND	186.68827	7.6398
256557	4125082	3RD	139.84704	10.12416
257557	4125082	3RD	143.90186	8.81243

Table 5–17
1-Hour NO_2 NAAQS Contribution Analysis Summary for NAQ-471 Scenario

UTM Easting (m)	UTM Northing (m)	Rank	Scenario	
			NAQ-471	AB-471
252557	4125082	1ST	161.996	8.07905
252557	4126082	1ST	176.8974	9.51335
252557	4128082	1ST	147.1107	7.82709
253557	4125082	1ST	150.7856	8.32244
254557	4125082	1ST	171.3416	9.9519
255557	4125082	1ST	176.7585	9.3318
255557	4126082	1ST	178.9489	7.65288
256557	4126082	1ST	195.0502	7.66798
257557	4124082	1ST	139.7186	9.23108
257557	4125082	1ST	190.6352	7.73372
257557	4126082	1ST	178.8294	11.79854
258557	4123082	1ST	145.9543	7.7248
258557	4124082	1ST	160.6351	7.64215
258557	4125082	1ST	218.7284	8.38654
260557	4124082	1ST	248.8598	10.57971
252557	4125082	2ND	147.6621	7.95232
254557	4125082	2ND	149.6584	10.30493
257557	4126082	2ND	156.0968	7.93613
258557	4124082	2ND	152.7412	9.21318
259557	4124082	2ND	187.1037	7.89125
256557	256557	3RD	139.8097	10.08679
257557	257557	3RD	143.9531	8.86367

Table 5–18
1-Hour NO_2 NAAQS Contribution Analysis Summary for NAQ-353 Scenario

UTM Easting (m)	UTM Northing (m)	Rank	Scenario	
			NAQ-353	AB-353
252557	4126082	1ST	175.4931	8.10908
254557	4125082	1ST	169.968	8.57834
255557	4125082	1ST	175.5487	8.122
257557	4126082	1ST	176.9833	9.95249
260557	4124082	1ST	247.6837	9.40362
254557	4125082	2ND	147.8957	8.54218
255557	4126082	2ND	171.1223	7.90365
258557	4124082	2ND	151.29	7.76192

Table 5–19
1-Hour NO_2 NAAQS Contribution Analysis Summary for NAQ-236 Scenario

UTM Easting (m)	UTM Northing (m)	Rank	Scenario NAQ-236	Scenario AB-236
260557	4124082	1ST	246.21477	7.93468

Table 5–20
1-Hour NO_2 NAAQS Contribution Analysis Summary for NAQ-141 Scenario

UTM Easting (m)	UTM Northing (m)	Rank	Scenario NAQ-141	Scenario AB-141
252557	4126082	1ST	175.143	7.75901
254557	4125082	1ST	169.8313	8.44163
255557	4125082	1ST	175.794	8.36732
257557	4125082	1ST	190.4531	7.5516
258557	4124082	1ST	160.5669	7.57394
259557	4124082	1ST	205.5654	8.29014
260557	4124082	1ST	249.0172	10.73715
262557	4123082	1ST	200.4258	7.97068
263557	4128082	1ST	217.8421	8.0085
267557	4128082	1ST	221.234	7.57366
252557	4125082	2ND	146.5493	8.13961
260557	4128082	2ND	188.7576	7.63316
257557	4130082	3RD	149.9285	10.03822
258557	4129082	3RD	178.3308	7.63971
264557	4129082	3RD	193.139	8.16176
264557	4127082	4TH	170.98355	7.80506

Table 5–21
Predicted Cumulative Annual NO_2 Concentration for NAAQS Evaluation

NO2 ANNUAL	Predicted H1H ALL Impacts (Plus Background)				
AERMOD 11103	2006	2007	2008	2009	2010
ALL-500 Includes Nearby Sources	22.45504 (29.95504)	24.84256 (32.34256)	21.76681 (29.26681)	22.80867 (30.30867)	25.95087 (33.45087)
ALL-471 Includes Nearby Sources	22.45701 (29.95701)	24.84347 (32.34347)	21.76771 (29.26771)	22.81006 (30.31006)	**25.95271 (33.45271)**
ALL-353 Includes Nearby Sources	22.43702 (29.93702)	24.82130 (32.32130)	21.74715 (29.24715)	22.78729 (30.28729)	25.93359 (33.43359)

The NAAQS for 1-hour NO_2 is 188.7 $\mu g/m^3$. The NAAQS for annual NO_2 is 100 $\mu g/m^3$. Based on the results detailed in Tables 5-15 through 5-21, the

proposed facility will not cause or significantly contribute to a violation of the NAAQS for 1-hour and annual NO_2.

5.2.4 SO_2 Results

The SO_2 results for PSD Class II area increment consumption and NAAQS compliance demonstration are described in the following sections.

5.2.4.1 PSD Increment Analysis

The modeling results for the SO_2 increment consumption analysis indicate that the maximum predicted SO_2 concentrations for the 24-hour and annual periods will not exceed the PSD increment allowable concentrations. Results of the SO_2 increment analysis are summarized in Tables 5-22 and 5-23. The predicted cumulative 24-hour SO_2 impacts are based on the H2H for comparison to the PSD increment since one exceedance per year per receptor is allowed. The predicted cumulative annual SO_2 impacts are based on the H1H for comparison to the PSD increment as the increment can never be exceeded.

Table 5–22
Predicted Cumulative 24-Hour SO_2 Increment Consumption for PSD Evaluation

SO2 24-HOUR		Predicted H1H & H2H ALL		UTM Easting	UTM Northing
AERMOD 11103	Operating Scenarios	Impacts	Date	(m)	(m)
PSD-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	17.67859 15.66319	9102224 9102224	288407 288457	4116682 4116682
PSD-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	18.8649 15.92035	7042524 7042524	288407 288457	4116682 4116682
PSD-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	17.7992 **15.97225**	7042524 7102124	288407 288407	4116682 4116632
PSD-236 Includes Nearby Sources	Boiler at 236 MMBtu/hr Flare Operational No Firewater Pump	16.4097 15.53946	7042524 7102124	288407 288407	4116682 4116682
PSD-141 Includes Nearby Sources	Boiler at 141 MMBtu/hr Flare Operational No Firewater Pump	14.95308 14.77959	7042524 7102124	288407 288407	4116682 4116682

Table 5–23
Predicted Cumulative Annual SO_2 Increment Consumption for PSD Evaluation

SO2 ANNUAL		Predicted H1H ALL Impacts				
AERMOD 11103	**Operating Scenarios**	**2006**	**2007**	**2008**	**2009**	**2010**
ALL-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	1.55811	1.69474	1.60183	N/A, ABBK < SIL	1.69000
ALL-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	1.62419	**1.76837**	1.67339	N/A, ABBK < SIL	1.76276
ALL-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	1.53765	1.66807	1.57693	N/A, ABBK < SIL	1.66240

The allowable PSD increment for 24-hour SO_2 is 91 $\mu g/m^3$. The annualSO_2 is 20 $\mu g/m^3$. Based on the results detailed in Tables 5-22 and 5-23, the proposed facility will not cause or significantly contribute to a violation of the PSD Class II area increment for 24-hour and annual SO_2.

5.2.4.2 *NAAQS Analysis*

The modeling results for the SO_2 NAAQS analysis indicate that the maximum predicted SO_2 concentrations for the 1-hour, 24-hour and annual periods will not exceed the NAAQS using the model parameters presented in Appendix B and modeling methodology presented in Section 3.

The predicted cumulative 1-hour SO_2 impacts are based on the 5-year average of the 99th percentile of 1-hour average concentrations at each receptor for comparison to the NAAQS, in accordance with the EPA memo, *Guidance Concerning the Implementing the 1-Hour SO_2 NAAQS for the Prevention of Significant Deterioration Program*, published August 23, 2010.

The predicted cumulative 24-hour SO_2 impacts are based on the H2H for comparison to the NAAQS since one exceedance per year per receptor is allowed. The predicted cumulative annual SO_2 impacts are based on the H1H for comparison to the NAAQS as the standard can never be exceeded. Results of the SO_2 NAAQS analysis are summarized in Tables 5-24, 5-25 and 5-26. The background concentrations used for comparison to the NAAQS

were 8.9 μg/m^3 for the 1-hour averaging period, 6.8 μg/m^3 for the 24-hour averaging period and 0 μg/m^3 for the annual averaging period (assumed negligible per KDHE).

Table 5–24
Predicted Cumulative 1-Hour SO_2 Concentration for NAAQS Evaluation

SO2 1-HOUR		Predicted H4H ALL Impacts (Plus Background)	UTM Easting	UTM Northing
AERMOD 11103	Operating Scenarios		(m)	(m)
NAQ-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	51.22504 (60.12504)	251557.00	4163082.00
NAQ-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	**51.22548 (60.12548)**	251557.00	4163082.00
NAQ-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	51.22302 (60.12302)	251557.00	4163082.00
NAQ-236 Includes Nearby Sources	Boiler at 236 MMBtu/hr Flare Operational No Firewater Pump	51.21974 (60.11974)	251557.00	4163082.00
NAQ-141 Includes Nearby Sources	Boiler at 141 MMBtu/hr Flare Operational No Firewater Pump	51.21612 (60.11612)	251557.00	4163082.00

Table 5–25
Predicted Cumulative 24-Hour SO_2 Concentration for NAAQS Evaluation

SO2 24-HOUR		Predicted H2H ALL Impacts (Plus Background)		UTM Easting	UTM Northing
AERMOD 11103	Operating Scenarios		Date	(m)	(m)
NAQ-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	15.66319 (22.46319)	9102224	288457.00	4116682.00
NAQ-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	15.92035 (22.72035)	7042524	288457.00	4116682.00
NAQ-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	15.97225 (22.77225)	7102124	288407.00	4116632.00
NAQ-236 Includes Nearby Sources	Boiler at 236 MMBtu/hr Flare Operational No Firewater Pump	15.53946 (22.33946)	7102124	288407.00	4116682.00
NAQ-141 Includes Nearby Sources	Boiler at 141 MMBtu/hr Flare Operational No Firewater Pump	14.77959 (21.57959)	7102124	288407.00	4116682.00

Table 5–26
Predicted Cumulative Annual SO_2 Concentration for NAAQS Evaluation

SO2 ANNUAL	Predicted H1H ALL Impacts (Background Assumed Negligible)				
AERMOD 11103	2006	2007	2008	2009	2010
ALL-500 Includes Nearby Sources	1.02234	1.17630	1.10610	0.70772	1.16297
ALL-471 Includes Nearby Sources	**1.08366**	**1.24310**	**1.17061**	**0.75221**	**1.23322**
ALL-353 Includes Nearby Sources	0.99129	1.13596	1.06990	0.69269	1.12570

The NAAQS for 1-hour SO_2 is 196 $\mu g/m^3$. The NAAQS for 24-hour SO_2 is 365 $\mu g/m^3$. The NAAQS for annual SO_2 is 80 $\mu g/m^3$. Based on the results detailed in Tables 5-24, 5-25 and 5-26, the proposed facility will not cause or significantly contribute to a violation of the NAAQS for 1-hour, 24-hour and annual SO_2.

5.3 AQIA Summary

This AQIA demonstrates that the proposed facility will not cause or significantly contribute to a violation of any NAAQS or PSD Class II area increment.

Section 6.0
PSD Additional Impacts Analyses

6.1 Commercial, Residential and Industrial Growth

The U.S. Department of Energy (DOE) is proposing to provide federal funding to ABBK to support the final design, construction and start-up of the facility. In accordance with DOE [Title 10 of the Code of Federal Regulations (CFR) Part 1021] and the Council on Environmental Quality regulations (40 CFR Parts 1500 through 1508) that implement the National Environmental Policy Act [NEPA; 42 U.S.C. 4321-4370(f)], DOE is required to evaluate the potential environmental impacts of the project. Since DOE must decide whether to use federal funds to support the Abengoa Biorefinery Project, it has prepared the *Final Environmental Impact Statement for the Proposed Abengoa Biorefinery Project near Hugoton, Stevens County, Kansas* (DOE/EIS-0407). The following discussion was obtained from the EIS and was relied upon for evaluating commercial, residential and industrial growth impacts, also referred to as socioeconomic impacts from the proposed facility. This section describes the potential effects of the construction and operations of the proposed facility in Hugoton, Kansas, on the existing environment of the socioeconomic region of influence. The socioeconomic region of influence consists of Morton, Seward and Stevens counties in Kansas, and Texas county in Oklahoma.

Any influx of capital (spending) or employment opportunities, such as a large construction project, to a region will impact the existing socioeconomic environment to some degree. Socioeconomic variables include population and housing, employment and income, education, and public services (law enforcement, fire protection, and medical services). These variables are interrelated in their response to changes in the environment.

Socioeconomic impacts can be addressed in terms of both direct and indirect impacts. Direct impacts are those changes that are directly attributed to the proposed facility, such as changes in employment, population, or spending (income or earnings) resulting from the construction and operations of the proposed facility. Indirect impacts in the region of influence occur as a reaction to project-induced changes in employment and regional expenditures. Changes in regional expenditures can occur because of changes in employment levels and the resulting changes in wage income. Changes in regional expenditures also occur from the demand for materials and services associated with

operations and maintenance of a facility. Socioeconomic impacts are the sum of the direct and indirect impacts.

Socioeconomic impacts were evaluated in detail and the EIS concluded that the proposed facility would impact socioeconomic variables in the region of influence. Construction and operation activities under the proposed facility would impact the region's population and housing, employment and income, and education and public services. Impacts would be driven by changes (increases) in population that in turn impact other socioeconomic variables. The increase in population during construction activities (from in-migrating construction worker and operations workers employed during construction) would peak at nearly 500 persons, or approximately a 1-percent increase over the region's 2007 population (51,240 persons). The project-induced population increase of an estimated 43 persons during the projected operational life of the facility represents a 0.18- percent increase over the region's 2007 population. Because the increases in population are small, impacts to other socioeconomic variables are also small, that is, less than 1-percent of the baseline or existing conditions.

Construction-related emissions will be limited to fugitive dust and mobile-source combustion emissions. Fugitive dust will be mitigated, as necessary, by the construction contractor. Given the temporary nature of these emissions and the ability to mitigate them as needed, these activities are not expected to significantly impact air quality. Further, it can be concluded that the air quality impacts associated with secondary growth will not be significant because the increase in population due to the proposed facility will be very small (less than 1-percent).

The EIS was required for construction of the proposed facility to commence; therefore, no further analysis of commercial, residential and industrial growth was deemed necessary for the PSD review process. The EIS can be reviewed at http://www.biorefineryprojecteis-abengoa.com/Final_EIS.html.

6.2 Vegetation and Soils

The Clean Air Act, which was last amended in 1990, requires EPA to set NAAQS (40 CFR Part 50) for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as

asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The EPA manual, *New Source Review Workshop Manual*, supports this by stating that, "for most types of soil and vegetation, ambient concentrations of criteria pollutants below the secondary NAAQS will not result in harmful effects. However, there are sensitive vegetation species (e.g., soybeans and alfalfa) which may be harmed by long-term exposure to low ambient air concentrations of regulated pollutants for which there are no NAAQS; therefore, research and evaluation of recent literature and studies is required to demonstrate that those pollutants associated with the proposed facility will not have an adverse effect on endangered or sensitive plant species."

For evaluating impacts to vegetation and soils from the proposed facility, the screening criteria in the EPA report, *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals*, and the secondary NAAQS, which are established by the EPA to protect public welfare (including agriculture), were relied upon. The EPA report establishes air pollutant concentrations that are generally viewed by the EPA to be protective of soils and vegetation having significant commercial or recreational value, including agricultural crops, based on a broad review of pertinent scientific literature. The criteria pollutants subject to PSD review included PM/PM_{10}/$PM_{2.5}$, NO_2, SO_2, CO and VOC. Total suspended particulate (TSP, a.k.a. PM) is not considered in this analysis as no useable information other than that used to develop the NAAQS was found. PM_{10} is the regulated air pollutant indicator of PM emissions; therefore only PM_{10} is used in the vegetation and soils analysis. Further, there is currently no EPA approved methodology for evaluating ozone (VOC) on a local scale, therefore ozone is not considered.

6.2.1 Pathways and Effect of Exposure

There are two pathways by which air pollutants can affect vegetation: direct exposure of a plant to a gaseous pollutant in the ambient air, and indirect exposure to trace elements through deposition of the pollutant in the soil and later uptake by the plant. Effects of pollutants can be classified as acute or chronic. Acute effects result from short-term exposures to relatively high concentrations, while chronic effects result from exposure to lower concentrations for times of months to several years.

6.2.2 *Screening Concentrations for Ambient Exposures*

Table 6-1 presents the suggested screening values for the gaseous pollutants NO_2, SO_2 and CO. These values represent the minimum concentrations at which adverse growth affects or tissue injury in exposed vegetation were reported in the literature reviewed for the EPA report, *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals*. The secondary NAAQS standards for PM_{10} is also listed in Table 6-1 and were used as the screening concentration for the purposes of this analysis.

Table 6–1
Screening Concentrations for Exposure to Ambient Air Concentrations

Pollutant	Averaging Period	Minimum Reported Level for Vegetation Sensitivity					
		Sensitive		Intermediate		Resistant	
		(ppmv)	($\mu g/m^3$)	(ppmv)	($\mu g/m^3$)	(ppmv)	($\mu g/m^3$)
PM_{10}	24-Hour	--	150	--	--	--	--
NO_2	4 Hours	2.0	3,760	5.0	9400	9.0	16,920
	8 Hours	2.0	3,760	4.0	7520	8.0	15,040
	1 Month	0.30	564	0.30	564	0.30	564
	Annual	0.05	94	0.05	94	0.05	94
SO_2	1 Hour	0.35	917	--	--	--	--
	3 Hour	0.30	786	0.80	2096	5.0	13,100
	Annual	0.007	18	0.007	18	0.007	18
CO	1 Week	1,000	1,800,000	NA	NA	10,000	18,000,000

Table 6-2 compares the screening values in Table 6-1 to the H1H ambient concentrations predicted in this AQIA. For those averaging times not included in the AQIA, modeling was performed for evaluation of the screening concentrations. For the 1-week CO average, the CO significance run file was reran for the 2006 to 2010 period and the worst month was identified. Impacts from the worst month were assumed equivalent to the 1-week averaging period. Only the sensitive vegetation values were used in this assessment. For comparison to the screening values, the source plus background values from the AQIA were used.

Table 6–2
Screening Concentrations for Exposure to Ambient Air Concentrations

Pollutant	Avg. Period	Vegetation Sensitivity ($\mu g/m^3$)	Facility Impacts ($\mu g/m^3$)	Background ($\mu g/m^3$)	Facility Impacts + Background ($\mu g/m^3$)	Exceeds Screening Conc. (Yes/No)
PM_{10}	24-Hour	150	32.61	89	121.61	No
NO_2	4 Hours	3,760	19.51	49	68.51	No
	8 Hours	3,760	19.51	49	68.51	No
	1 Month	564	6.56	49	55.56	No
	Annual	94	2.33	7.5	9.83	No
SO_2	1 Hour	917	23.77	8.9	32.67	No
	3 Hour	786	24.15	6.8	30.95	No
	Annual	18	1.24	0	1.24	No
CO	1 Week	1,800,000	3.38	573	576.38	No

Note 1: 1-hour NO_2 daily maximum concentration from this AQIA update used for the facility's impacts during the 4-hour and 8-hour averaging periods.
Note 2: Background concentrations for the 4-hour, 8-hour and 1-month NO_2 averaging periods were assumed equivalent to the 1-hour period.
Note 3: Background concentrations for the 1-week CO averaging period were assumed equivalent to the 8-hour period, as obtained from the facility's EIS.

6.2.3 Impacts to Soils and Vegetation Summary

The impacts of emissions from the proposed facility on soils and vegetation are expected to be negligible. Ambient concentrations of pollutants below the secondary NAAQS are generally protective of any harmful effects to soils and vegetation. The maximum predicted ambient concentrations are well below the NAAQS. Furthermore, a comparison of the maximum predicted concentrations to the screening levels found in the EPA document, *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals*, indicate that none of the screening levels are exceeded. Therefore, the results demonstrate that the proposed facility will not adversely impact soils and vegetation in the area.

Section 7.0
Visibility Assessment

7.1 Class II and Sensitive Areas Visibility Assessment

The K.A.R. provides no specific prohibitions against visibility impairment other than regulations limiting source opacity and protecting visibility at Federally protected Class I areas. There are no Federal Class I areas located within 100 km of the proposed facility. The nearest Federal Class I Area is the Great Sand Dunes in southeastern Colorado, located approximately 370 km (230 miles) west of the proposed facility location. There is one potential Class II area of concern within 50 km (31 miles) to the proposed facility. The Cimarron National Grasslands is located within Morton and Stevens Counties in southwestern Kansas, approximately 24 km (15 miles) west of the proposed facility location. All sources at the proposed facility will maintain compliance with applicable opacity restrictions; however, KDHE requested that a visibility analysis be performed on the Class II area to demonstrate that no significant deterioration of visibility will result from the operation of the proposed facility. In addition to the Class II area, KDHE also identified one sensitive area, Hugoton Municipal Airport, to be included in the visibility analysis.

7.2 Visual Impairment Screening Assessment

A Class II visual impairment screening analysis was conducted on the Cimarron National Grasslands to provide a conservative indication of the perceptibility of plumes from the proposed facility. This analysis was performed in accordance with the EPA's workbook, *Workbook for Plume Visual Impact Screening and Analysis*, using the VISCREEN model. It should be noted that the visibility impairment analysis and model VISCREEN are typical for assessments in Federal Class I areas where visibility preservation is a factor in the permit approval process. However, since an applicable Class II visibility model is not available, this model and methodology for Class I areas as outlined in the EPA workbook were used.

The VISCREEN model is designed to determine whether a plume from a facility may be visible from a given vantage point. The primary variables that affect whether a plume is visible or not at a certain location are the quantity of emissions, the types of emissions, the relative location of the emission source and the observer, and the background visibility range.

The VISCREEN model can be applied in two successive levels of screening: Level 1 and Level 2. Level 1 screening assumes default particle size and density, and worst-case meteorological conditions of category F stability and 1.0 meter per second (m/s) wind speed. Level 2 screening allows user-specified particle size, density, and more representative meteorological conditions.

7.2.1 Level 1 VISCREEN Input Requirements and Methodology

Because it was known from previous visibility analyses that the Level 1 VISCREEN results would indicate potential adverse visibility impacts to the Class II and sensitive areas analyzed, the emissions from the proposed facility were analyzed using the more refined Level 2 VISCREEN analysis.

7.2.2 Level 2 VISCREEN Input Requirements and Methodology

The input parameters required for VISCREEN are as follows:

- Emission rates of NO_2 and PM_{10}
- Background visual range of the region
- Source-observer distance
- Distance to the nearest approach of the Class I/II area
- Distance to the farthest approach of the Class I/II area

7.2.2.1 Emission Rates

The facility-wide PTE emissions used in the Level 2 VISCREEN analysis are as follows:

- $PM_{2.5}$ = 77.0 ton/yr
- NOx (as NO_2) = 687.34 ton/yr (Based on Tier 2 Screening)

Note that for the Level 2 VISCREEN analysis, the Tier 2 screening method for NOx emissions was used. Tier 2 is based on the ambient ratio method (ARM) detailed in 40 CFR Part 51, Appendix W, Section 5.2.4. For Tier 2 screening analysis, the Tier 1 emissions estimate is multiplied by an empirically derived NO_2/NOx value of 0.75 (annual national default). Also, the $PM_{2.5}$ emission rate was used for the Level 2 VISCREEN analysis in place of adjusting the size distribution of the emitted particulate, as the default plume particulate density is 2.5 g/cm^3 with a size index of 6 μm. In

general, larger particles (greater than 10 μm in diameter) have relatively small effects to visibility. Because the majority of the particulate matter is less than 1.0 μm (from fuel combustion emissions and fugitive dust emissions from materials handling dust collectors), the $PM_{2.5}$ emission rate for primary particle emissions was determined to be more appropriate for use in the Level 2 VISCREEN analysis.

7.2.2.2 *Background Visual Range*

The background visual range from Figure 9 of the EPA's workbook was 60 km.

7.2.2.3 *Selection of Observer Distances*

VISCREEN required the following three items:

1. The observer: This distance was conservatively assumed to be the same as the distance between the proposed emission source and the closest Class II or sensitive area boundary.
2. The closest Class I/II boundary: This distance was the distance to the nearest Class II or sensitive area boundary.
3. The most distant Class I/II boundary: This distance is the distance to farthest Class II or sensitive area boundary.

The distance from the proposed facility to the Class II and sensitive areas was used in VISCREEN as the source-observer distance. VISCREEN also requests the distance to the nearest and farthest approach of the Class II area. Table 7-1 shows the location, distance and directions from the proposed facility to the Class II and sensitive areas.

Table 7–1
Location of Class II and Sensitive Area

Class II and Sensitive Areas	UTM Easting (m)	UTM Northing (m)	UTM Zone	Nearest Location (km)	Farthest Location (km)
Cimarron National Grasslands	252218	4112373	14	24	105
Hugoton Municipal Airport	289132	4117071	14	0.8	2.6

7.2.2.4 *Background Ozone Concentration*

The background ozone concentration used for the Level 2 VISCREEN analysis is 0.034 ppm, based on the default value of 34 ppb used during the AQIA and discussed in Section 3.

7.2.2.5 *Meteorological Conditions*

The Level 2 analysis was performed using more representative meteorological data from the years 2002 to 2006. The surface air data from the Garden City Station, WBAN #23064 was used to determine the most representative meteorological conditions for each observer location.

In order to assess the worst-case dispersion conditions, a joint frequency distribution table for each location was prepared following the EPA's workbook. The joint frequency distribution table ranks dispersion conditions in order of decreasing severity and the frequency of occurrence of the conditions associated with the wind direction that could transport emissions towards the area of concern.

For the Level 2 VISCREEN analysis, the angle between the Class II and sensitive areas and the source were measured assuming north is 0 degrees. Then the worst-case cardinal wind direction sector was determined for each source.

Periods of meteorological conditions for which the flow vectors fall within the cardinal flow vector sectors that contain the observer were chosen to determine the joint frequency distribution of meteorological categories. For the Cimarron National Grasslands, the flow vector bounds were 232° to 309° (centerline located at ~271°). Therefore, it was determined that the two primary flow vector sectors: West-Southwest (WSW) flow vector sector (236.25° to 258.75°) and West (W) flow vector sector (258.75° to 281.25°), would potentially bring the plume into the main part of the Cimarron National Grasslands. For the Hugoton Municipal Airport, the flow vector bounds were 138° to 178° (centerline located at ~158°). Therefore, it was determined that the two primary flow vector sectors: South-Southeast (SSE) flow vector sector (146.25° to 168.75°) and South (S)

flow vector sector (168.75° to 191.25°), would potentially bring the plume in the Hugoton Municipal Airport.

Table 7-2 shows the lower and upper bounds of the flow vectors with respect to the facility location. Figures 7-1 and 7-2 depict the flow vectors and flow vector sectors for each area of concern.

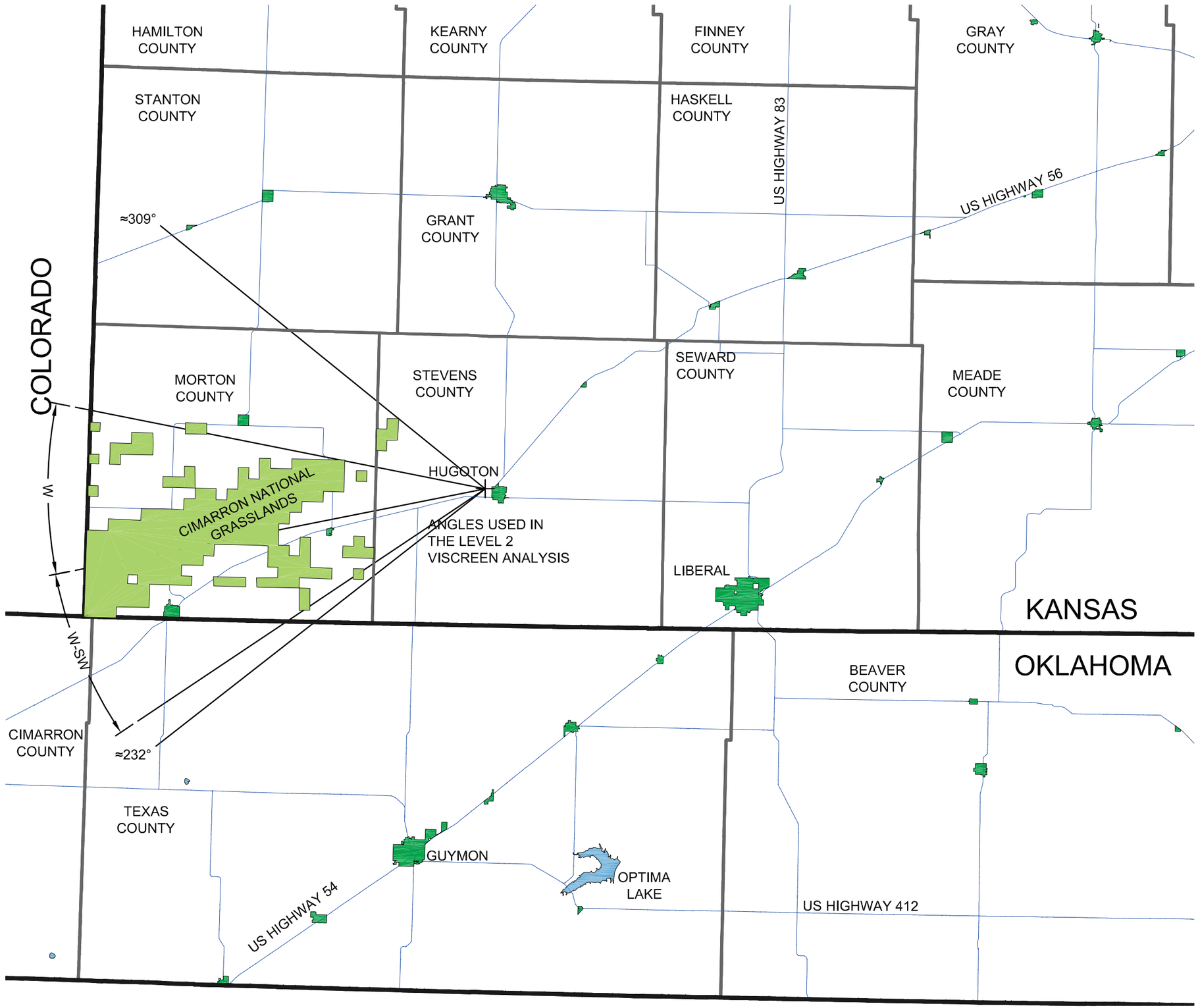
Table 7–2
Distance to Class II and Sensitive Areas and Flow Vectors

Class II and Sensitive Areas	Distance (km)	Direction (degrees)	Lower Flow Vector Bound (degrees)	Upper Flow Vector Bound (degrees)
Cimarron National Grasslands	24	270	232	309
Hugoton Municipal Airport	0.8	159	138	178

The joint frequency distribution analysis was conducted for the meteorological conditions presented in Table 6-3.

Table 7–3
Joint Frequency Distribution Analysis Meteorological Conditions

Pasquill-Gifford Stability Class	Wind Speed (m/s)
F	1, 2, 3
E	1, 2, 3, 4, 5
D	1, 2, 3, 4, 5, 6, 7, 8



REVISION TRACKING		
DATE	DESCRIPTION	REVISION
DATE	ORIGINAL DRAWINGS	12/30/09

ABENGOA BIOENERGY BIOMASS OF KANSAS, LLC
HUGOTON, KANSAS

LOCATION OF CIMARRON NATIONAL GRASSLANDS

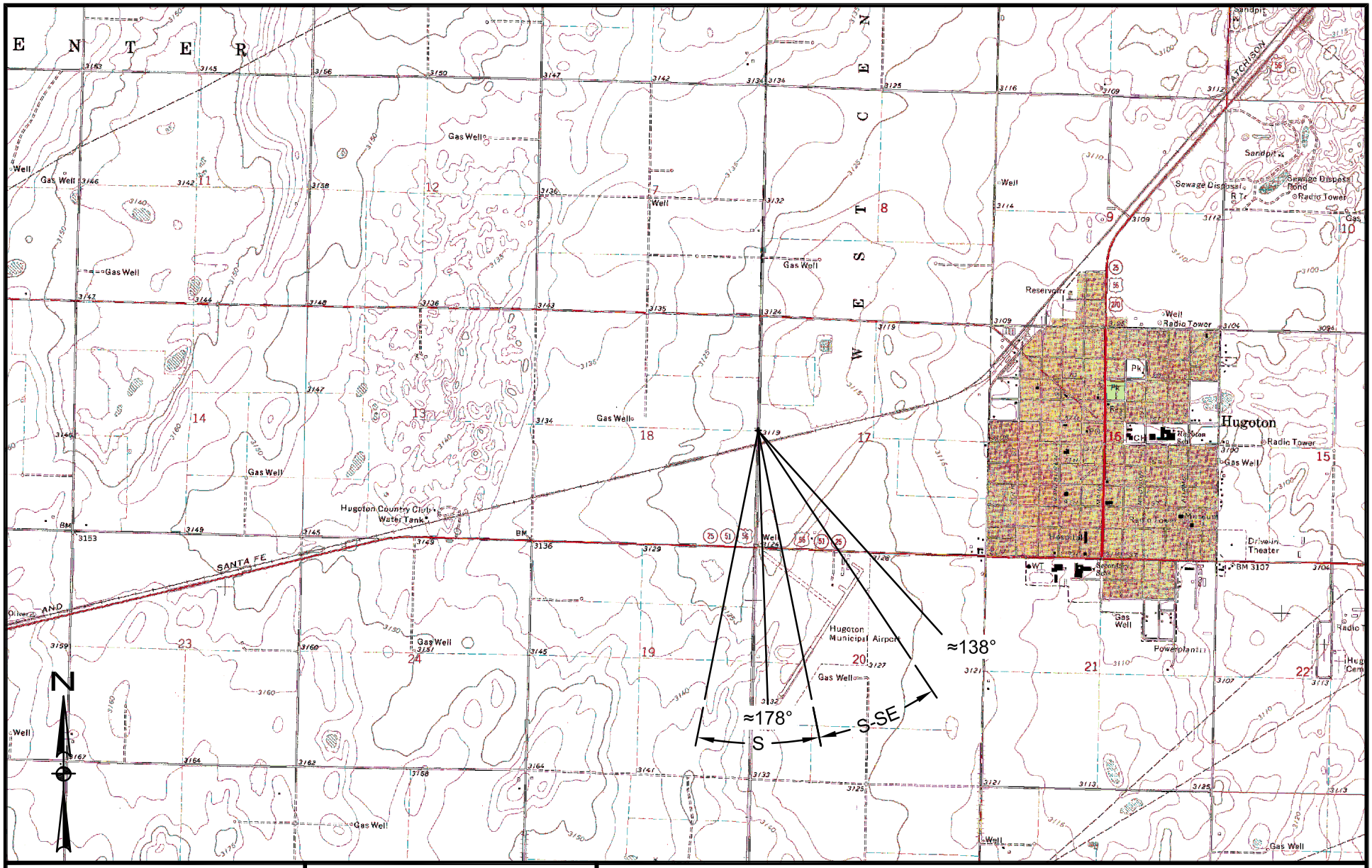
PROJECT NUMBER: 165-001
DESIGNED: SES
DRAWN: JAS
CHECKED: DAJ

1640 "L" STREET, SUITE D
LINCOLN, NE 68508
TEL (402) 475-8588
FAX (402) 477-1956
www.WLA-consulting.com
WLA Consulting, Inc.
Engineers & Scientists
WaterLandAir

DRAWING NUMBER FIG 6-1

FILE: 165001FIG6-1(0)

R:_Drawings\165-001 ABHK - Air Constr Permit\165001FIG6-1(0).dwg, FIG6-1, 1/4/2010 9:12:26 AM



WLA Consulting, Inc.

FILE NO.: 165001FIG6-2(0)

DATE:	2/9/11
SCALE:	NOT TO SCALE
PROJ. NO.:	165-001
DRAWN:	JAS
CHECKED:	SES
FIGURE 6-2	

LOCATION OF HUGOTON MUNICIPAL AIRPORT
ABENGOA BIOENERGY BIOMASS OF KANSAS, LLC
HUGOTON, KANSAS

R:_Drawings\165-001 ABHK - Air Constr Permit\165001FIG6-2(0).dwg, FIG 7-2, 2/10/2011 10:36:30 AM

For each of the meteorological conditions, the dispersion capability was determined by evaluating the product of σ_y, σ_z and u, where σ_y and σ_z are the Pasquill-Gifford horizontal and vertical diffusion coefficients for the given stability class and downwind (source to observer) distance, and u is the wind speed for the given wind speed category in the joint frequency table. The dispersion parameter equations presented in Appendix E of the updated pages for the EPA's workbook were used to calculate σ_y and σ_z. The dispersion parameter equations for σy and σz are as follows:

- $\sigma_y = 465.11628\ (x)\ \tan(TH)$

  where:

  $TH = 0.017453293\ [c - d\ \ln(x)]$
- $\sigma_z = axb$

For both equations, x is the downwind distance in kilometers and σ_y and σ_z are in meters. The coefficients a, b, c and d are listed in Tables E-1 and E-2 of Appendix E of the updated pages for the EPA's workbook. The dispersion conditions were ranked in ascending order of the value of $\sigma_y\sigma_z u$. The dispersion capability of the atmosphere increases with an increase in the product of $\sigma_y\sigma_z u$. The dispersion parameter calculations are included in Appendix E of this AQIA.

The transport times for the plume along the minimum trajectory distances were calculated based on a minimum distance to the area of concern and the midpoint value of wind speed for the given wind speed category. Table 6-4 presents the transport times for the plume based on the minimum trajectory distances.

Table 7–4
Joint Frequency Distribution Analysis Meteorological Conditions

Cimarron National Grasslands		Hugoton Municipal Airport	
Wind Speed Category (m/s)	**Transport Time (hours)**	**Wind Speed Category (m/s)**	**Transport Time (hours)**
0-1	13.3	0-1	0.44
1-2	4.4	1-2	0.15
2-3	2.7	2-3	0.09
3-4	1.9	3-4	0.06
4-5	1.5	4-5	0.05
5-6	1.2	5-6	0.04

Dispersion conditions associated with transport times of more than twelve hours were not considered in the cumulative frequency as it was assumed that steady-state plume conditions would unlikely persist for more than twelve hours. If the transport time is less than twelve hours, then the time period having the highest frequency of occurrence (f) for the given meteorological category is added to the cumulative frequency (cf).

Following guidance from the EPA's workbook, using the identified wind direction sectors for the Cimarron National Grasslands impacts, the dispersion condition related to the worst-case cumulative frequency of occurrence greater than 1 percent was E stability and a wind speed of 5 m/s in the West (W) flow vector sector. Using the identified wind direction sectors for the Hugoton Municipal Airport, the dispersion condition related to the worst-case cumulative frequency of occurrence greater than 1 percent was E stability and a wind speed of 4 m/s in the South-Southeast (SSE) flow vector sector. The dispersion condition E 4 in both the SSE and S flow vector sectors for the Hugoton Municipal Airport was selected over E-3 and D-2 because although the frequency of occurrence greater than 1 percent occurred for both of these dispersion conditions before E-4, the occurrences were in the 12:00 am to 5:59 am time period which is dark and visibility is not a concern. Tables 7-5 through 7-8 show the analysis of worst-case meteorological conditions for plume visual impact calculations that led to the choice of these dispersion conditions. An asterisks (*) indicates transport time to area during the

given conditions is longer than 12 hours, so the frequency of occurrence is not added to the cumulative frequency summation.

Table 7–5
Worst-Case Meteorological Conditions for Plume Visual Impact Calculations at the Cimarron National Grasslands – WSW Wind Direction Sector Only

Dispersion Condition (stability, wind speed)	$\sigma_y\sigma_z u$ (m^3/s)	Transport Time (hours)	Frequency (f) and Cumulative Frequency (cf) of Occurrence of Given Dispersion Condition Associated with Worst-Case Wind Direction for Given Time of Day (percent)							
			0-6		6-12		12-18		18-24	
			f	cf	f	cf	f	cf	f	cf
F,1	1.88E+04	13.3*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F,2	5.65E+04	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F,3	9.41E+04	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E,1	5.17E+04	13.3*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D,1	1.31E+05	13.3*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E,2	1.55E+05	4.4	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
E,3	2.59E+05	2.7	0.3	0.4	0.2	0.2	0.1	0.1	0.2	0.2
E,4	3.62E+05	1.9	0.3	0.7	0.2	0.4	0.0	0.1	0.2	0.4
D,2	3.92E+05	4.4	0.1	0.8	0.1	0.5	0.0	0.1	0.1	0.5
E,5	4.65E+05	1.5	0.2	1.0	0.2	0.7	0.2	0.3	0.2	0.7
D,3	6.53E+05	2.7	0.5	1.5	0.4	1.1	0.1	0.4	0.2	0.9
D,4	9.14E+05	1.9	1.1	2.6	0.7	1.8	0.2	0.6	0.3	1.2
D,5	1.44E+06	1.2	0.5	3.1	0.5	2.3	0.2	0.8	0.2	1.4

Table 7–6
Worst-Case Meteorological Conditions for Plume Visual Impact Calculations at the Cimarron National Grasslands – W Wind Direction Sector Only

Dispersion Condition (stability, wind speed)	$\sigma_y\sigma_z u$ (m^3/s)	Transport Time (hours)	Frequency (f) and Cumulative Frequency (cf) of Occurrence of Given Dispersion Condition Associated with Worst-Case Wind Direction for Given Time of Day (percent)							
			0-6		6-12		12-18		18-24	
			f	cf	f	cf	f	cf	f	cf
F,1	1.88E+04	13.3*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F,2	5.65E+04	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F,3	9.41E+04	2.7	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
E,1	5.17E+04	13.3*	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
D,1	1.31E+05	13.3*	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
E,2	1.55E+05	4.4	0.1	0.2	0.0	0.0	0.0	0.0	0.1	0.1
E,3	2.59E+05	2.7	0.3	0.5	0.2	0.2	0.0	0.0	0.1	0.2
E,4	3.62E+05	1.9	0.3	0.8	0.3	0.5	0.1	0.1	0.2	0.2
D,2	3.92E+05	4.4	0.1	0.9	0.0	0.5	0.0	0.1	0.0	0.4
E,5	4.65E+05	1.5	0.5	1.4	0.5	1.0	0.2	0.3	0.4	0.8
D,3	6.53E+05	2.7	0.7	2.1	0.4	1.4	0.1	0.4	0.2	1.0
D,4	9.14E+05	1.9	1.3	3.4	0.8	2.2	0.3	0.7	0.3	1.3
D,5	1.44E+06	1.2	0.6	4.0	0.6	2.8	0.3	1.0	0.2	1.5

Table 7–7
Worst-Case Meteorological Conditions for Plume Visual Impact Calculations at the Hugoton Municipal Airport – SSE Wind Direction Sector Only

Dispersion Condition (stability, wind speed)	$\sigma_y\sigma_z u$ (m^3/s)	Transport Time (hours)	Frequency (f) and Cumulative Frequency (cf) of Occurrence of Given Dispersion Condition Associated with Worst-Case Wind Direction for Given Time of Day (percent)							
			0-6		6-12		12-18		18-24	
			f	cf	f	cf	f	cf	f	cf
F,1	1.65E+02	0.44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E,1	3.79E+02	0.44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F,2	4.96E+02	0.15	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
D,1	7.44E+02	0.44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F,3	8.27E+02	0.09	0.3	0.3	0.1	0.1	0.0	0.0	0.2	0.2
E,2	1.14E+03	0.15	0.2	0.5	0.0	0.1	0.0	0.0	0.1	0.3
E,3	1.90E+03	0.09	1.1	1.6	0.4	0.5	0.0	0.0	0.5	0.8
D,2	2.23E+03	0.15	0.1	1.7	0.1	0.6	0.0	0.0	0.1	0.9
E,4	2.66E+03	0.06	2.3	4.0	1.0	1.6	0.2	0.2	1.2	2.1
E,5	3.42E+03	0.05	2.3	6.3	1.2	2.8	0.4	0.6	1.9	4.0
D,3	3.72E+03	0.09	0.7	7.0	0.2	3.0	0.2	0.8	0.7	4.7
D,4	5.21E+03	0.06	1.5	8.5	0.3	3.3	0.4	1.2	1.8	6.5
F,1	1.65E+02	0.44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 7–8
Worst-Case Meteorological Conditions for Plume Visual Impact Calculations at the Hugoton Municipal Airport – S Wind Direction Sector Only

Dispersion Condition (stability, wind speed)	$\sigma_y\sigma_z u$ (m^3/s)	Transport Time (hours)	Frequency (f) and Cumulative Frequency (cf) of Occurrence of Given Dispersion Condition Associated with Worst-Case Wind Direction for Given Time of Day (percent)							
			0-6		6-12		12-18		18-24	
			f	cf	f	cf	f	cf	f	cf
F,1	1.65E+02	0.44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E,1	3.79E+02	0.44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F,2	4.96E+02	0.15	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
D,1	7.44E+02	0.44	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
F,3	8.27E+02	0.09	0.2	0.3	0.1	0.1	0.0	0.0	0.1	0.1
E,2	1.14E+03	0.15	0.1	0.4	0.0	0.1	0.0	0.0	0.1	0.2
E,3	1.90E+03	0.09	0.7	1.1	0.3	0.4	0.0	0.0	0.3	0.5
D,2	2.23E+03	0.15	0.1	1.2	0.1	0.5	0.0	0.0	0.0	0.5
E,4	2.66E+03	0.06	1.5	2.7	0.8	1.3	0.2	0.2	0.4	0.9
E,5	3.42E+03	0.05	1.3	4.0	0.9	2.2	0.3	0.5	0.6	1.5
D,3	3.72E+03	0.09	0.3	4.3	0.3	2.5	0.1	0.6	0.4	1.9
D,4	5.21E+03	0.06	1.2	5.5	0.4	2.9	0.4	1.0	1.3	3.2
F,1	1.65E+02	0.44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

7.3 VISCREEN Screening Criteria

VISCREEN analyzes a matrix of conditions for regions within and outside the area of interest. This matrix includes forward and backward scattering impacts viewed against the sky and the surrounding terrain (e.g., mountains, hills, etc.). The forward scattering case assumes that the sun is in front of the observer at an angle of 10° above the horizon. The backward scattering case assumes that the sun is at the observer's back at an angle of 140° above the horizon.

Results from the VISCREEN model are expressed in terms of perceptibility (Delta E) and contrast. The VISCREEN program suggests a default critical value for perceptibility of 2.0. For a sharp-edged plume, this results in 50 percent plume detection by the casual observer. Hence, a critical value for perceptibility of 2.0 is used for the Level 1 analysis. The critical value for contrast is taken to be the VISCREEN default value of 0.05. An absolute value of contrast greater than 0.05 is indicative of a visible plume for the modeled conditions in the Level 1 analysis.

There are no perceptibility or contrast criteria thresholds for Class II or sensitive areas; therefore, the U. S. EPA's Workbook perceptibility (Delta E) critical value of 4.0 and the contrast value of 0.1 were used as a threshold for evaluating adverse impacts upon visibility by the proposed facility.

7.4 Level 2 VISCREEN Results

The results of the VISCREEN analysis present the following information:

- Background: The background against which the plume is viewed.
- Theta: The sun elevation angle above the horizon.
- Azimuth: The angle between the line of sight and the line connecting the source and observer.
- Distance: The distance from the source to the point at which the observer's line of sight intersects the plume.
- Alpha: The angle between the light of sight and the plume centerline.
- Delta E Critical: The perceptibility screening threshold (2.0 default).
- Delta E Plume: The maximum modeled plume perceptibility.
- Contrast Critical: The contrast screening threshold (0.05 default).
- Contrast Plume: The maximum modeled plume contrast.

The results of the Level 2 VISCREEN analysis are summarized in Tables 7-9 and 7-10, for the Cimarron National Grasslands and Hugoton Municipal Airport, respectively. The Level 2 VISCREEN analysis printouts for each location are included in Appendix E. An asterisk (*) indicates plume impacts that exceed screening criteria.

Table 7–9
Level 2 VISCREEN Results for Cimarron National Grasslands

	Background	Theta (deg)	Azimuth (deg)	Distance (km)	Alpha (deg)	Delta E		Green Contrast	
						Critical	Plume	Critical	Plume
Inside Class II Area	Sky (forward)	10	140	32.1	29	4.0	0.477	0.10	-0.000
	Sky (backward)	140	140	32.1	29	4.0	0.198	0.10	-0.003
	Terrain (forward)	10	84	24.0	84	4.0	0.188	0.10	0.002
	Terrain (backward)	140	84	24.0	84	4.0	0.054	0.10	0.001
Outside Class II Area	Sky (forward)	10	10	1.0	168	4.0	1.058	0.10	0.004
	Sky (backward)	140	10	1.0	168	4.0	0.312	0.10	-0.010
	Terrain (forward)	10	0	1.0	168	4.0	1.061	0.10	0.015
	Terrain (backward)	140	0	1.0	168	4.0	0.317	0.10	0.012

Table 7–10
Level 2 VISCREEN Results for Hugoton Municipal Airport

	Background	Theta (deg)	Azimuth (deg)	Distance (km)	Alpha (deg)	Delta E		Green Contrast	
						Critical	Plume	Critical	Plume
Inside Class II Area	Sky (forward)	10	164	2.6	5	4.0	20.214*	0.10	-0.011
	Sky (backward)	140	164	2.6	5	4.0	9.9091*	0.10	-0.099
	Terrain (forward)	10	164	2.6	5	4.0	24.317*	0.10	0.116*
	Terrain (backward)	140	164	2.6	5	4.0	5.460*	0.10	0.040
Outside Class II Area	Sky (forward)	10	5	0.2	164	4.0	6.150*	0.10	0.086
	Sky (backward)	140	5	0.2	164	4.0	3.130*	0.10	-0.068
	Terrain (forward)	10	5	0.2	164	4.0	47.183*	0.10	0.179*
	Terrain (backward)	140	5	0.2	164	4.0	6.914*	0.10	0.050

VISCREEN is designed for use in Level 1 and Level 2 plume visual impact screening calculations. The objective of the screening exercise is to identify emission sources that have the potential to cause adverse visibility impairment. Because these sources can be analyzed further (with more sophisticated models) in a more detailed manner (e.g., using Level 3 analysis), the screening model was designed to yield an output that is consistently conservative. That is, the screening model calculates plume visual impacts that are likely to be greater than those that would actually be encountered and those that would be calculated in Level 3 analysis.

Table 7-9 indicates that the plume perceptibility (Delta E) both inside and outside the Cimarron National Grasslands is below the critical values established by the EPA's workbook. Since the visibility screening analysis is designed to be conservative, it can be concluded that the proposed facility will not have any adverse impacts on visibility at this Class II area. The Level 2 VISCREEN analysis results in Table 7-10 indicate potential adverse visibility impacts at the Hugoton Municipal Airport; therefore, a sun angle analysis was completed to determine if an observer could observe the plume at a critical sun elevation.

7.5 Sun Angle Analysis

A forward scattering analysis was performed on the Hugoton Municipal Airport. The range of sun angles over which the critical sun elevation (10°) can occur was calculated using the winter and summer solstices. The 10° sun elevation is bounded by the sun angles 68.2° (summer solstice) and 129.3° (winter solstice) for sunrise conditions. Thus, any observer at any angle between 248.2° (68.2° + 180°) and 309.3° (129.3° + 180°) could observe the plume at the critical sun elevation. Hugoton Municipal Airport is located at an angle of 162° from the facility. Further, the airport has two runways:

1. Runway 2/20 – Heading 16°/196°
2. Runway 13/31 – Heading 126°/306°

Due to the close proximity of the airport to the facility, and the runway heading of Runway 13/31, a person using Runway 13/31 facing the sunrise with an elevation of 10° could experience an adverse impact on visibility. However, Runway 13/31 is not the primary runway used at the airport. There is also an obstruction already associated with this runway that impacts its use. The obstruction at Runway 13/31 includes a 10 foot traveling center irrigation pivot/tower located 90 to 200 feet from the runway end. Therefore, the

potential for decreased visibility at this runway will have minimal impacts on the airport operations.

For sunset conditions, the 10° sun elevation is bounded by the sun angles 230.7° (winter solstice) and 291.8° (summer solstice) for sunset conditions. Thus, any observer at any angle between 50.7° (230.7° - 180°) and 111.8° (291.8° - 180°) could observe the plume at the critical sun elevation. Since the Hugoton Municipal Airport and its runways do not fall between these sun angle boundaries for sunset conditions, this condition will never occur.

In a backwards scatter analysis, the range of sun angles over which the critical sun elevation (140°) can occur was calculated using the summer solstice since the sun does not reach 140° during the winter solstice. The 140° sun angle elevation is bounded by the sun angles 88.6° and 91.5°. Thus any observer at an angle between 268.6° (88.6° + 180°) and 271.5° (91.5° + 180°) could observe the source with a sun elevation of 140°. Since the Hugoton Municipal Airport and its runways do not fall between these sun angle boundaries, this condition will never occur.

Based on this sun angle analysis, it is concluded that there will be minimal visibility impacts at the Hugoton Municipal Airport.

Appendix A

Correspondences from U.S. Environmental Protection Agency and Kansas Department of Health and Environment Regarding the April 2011 Ambient Air Dispersion Modeling Protocol; Use of the AERMOD Parallel Modeling Applications; Use of AERMOD Version 09292; and Use of PVMRM Option for 1-Hour NO_2 Modeling

WLA
Consulting, Inc.
Engineers & Scientists
WaterLandAir

June 30, 2011

Ms. Mindy Bowman, P.E.
Kansas Department of Health and Environment
Bureau of Air and Radiation
1000 SW Jackson, Suite 310
Topeka, Kansas 66612-1366

Re: Parallel Demonstration for AERMOD Version 11103 and AERMOD Version 09292 for Abengoa Bioenergy Hybrid of Kansas, Prevention of Significant Deterioration, Air Quality Construction Permit Application
Source ID No. 1890231
WLA Project No. 165-001

Dear Ms. Bowman:

Abengoa Bioenergy Hybrid of Kansas (ABBK) has completed a parallel demonstration for AERMOD Version 11103 and AERMOD Version 09292. For each pollutant and applicable averaging period modeled except 1-hour NO_2 NAAQS; PM_{10} Significant Impact Level (SIL), NAAQS and PSD; and $PM_{2.5}$ SIL, NAAQS and PSD; the U.S. EPA Fortran executable AERMOD Version 11103 was used to evaluate maximum predicted ground-level concentrations. The Oris Solutions, LLC, Bee-Line Software AERMOD 11103 Parallel modeling application (BEEST) and BeestXpress Remote Modeling System (BeestXpress) was used to evaluate the maximum predicted ground-level concentrations for 1-hour NO_2 NAAQS as this is the parallel modeling application proved to be the most efficient for calculating results. The BREEZE Remote Modeling System (BRMS) and BREEZE AERMOD 09292 Parallel modeling application was used to evaluate the maximum predicted ground-level concentrations for PM_{10} and $PM_{2.5}$ as this parallel modeling application has historically been the preferred software for the modeling conducted for the proposed facility and the changes from AERMOD 09292 to AERMOD 11103 did not impact the algorithms used to calculate concentrations when the regulatory modeling options (i.e. default model operations) are selected. The change from AERMOD 09292 to AERMOD 11103 that affected the 24-hour $PM_{2.5}$ averaging period was the method of calculating the 1st highest maximum daily 24-hour average over five years of meteorological data. This averaging calculation was performed manually using a spreadsheet program as part of the AQIA with the AERMOD 09292 results.

For the 1-hour NO_2 SIL, the AERMOD 11103 Parallel modeling application results were compared to the U.S. EPA Fortran executable AERMOD Version 11103 results for the entire receptor grid (extended out to 50 kilometers). The results of the AERMOD 11103 Parallel modeling application parallel demonstration are included with the modeling results on the enclosed DVDs. The file names are designated with either "EPA" or "Parallel" which correspond to either the U.S. EPA Fortran executable AERMOD Version 11103 or AERMOD 11103 Parallel modeling application, respectively. The results for 1-hour NO_2 SIL were compared and found to be identical. Because the results were identical, the use of the AERMOD 11103 Parallel modeling application was deemed appropriate for the 1-hour NO_2

NAAQS model. The maximum receptors were confirmed using the U.S. EPA Fortran executable AERMOD Version 11103 to ensure that the modeled results used for comparison to the NAAQS were identical.

For the AERMOD 09292 Parallel modeling application, a parallel demonstration was completed for both PM_{10} and $PM_{2.5}$ using a 50 meter receptor grid spacing out to 200 meters, including the maximum receptor), as approved by EPA. The results of the AERMOD 09292 Parallel modeling application parallel demonstration are included with the modeling results on the enclosed DVDs. The file names are designated with either "EPA" or "BRMS" which correspond to either the U.S. EPA Fortran executable AERMOD Version 11103 or AERMOD 09292 Parallel modeling application, respectively. The results for 24-hour PM_{10}, annual PM_{10}, 24-hour $PM_{2.5}$ and annual $PM_{2.5}$ were compared and found to be identical with the exception of the 24-hour $PM_{2.5}$ results which were manually calculated to generate the 1st highest maximum daily 24-hour average over five years of meteorological data results. The maximum difference was calculated as 0.00024 $\mu g/m^3$, or 0.0104% difference, and is due to slight rounding differences. The maximum receptors were confirmed using the U.S. EPA Fortran executable AERMOD Version 11103 to ensure that the modeled results used for comparison to the NAAQS and PSD increment were identical.

The following documentation was relied upon for completing the parallel demonstration for both AERMOD Version 11103 and AERMOD Version 09292.

Sincerely,

WLA CONSULTING, INC.

Stephanie Salter

Stephanie E. Salter, P.E.

WLA
Consulting, Inc.
Engineers & Scientists
WaterLandAir

April 25, 2011

Ms. Mindy Bowman, P.E.
Kansas Department of Health and Environment
Bureau of Air and Radiation
1000 SW Jackson, Suite 310
Topeka, Kansas 66612-1366

Re: Request to Use the BREEZE Remote Modeling System (BRMS) and BREEZE AERMOD Parallel Modeling Application for Abengoa Bioenergy Hybrid of Kansas, Prevention of Significant Deterioration, Air Quality Construction Permit Application
Source ID No. 1890231
WLA Project No. 165-001

Dear Ms. Bowman:

Abengoa Bioenergy Hybrid of Kansas (ABBK) requests approval to use the BREEZE Remote Modeling System (BRMS) and BREEZE AERMOD Parallel modeling application for the modeling analysis, in addition to the U.S. Environmental Protection Agency (EPA) AERMOD Fortran executable Version 11103 for the pollutants and averaging periods: 24-hour PM_{10}; 24-hour and annual $PM_{2.5}$; 1-hour and annual NO_2; 1-hour, 24-hour and annual SO_2; and 1-hour and 8-hour CO.

The BRMS for AERMOD operates on a massively parallel computer cluster that combines the processing power of multiple multi-core computers. Multi-core computers have more than one processing unit, or CPU, on a computer chip. Each core can be viewed as a separate computer capable of performing independent calculations. As air quality modeling software and associated preprocessing applications become more complex to address the physical and chemical processes occurring in the atmosphere, multi-core computers or clusters are necessary to complete extensive modeling analyses in a reasonable time period. The BRMS executes the U.S. EPA AERMOD Fortran executable that has been parallelized for performance across multiple processors (AERMOD Parallel) by BREEZE developers. No changes to Fortran algorithms are made and results generated by the BRMS and BREEZE AERMOD Parallel have been demonstrated to be identical to those generated by the EPA AERMOD Fortran executable (through Version 09292).

Trinity Consultants, Inc. has made available to all U.S. state and federal regulatory modelers the BREEZE AERMOD Parallel modeling application to assist in their equivalency demonstration. In addition, Trinity has made available, as requested by the EPA's Office of Air Quality Planning and Standards, model runs completed with the SCRAM version of AERMOD and BREEZE AERMOD Parallel. Model scenarios include the test cases available for download from the AERMOD model page at the SCRAM website (http://www.epa.gov/scram001/dispersion_prefrec.htm) and those described in a related memo (http://www.epa.gov/scram001/7thconf/aermod/evalreadme.txt).

At this time, BREEZE has not incorporated AERMOD Version 11103 into their product. In the event that the BREEZE AERMOD Parallel modeling application becomes available during the completion of the AQIA, the BRMS would then be utilized. A parallel demonstration will be provided with the AQIA for the 1-hour NO_2 significance analysis.

Sincerely,

WLA CONSULTING, INC.

Stephanie E. Salter, P.E.

WLA
Consulting, Inc.
Engineers & Scientists
WaterLandAir

April 25, 2011

Ms. Mindy Bowman, P.E.
Kansas Department of Health and Environment
Bureau of Air and Radiation
1000 SW Jackson, Suite 310
Topeka, Kansas 66612-1366

Re: Request to Use Non-Regulatory Default Modeling Option for Abengoa Bioenergy Hybrid of Kansas, Prevention of Significant Deterioration, Air Quality Construction Permit Application
Source ID No. 1890231
WLA Project No. 165-001

Dear Ms. Bowman:

Abengoa Bioenergy Hybrid of Kansas (ABBK) requests approval to use the Plume Volume Molar Ratio Method (PVMRM) option in AERMOD as part of the modeling analysis for the proposed biomass-to-ethanol and biomass-to-energy production facility to be located near Hugoton, Kansas. The majority of the NOx emissions from combustion sources at the proposed facility are in the form of nitric oxide (NO), whereas the U.S. Environmental Protection Agency (EPA) has established air quality standards for nitrogen dioxide (NO_2). Therefore, a methodology must be used to convert model estimates of ambient NO concentrations into equivalent ambient NO_2 concentrations.

ABBK proposes to use PVMRM to demonstrate compliance with the new 1-hour NO_2 NAAQS which became effective April 12, 2010. In June of 2010 and March 1, 2011, EPA issued clarification memoranda concerning the implementation of the new 1-hour NO_2 standard. These memoranda included:

1. General Guidance for Implementing the 1-Hour NO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including Interim 1-hour NO_2 Significant Impact Levels, dated June 28, 2010 (hereinafter referred to as the "General Guidance memorandum"); and
2. Applicability of Appendix W Modeling Guidance for the 1-Hour NO_2 National Ambient Air Quality Standard, dated June 28, 2010 (hereinafter referred to as the "Appendix W Applicability memorandum").
3. Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 NAAQS, dated March 1, 2011.

In brief, the use of non-regulatory options in AERMOD, specifically PVMRM, would change the status of the model. As stated in Section 3.1.2 (c) of 40 CFR Part 51, Appendix W, "A preferred model should be operated with the options listed in Appendix A as 'Recommendations for Regulatory Use.' Therefore, according to Appendix W, if other options are exercised, the model is no longer 'preferred.' Any other modification to a preferred model that would result in a change in the concentration estimates

likewise alters its status as a preferred model. Use of the model must then be justified on a case-by-case basis."

Appendix W recommends the following three-tiered screening approach for NO_2 modeling for annual averages:

- Tier 1 – Assumes full conversion of NO to NO_2;
- Tier 2 – Multiplies the Tier 1 result by a NO_2/NOx ambient equilibrium ratio, with 75 percent (0.75) as the annual national default ratio; and
- Tier 3 – Uses case-by-case detailed screening methods.

Using the Tier 1 approach, ABBK readily demonstrated compliance with the annual NO_2 NAAQS and PSD increment. However, using both the Tier 1 and Tier 2 (also known as the Ambient Ratio Method, ARM) approaches, the NO_2 ambient concentrations exceeded the 1-hour NAAQS beyond 50 km from the proposed facility. Because AERMOD is intended for estimating impacts from short-range transport (distances less than 50 km from the source), the 1-hour NO_2 modeling required the use of the Tier 3 approach.

The Appendix W Applicability memorandum states that PVMRM is considered a detailed screening method under Tier 3. The memorandum also notes that key model inputs for PVMRM include the in-stack ratios of NO_2/NOx emissions and background ozone concentrations, and recommends that the in-stack ratios be justified based on the specific application (i.e., there is no "default" in-stack NO_2/NOx ratio for PVMRM). The PVMRM method is available as non-regulatory-default option within AERMOD. While EPA is continuing to evaluate PVMRM for use in compliance demonstrations for the 1-hour NO_2 standard, as long as it is considered to be non-regulatory-default option, its use as alternative modeling techniques under Appendix W should be justified in accordance with Section 3.2.2 (e) of 40 CFR Part 51, Appendix W. The key criteria that must be addressed include:

1. PVMRM has received a scientific peer review;
2. PVMRM can be demonstrated to be applicable to the problem on a theoretical basis;
3. The data bases which are necessary to perform the analysis are available and adequate;
4. Appropriate performance evaluations of PVMRM have shown that the method is not biased toward underestimates; and
5. A protocol on methods and procedures to be followed has been established.

As noted in Appendix W Applicability memorandum, "[s]ince AERMOD is the preferred model for dispersion for a wide range of application, the focus of the alternative model demonstration for use of the OLM and PVMRM options within AERMOD is on the treatment of NOx chemistry within the model, and does not need to address basic dispersion algorithms within AERMOD." Therefore, only the AERMOD-PVMRM algorithm for estimating ambient NO_2/NOx ratio and NO_2 concentrations needs to be justified herein.

PVMRM was recently determined to be adequate both in terms of accuracy and conservatism for predicting NO_2 impacts on 1-hour and annual bases, as presented in the *Responsiveness Summary for Sunflower Electric Power Corporation, Holcomb Expansion, Air Quality Construction Permit Application*, prepared by KDHE in December 2010. Comment 27 of the December 2010 responsiveness summary provides an overview of the justification for use of PVMRM on that project. The Sunflower Electric Power Corporation, Holcomb Expansion project lies approximately 90 meters to the north-northwest of the proposed project in a similar rural and topographic setting.

Section 3.2.2 (e)(i) & (iv)

The AERMOD-PVMRM algorithm determines the conversion rate for NOx to NO_2 based on a calculation of the NOx moles emitted into the plume, and the amount of O_3 moles contained within the volume of the plume between the source and receptor. The dispersion algorithms in AERMOD and other steady-state plume models are based on the use of total dispersion coefficients, which are formulated to represent the time-averaged spread of the plume. A more appropriate definition of the volume of the plume for purposes of determining the ozone moles available for conversion of NOx is based on the instantaneous volume of the plume, which is represented by the use of relative dispersion coefficients.[1,2] The implementation of PVMRM in AERMOD is based on the use of relative dispersion coefficients to calculate the plume volume.

The chemistry for PVMRM has been peer-reviewed as noted by the documents posted on EPA's Support Center for Regulatory Air Modeling (SCRAM) web site entitled "Sensitivity Analysis of PVMRM and OLM in AERMOD" and "Evaluation of Bias in AERMOD-PVMRM", hereinafter referred to as the Brode sensitivity and bias reports[3,4]. The Hanrahan articles[5,6] on PVMRM also provide a technical description of the PVMRM algorithm and implemented and evaluated the PVMRM algorithm as a post-processor for the ISCST3 model. Both Hanrahan and Brode performed comparisons of PVMRM modeling results and ambient monitoring data for a few different data sets, and the conclusion was that the AERMOD-PVMRM algorithm provides unbiased estimates of the ambient NO_2/NOx ratio and NO_2 concentrations.

The Appendix W Applicability memorandum indicates that items (i) and (iv) in Section 3.2.2 (e) are fulfilled in part, based on existing documentation by Cole and Summerhays, Hanrahan, and Brode, while the rest of the items should be routinely addressed as part of the modeling protocol. Two additional items that complete the requirements of items (i) and (iv) are: 1) PVMRM has been independently tested and, on January 17, 2006, was approved by EPA Region 10 for use in Alaska;[7] and 2) EPA used PVMRM to estimate the conversion of NOx to NO_2 in its risk and exposure assessment to support the new 1-hour NO_2 NAAQS.[8] This risk and exposure assessment was a key consideration in EPA's decision-making process.

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[1] Cole, H.S. and J.E. Summerhays, 1979. A Review of Techniques Available for Estimation of Short-Term NO_2 Concentrations. Journal of the Air Pollution Control Association, 29(8): 812–817.
[2] Bange, P., L. Jannsen, F. Nieuwstadt, H. Visser, and J. Erbrink, 1991. Improvement of the modeling of daytime nitrogen oxidation in plumes by using instantaneous plume dispersion parameters. Atmos. Environ., 25A (10), 2321-2328.
[3] MACTEC, 2004. Sensitivity Analysis of PVMRM and OLM in AERMOD. Final Report, Alaska DEC Contract No. 18-8018-04. MACTEC Federal Programs, Inc., Research Triangle Park, NC.
[4] MACTEC, 2005. Evaluation of Bias in AERMODPVMRM. Final Report, Alaska DEC Contract No. 18-9010-12. MACTEC Federal Programs, Inc., Research Triangle Park, NC.
[5] Hanrahan, P.L., 1999. The Plume Volume Molar Ratio Method for Determining NO_2/NOx Ratios in Modeling – Part I: Methodology. J. Air & Waste Manage. Assoc., 49, 1324–1331.
[6] Hanrahan, P.L., 1999. The Plume Volume Molar Ratio Method for Determining NO_2/NOx Ratios in Modeling – Part II: Evaluation Studies. J. Air & Waste Manage. Assoc., 49, 1332-1338.
[7] EPA Region 10 Letter from Office Modeling Contact Mr. Herman Wong to Mr. Alan E. Schuler, Alaska Department of Environmental Conservation, January 17, 2006.
[8] EPA Doc. # EPA-452/R-08-008a, Risk and Exposure Assessment to Support the Review of the NO_2 Primary National Ambient Air Quality Standard, November 2008.

Section 3.2.2 (e)(ii)

For item (ii), the issue of applicability to the problem on a theoretical basis, is a case-by-case determination based on an assessment of the adequacy of the ozone titration mechanism to account for NOx chemistry based on "the chemical environment into which the source's plume is to be emitted." The Appendix W Applicability memorandum states that while the titration mechanism used in PVMRM may capture the most important aspects of NO-to-NO_2 conversion in many applications, there can be limitations for applications in which other mechanisms contribute significantly to the overall process of chemical transformation. Sources located in areas with high levels of VOC emissions may also be subject to these limitations. Cole and Summerhays present a more complete discussion of the ozone titration mechanism than the Appendix W Applicability memorandum, and they note two important yet counter-balancing limitations for the ozone titration mechanism: 1) the conversion of NO to NO_2 by organic radicals is neglected, which may underestimate the amount of NO_2 produced; and 2) the method ignores photo-dissociation of NO_2 back into NO caused by UV radiation, with results in an overestimate of converted NO_2 during daylight periods. Hanrahan and Brode tested the performance of PVMRM with a variety of data bases from different "chemical environments", and found that PVMRM consistently predicts the conversion ratio well.

Brode's sensitivity report presented results of a sensitivity analysis of the PVMRM and OLM options for NOx to NO_2 conversion in the AERMOD dispersion model. Brode's sensitivity report stated that "[s]everal single source scenarios were examined as well as a multiple-source scenario. The average conversion ratios of NO_2/NOx for the PVMRM option tend to be lower than for the OLM option and for the Tier 2 option or the Ambient Ratio Method which has a default value of 0.75 for the annual average. The sensitivity of the PVMRM and OLM options to emission rate, source parameters and modeling options appear to be reasonable and are as expected based on the formulations of the two methods. For a given NOx emission rate and ambient ozone concentration, the NO_2/NOx conversion ratio for PVMRM is primarily controlled by the volume of the plume, whereas the conversion ratio for OLM is primarily controlled by the ground-level NOx concentration." The Brode report went on to state that "[o]verall the PVMRM option appears to provide a more realistic treatment of the conversion of NOx to NO_2 as a function of distance downwind from the source than OLM or the other NO_2 screening options. No anomalous behavior of the PVMRM or OLM options was identified as a result of these sensitivity tests."

Based on Brode's sensitivity report, PVMRM appears to be applicable to the problem of NO_2 formation and as noted by the author provide a better estimation of the NO_2 impacts compared to other screening options. In addition, based on the rural setting of the proposed project, the ambient VOC concentrations in western Kansas are expected to be low and therefore, the ozone concentrations would be NOx limited. Therefore, based on the good performance of PVMRM at a variety of different chemical environments, and the fact that there is no indication that the chemical environment of the project area has unusually high VOC or organic radical concentrations, the PVMRM ozone titration mechanism appears to be appropriate for this project.

Section 3.2.2 (e)(iii)

The data needed to conduct a PVMRM run are: 1) hourly meteorological data; 2) hourly ozone data, and 3) in-stack and equilibrium NO_2/NOx ratios.

Both meteorological and ozone data sets must be processed into AERMOD ready formats. Due to the sensitivity of the meteorological data processing and known issues related to the data processing for recent projects, ABBK requests from KDHE, processed and EPA approved meteorological data files for the most recent five years. The meteorological files should be suitable for use with the non-regulatory

NO_2 – Plume Volume Molar Ratio Method (PVMRM) option and new output file options such as MAXDCONT. The model guidance requires the most recent five years of sequential hourly meteorological data be utilized to account for annual variability. The upper air data should be from the Dodge City station, WBAN# 13985 and the surface air data should be from the Garden City National Weather Station (NWS), WBAN #23064.

Hourly background ozone concentrations from the Cedar Bluff monitoring station located in Trego County, Kansas were also provided by KDHE for use in the model on August 26, 2010. Hourly readings were included for years 2002 to 2009. For periods of missing data or where the reading is zero, a default value of 34 parts per billion (ppb) will be used, as recommended by KDHE. If the values presented to ABBK on August 26, 2010 have changed or the recommendations are different, KDHE should provide new background concentrations and/or recommendations.

The selection of in-stack and equilibrium NO_2/NOx ratios and background ozone concentrations is an important aspect of the alternative modeling techniques demonstration. Brode's bias report presents a detailed analysis of the original plume measurement studies that were used by Cole and Summerhays to develop the OLM method, and an analysis of EPA's AP-42 emission factor document. Brode's bias report concluded that an in-stack NO_2/NOx ratio of 0.05 was representative of power plant boiler stacks. In addition to the sources used by Brode, ABBK relied on NO_2/NOx ratios obtained from the following sources:

- EPA Memorandum, Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 NAAQS, published March 1, 2011.
- Portable Combustion Gas Analyzer Technical Guidance Document – BAR 1998-01, Kansas Department of Health and Environment, Revised January 25, 2010.
- Texas Administrative Code (TAC); Title 30, Environmental Quality; Part 1, Texas Commission on Environmental Quality (TCEQ); Chapter 106, Permits By Rule; Subchapter W, Turbines and Engines; Section 106.512(6)(A), Stationary Engines and Turbines, amended June 13, 2001.

The default value in-stack NO_2/NOx ratio in AERMOD is 10 percent (0.10); however, the Appendix W Applicability memorandum does not allow for the use of a "default" in-stack NO_2/NOx ratio. EPA specifically states that for in-stack NO_2/NOx ratios, the specific application must be justified.

An inventory of all NAAQS sources was previously provided by KDHE for an area extending 100 km from the proposed project. From this source data and the proposed facility's sources, it was determined that 10 types of emission sources are present:

- Wood/Biomass-Fired Boilers
- Combustion Turbines
- Coal-Fired Boilers
- Natural Gas-Fired Boilers/Heaters
- Oil-Fired Boilers/Heaters
- Diesel Engines
- Gasoline Engines
- Natural Gas-Fired Engines
- Flares
- Carbon Black Production

The NAAQS inventory sources will be thoroughly reviewed and each individual source categorized so as to properly assign the specific type of activity to each source. This allows for accurate

categorization in the modeling analysis. Table 1 presents the in-stack NO_2/NOx ratios to be used with the PVMRM option and the references relied upon to support their use. In the absence of NO_2/NOx ratio data, it will be assumed that 50% of NOx emissions are NO_2, consistent with the EPA March 1, 2011 memo.

Table 1
In-Stack NO_2/NOx Ratios for use with PVMRM Option

Emission Source	NO_2/NOx Ratio	Reference
Wood-Fired Boilers	0.05	Brode's Bias Report
Combustion Turbines	0.25[1]	30 TAC 106.512(6)(A)
Coal-Fired Boilers	0.05	AP-42 Section 1.1
Natural Gas-Fired Boilers/Heaters	0.05	AP-42 Section 1.3
Oil-Fired Boilers/Heaters	0.05	AP-42 Section 1.3
Diesel Engines	Varies[1]	30 TAC 106.512(6)(A)
Gasoline Engines	Varies[1]	30 TAC 106.512(6)(A)
Natural Gas-Fired Engines	0.10	KDHE Guidance: BAR 1998-01
Flares	0.50	EPA March 1, 2011 Memo
Carbon Black Production	0.50	EPA March 1, 2011 Memo

Note 1: A review of the regulations promulgated by the TCEQ indicates that the agency has set NO_2/NOx ratios for turbines and engines that are to be used unless test data us available for the unit. This data taken from Figure 1 in 30 TAC 106.512(6)(A) is as follows:

Device	NOx Emission Rate (Q) (g/Hp-hr)	NO_2/NOx Ratio
IC Engine	Less than 2.0	0.4
IC Engine	2.0 thru 10.0	0.15 + (0.5/Q)
IC Engine	Greater than 10.0	0.2
Turbines	--	0.25
IC Engine with Catalytic Converter	--	0.85

Further, recent detailed in-stack NO_2/NOx ratio analysis was performed specifically for establishing an in-stack NO_2/NOx ratio for the PSD air quality construction permit for the We Energies' 50 MW Biomass-Fired Cogeneration Facility to be Located at the Domtar – Rothschild Mill, Marathon County, Wisconsin. According to information presented in Appendix E – Updated Air Quality Impact Analysis of the permit application, "We Energies contacted the operators of the French Island Generating Plant, a biomass and municipal refuse-derived-fuel (RDF) fired power station located in La Crosse, Wisconsin, to receive permission to install a NOx Continuous Emission Monitor (CEM) that was setup and calibrated to record 1-minute averages of both NO_2 and NOx data for a 2 week period. French Island has two Fluidized Bed Combustion boiler units that generate an approximate total of 28 MW of electricity. These boilers typically burn a 50/50 mix of RDF and wood waste, but there are time periods at night when the units combust 100% wood waste. Data was collected for Unit 1 during the period August 10 through 24, 2010 (which included 21 hours of operation on 100% wood waste), and the boiler operating loads ranged from approximately 65% to 95%. Note that during nighttime periods of wood waste only operation, the boiler loads are typically 65% rather than the normal full load operation during daytime periods with mixed wood and RDF combustion. The average in-stack NO_2/NOx ratio calculated for the entire data set was 0.027 with a standard deviation of 0.017, and the in-stack NO_2/NOx ratio calculated for wood-fired data periods was 0.017 with a standard deviation of 0.007."

Based on the We Energies' analysis and the literature review, for both the biomass boiler as well as all other combustion sources modeled, the in-stack NO_2/NOx ratios presented in Table 1 are appropriate and consistent with other guidance for other similar sources.

For the NO_2/NOx ambient equilibrium ratio (NO2EQUIL), a value of 0.9 will be used in the modeling runs, which was determined to be appropriate for this modeling scenario consistent with the AERMOD default setting of 0.90 (90%). The Tier 2 (ARM) approach in Appendix W recommends the use of an NO_2/NOx ambient equilibrium ratio of 75 percent (0.75) on an annual basis and the EPA March 1, 2011 memorandum indicated that an NO_2/NOx ambient equilibrium ratio of 80 percent (0.80) is appropriate on an hourly basis. Because EPA does not specifically state in the March 1, 2011 memorandum that the use of an NO_2/NOx ambient equilibrium ratio of 80 percent (0.80) is appropriate on an hourly basis when PVMRM is used, the AERMOD default value of 90 percent (0.90) is assumed to be more appropriate for Tier 3 based on the following discussion.

To understand the importance of the NO_2/NOx ambient equilibrium ratio and how it works, the actual monitoring data at Peck monitoring station located in the city of Wichita, Kansas was reviewed. An example of the NO_2/NOx ambient equilibrium ratio is presented in Figure 1. In Figure 1, 48 hours of the ambient monitoring data, ozone, NO_2 and NOx, are plotted together with the corresponding NO_2/NOx ratios. As depicted in the figure, the monitored values of ozone and NO_2 change as NO is converted to NO_2. During the day, ozone is being produced; and at night, ozone is consumed in the NO to NO_2 reaction.

Figure 2 depicts the NO_2/NOx ambient equilibrium ratios for the years 2000 to 2009 when the NO_2 concentrations are 0.005 ppm or higher. As illustrated in Figure 2, many of the NO_2/NOx ambient equilibrium ratios are above 0.75.

Figure 1
NO_2/NOx Ambient Equilibrium Ratio Example

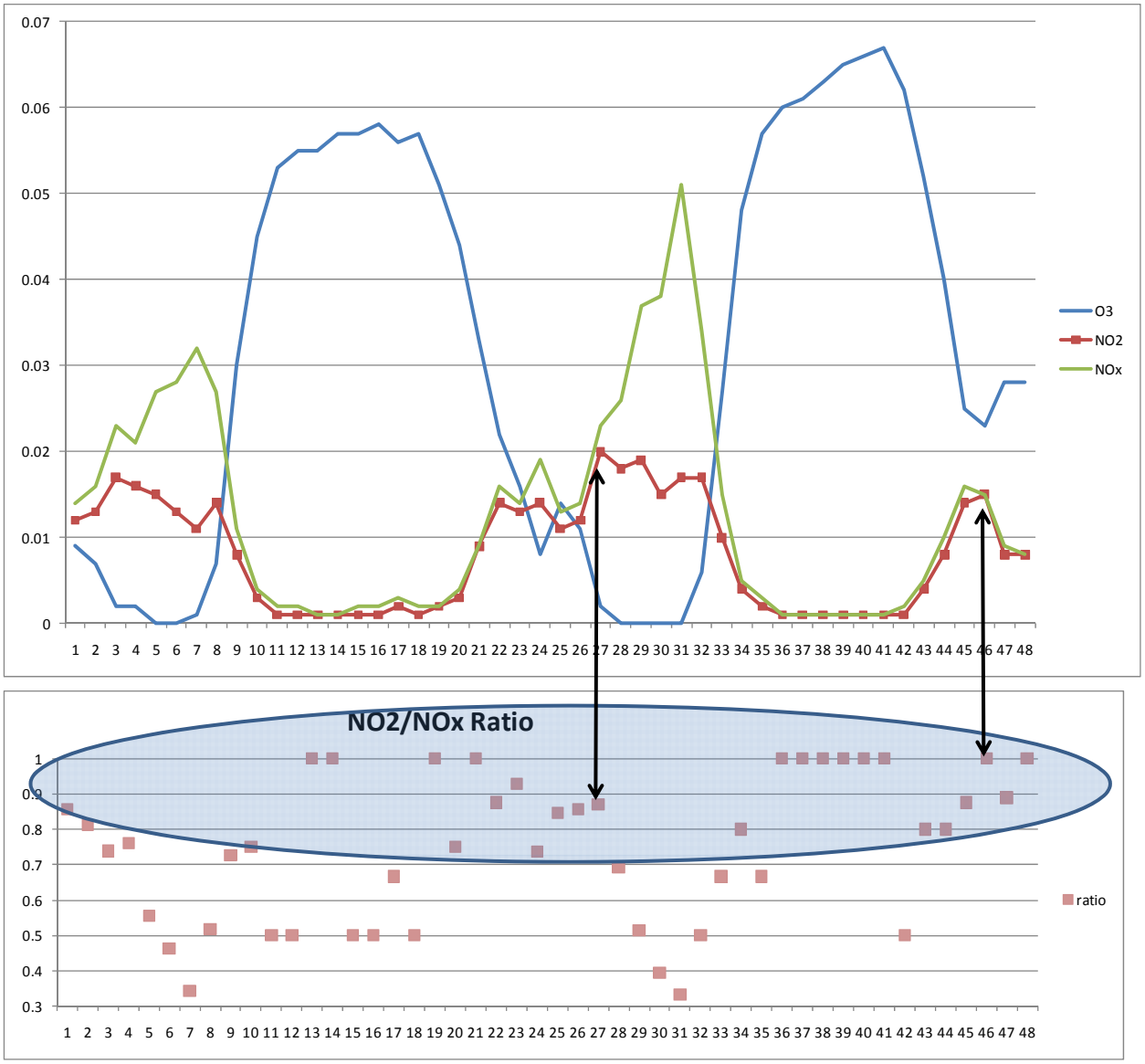
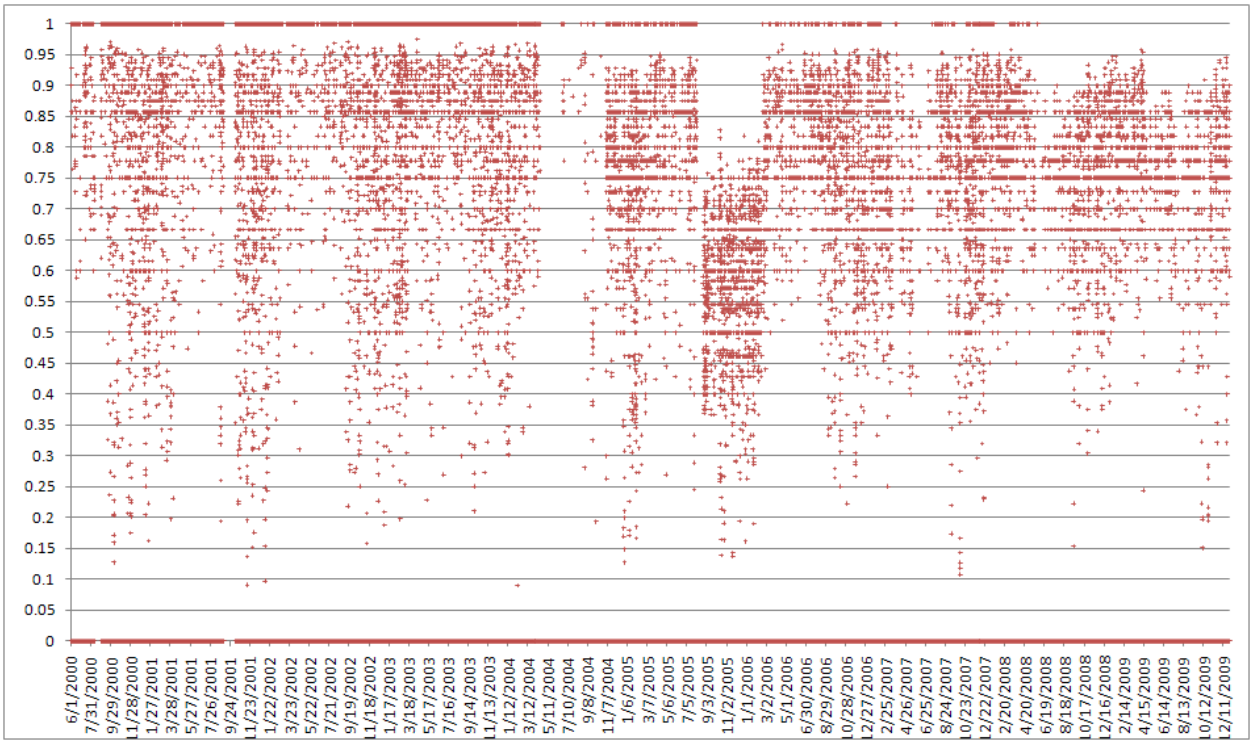


Figure 2
NO_2/NOx Ambient Equilibrium Ratios for Peck Monitoring Station, Years 2000 to 2009



The monitoring data indicates that the NO_2/NOx ambient equilibrium ratios routinely go above 0.80, thus the default 0.9 equilibrium ratio will be used in AERMOD when evaluating the 1-hour NO_2 NAAQS.

<u>Section 3.2.2 (e)(v)</u>
Finally for item (v), the alternative modeling techniques demonstration requires that the methods and procedures to be followed have been established. A modeling protocol detailing the methods and procedures to be followed was prepared and submitted concurrent with this letter.

Sincerely,

WLA CONSULTING, INC.

Stephanie Salter

Stephanie E. Salter, P.E.

Stephanie Salter

From: Sergio Guerra [SGuerra@kdheks.gov]
Sent: Friday, May 06, 2011 4:26 PM
To: Stephanie Salter; Robert.Wildgen@bioenergy.abengoa.com; Joseph.Birschbach@bioenergy.abengoa.com
Cc: Terry Tavener; Marian Massoth; Mindy Bowman; Daye.Richard@epamail.epa.gov; Tom Gross; BAR ImageNow
Subject: FW: Abengoa Modeling Protocol - 1890231

May 6, 2011

Source ID No. 1890231

Ms. Stephanie Salter, P.E.
Environmental Project Manager
WLA Consulting, Inc.
1640 "L" Street, Suite D
Lincoln, NE 68508-2581

RE: Air Quality Modeling Protocol submitted April 26, 2011 for Abengoa Bioenergy Hybrid of Kansas, Hugoton, Kansas

Dear Ms. Salter:

KDHE has reviewed the modeling protocol submitted on behalf of Abengoa Bioenergy Hybrid of Kansas on April 26, 2011. The protocol was also forwarded to modeling staff at the Environmental Protection Agency in Region 7 (EPA Region 7). EPA comments are attached. KDHE comments are as follows:

- Modeling Programs: Please use the following modeling software released by EPA:
  AERMOD Version 11103
  AERMAP Version 11103
  AERMET Version 11059
  AERMINUTE Version 11059
- KDHE requests that proper justification and demonstrations be provided if using a parallel version of AERMOD.
- Modeling Protocol cover letter, p. 2: "*ABBK requests from KDHE, processed and EPA approved meteorological data files for the most recent five years*." KDHE will provide the requested data, with a copy to EPA. We encourage ABBK to separately verify these meteorological data files. If EPA comments on the meteorological data, we will forward this information to you.
- Page 11: Please verify that ambient temperatures are assigned when entering a "0.0 Fahrenheit" value for stack temperatures when using your 3rd party AERMOD vendor since this is not the usual way the AERMOD executable works.
- Page 16: Volume and Area No. 5 statement read as follows:
  "The release height of the volume will be equal to twice the plume height, rounded to the nearest meter."
  This statement is not correct. The release height should be half of the top of plume height as specified in the draft "Haul Road Workgroup Recommendations- February 9, 2011" sent by KDHE on April 21, 2011. Please follow this guidance since any other undocumented deviations from it will have to be remodeled and will inevitably delay the review process.
- Page 18: Annual PM10/PM2.5 emissions should be modeled according to each haul road scenario.
- Page 19: Emergency equipment may be excluded from the short term (1-hour) modeling demonstrations after showing enough evidence that these equipment qualifies as an intermittent source. Other averaging periods shall include emergency equipment accordingly.

- Page 20: The previous submittal included modeling at 25%, 33%, 75% and 100% loads for the boiler. Boiler emissions at these different loads shall be included in the modeling demonstrations. For the 1-hour NO2 and SO2 modeling runs, the start-up and shutdown (S&S) emissions from the boiler may be excluded once sufficient justification is received and approved by KDHE. Justification must include at the very least the expected number of S&S episodes and their duration.
- Page 22: The receptor grids should follow those recommended in the recent SO2 guidance: i.e., 50 meter spacing from fence line to 1 kilometer (km), then 100 meter spacing to 2 km, then 250 meter spacing to 10 km and 500 meter spacing beyond 10 km.

Distance From Facility Boundary (meters)	**Receptor Spacing (meters)**
Fenceline to 1000	50
1,000 to 2,000	100
2,000 to 10,000	250
> 10,000	500

- Page 24 & Appendix A: PVMRM. The ozone data from Cedar Bluff must have missing data filled with a missing flag (999) instead of zeros ("0"). Valid ozone readings of zero should be retained and not set to a background value. NO2/NOx in-stack ratios must be source specific and justified. An NO2EQUIL value of 0.9 must be used with PVMRM.
- Page 28: Please include any nearby sources from Texas as applicable to each radius of impact.
- Page 29: A PM2.5 emission rate of 0.1613 g/s shall be used for source SEA10305 (Food pelletizer). This emission factor was corrected in a previous email dated January 21, 2011.
- Page 29: Background concentrations are currently being reviewed. Any updates on these concentrations will be provided by next week.
- Page 29: Ozone data. Substitute data should be used for missing ozone hours. Interpolation could be used if only a few hours are missing. If an ozone reading of zero is valid, it should not be substituted.
- If an NO2 background pairing methodology is to be used, it needs to be described in more detail and it should match the latest OAQPS guidance. This also applies to SO2 hourly pairing as well.
- Page 31: SILs. KDHE interim SILs include 10 ug/m^3 for 1-hour NO2 and SO2. For PM2.5 the interim SILs are 1 ug/m^3 and 5 ug/m^3 for the annual and 24-hour averaging periods respectively. Abengoa may choose to use lower (more conservative) SILs than those present in Kansas.
- Page 32: Section 4.2.1 NAAQS: Please use the following for comparison to the NAAQS:
  1-hr NO2 = 188.7ug/m^3
  1-hr SO2 = 196 ug/m^3

Please include the source ID number listed above in all communications with KDHE in reference to this facility. If you have any questions or need any additional information, please contact me at (785) 296-296-0365, or Mindy Bowman at (785) 296-6421.

Sincerely,

Sergio Guerra

Sergio Guerra
Email : sguerra@kdheks.gov
Work #: 785-296-0365

-----Original Message-----
From: Daye.Richard@epamail.epa.gov [mailto:Daye.Richard@epamail.epa.gov]
Sent: Thursday, May 05, 2011 5:47 PM

To: Mindy Bowman; Sergio Guerra; Smith.Marka@epamail.epa.gov; Scott.PatriciaA@epa.gov
Cc: knodel.jon@epa.gov; burns.ward@epa.gov; jay.michael@epa.gov; hawkins.andy@epa.gov
Subject: Abengoa Modeling Protocol - 1890231

Abengoa's 2011 Updated Facility Design Ambient Air Dispersion Modeling Protocol for Prevention of Significant Deterioration Air Quality Construction Permit Application Source ID No. 1890231, April 2011

Some changes need to be made before the protocol can be approved. The major concerns are the haul roads characterizations and the receptor grid. My comments are:

As the protocol states, the latest version of AERMOD (11103) programs will be used. However, additional justification/demonstration will be required if the consultants use a parallel version of the AERMOD.

Page 5: We suggest that the Federal Land Managers be made aware of a project.

Page 9: It should be explained how secondary particulates will be accounted for.

Page 11: AERMOD calculations are in metric units. The conversion of "0.0 Fahrenheit" to degrees Kelvin will not give the desired result that the stack temperatures are at ambient temperature. (I don't know if Trinity's program automatically converts "0.0 Fahrenheit" to 0.0o K. A negative number indicates the number of degrees above ambient).

Page 15 & 18: The number of trucks per hour for each scenario must be specified and in the permit. Each scenario must be modeled. The emissions are based on the number of vehicles.

Page 16: Volume and Area No. 5 statements are not correct. The release height should be half the top of plume height instead of twice the top of the plume height.
Page 17: There is not enough information to determine if the silos should be treated as separate elevated sources or as adjacent sources

Page 18: Each scenario should be modeled when calculating the annual concentrations.

Page 19: Emergency equipment should be modeled as a separate source group using MAXDCONT. Abengoa can subtract out this contribution for purposes of hourly standard if needed.

Page 20: Additional justification is required for not modeling reduced loads.

Page 20: The expected number of start-up and shutdown and their durations should be included in the protocol for evaluation before we could exclude these. This 1-hour exclusion guidance would probably not necessarily apply to other averaging periods.

Page 21: The latest meteorological data should be used (2006-2010) as well as the year that was previously modeled that determined the

critical concentrations.

Page 22: The receptor grids should follow those recommended in the SO2 guidance, i.e., 50 meter spacing from fence line to 1 Kilometer (KM), then 100 meter spacing to 2 KM, then 250 meter spacing to 10 KM meters and 500 meter spacing beyond 10 KM.

Page 24 & Appendix A: PVMRM AERMOD Version 11103 must be used. The ozone data from Cedar Bluff must have missing data filled with a missing flag (999) not zero's. Valid ozone readings of zero should be retained and not set to a background value. NO2/NOx in-stack ratios must be source specific and justified. An NO2EQUIL value of 0.9 must be used with PVMRM. There should be no omitted days in the meteorological data as this gives erroneous results when using the MAXDCONT option. Missing periods should have a missing flag.

Page 26: EPA requests a post construction stack test of the in-stack NO2/NOx ratio for the biomass fired boiler. In the prior analysis the company never answered how fuel variability with nitrogen content would impact the ratios as well as how control equipment could impact the ratios. The reference that the company is using is for wood firing only. Should the stack test show a higher ratio (i.e. a higher NO2 rate) they will have to demonstrate via modeling the NAAQS is protected.

Page 28: The “10D” Method for screening has not been approved for use in Region 7 and should not be used.

Page 29: Additional justification/demonstration is needed to show why the background concentrations are representative.

Page 32: Substitute data should be used for missing ozone hours. Interpolation could be used if only a few hours are missing. If a ozone reading of zero is valid, it should not be substituted. The NO2 background pairing methodology needs to be better described and it should match the latest OAQPS guidance. (This would also apply to SO2 hourly pairing).

Page 33: Commercial, Residential and Industrial Growth should be included – can use EIS information.

Page 33: The effects on vegetation and soils should be included.

Richard L. Daye
Regional Meteorologist
Environmental Protection Agency Region VII
AWMD/APDB/ATPS
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daye.richard@epa.gov

Stephanie Salter

From: Mindy Bowman [mbowman@kdheks.gov]
Sent: Friday, May 13, 2011 1:20 PM
To: Stephanie Salter
Cc: Sergio Guerra; Marian Massoth
Subject: Secondary Particulate Language KDHE has used in previously
Attachments: 00 0550023 C-8849 SIL with comments added for Abengoa.pdf

Stephanie,

You asked for some help responding to Mick's comment about secondary particulate when you update the protocol. I am attaching the SIL document that we used for another facility. I used Adobe's highlighter and a couple of sticky notes to point you in the right direction. The key to our approach for that facility was EPA's March 23, 2010 memo, which basically says that their approach is a screening approach and is conservative to compensate for things like PM2.5 secondary formation. We used the conservative screening approach outlined in that memo, and that's why we did not separately consider secondary particulate. I hope this helps.

Mindy

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT
Division of Environment
Bureau of Air and Radiation

MEMORANDUM

Date: July 9, 2010; Revised September 22, 2010

To: File, C-8849, Source ID 0550023

From: Mindy Bowman MB
Sergio Guerra SG

Subject: Sunflower Electric Power Corporation Modeling Significant Impact Levels

Purpose

To establish interim Significant Impact Levels (SIL) to be used in modeling for the 1-hour NO_2 National Ambient Air Quality Standard (NAAQS), 1- hour SO_2 NAAQS, annual $PM_{2.5}$ NAAQS, and 24-hour $PM_{2.5}$ NAAQS.

Background

Sunflower Electric Power Corporation (Sunflower) submitted a prevention of significant deterioration (PSD) construction permit application for construction of an 895 megawatt (MW) nominal capacity coal fired generating unit, including one steam generator (H2), one companion cooling tower, one auxiliary boiler, one emergency diesel power generator, one diesel fire pump booster pump and associated coal, lime, powdered activated carbon, and waste powder handling equipment, at the existing Holcomb 1 generating unit site. This PSD permit application requires the facility to conduct a dispersion modeling analysis.

The dispersion modeling analysis for a PSD project (proposed or modified source) typically involves two distinct phases. The first phase is the preliminary analysis, or significant impact analysis, which determines if the applicant can forego further air quality analysis for a particular pollutant with respect to the NAAQS and PSD increments. The second phase is the cumulative analysis for the NAAQS and applicable PSD increments. This analysis involves a multi- source comprehensive assessment of air quality impacts.

Significant Impact Levels (SILs) are numeric values normally derived and published by the U.S. Environmental Protection Agency (EPA), and adopted in state regulations. SILs play an important role in the dispersion modeling methodology for PSD projects. SILs are used to evaluate the impact of a proposed major source or modification on the NAAQS or PSD increment. The EPA and KDHE consider a source whose individual impact falls below a SIL to have a *de minimis*[1] impact on air quality concentrations. Consequently, SILs are used in the preliminary phase and are an inherent part of the modeling analysis to determine if the applicant of a PSD project that wishes to locate in an attainment or unclassifiable area must conduct a cumulative analysis. If the cumulative analysis results in modeled violations of the NAAQS, then the applicant must perform a "significant contribution" determination based on a comparison of the modeled impacts from the proposed project emissions to the appropriate SIL value. SILs are used in significant contribution determinations to demonstrate that a proposed project will not cause or contribute to a violation of the NAAQS or PSD increments in the area.

- Preliminary Analysis

  If the modeled ambient impacts from a proposed project are less than the respective SIL, then no further cumulative analysis is required. The EPA and KDHE consider this to be a sufficient demonstration that a project does not cause or contribute to a violation of the NAAQS or PSD increment.

- Cumulative Analysis

  If the modeled ambient impacts from a proposed project are equal to or greater than the respective SIL, then the source must conduct the second phase of modeling. The preliminary air quality analysis uses the SIL to define the extent of the Significant Impact Area (SIA). The SIA is a circular area with a radius that extends from the source to the most distant point where the model predicts concentrations equal to or greater than the SIL. The cumulative modeling analysis includes the facility's total emissions along with emissions from other nearby sources (within SIA + 50 km), and combines impacts with representative ambient monitored background concentrations to estimate if a NAAQS or PSD increment will be violated. If modeling results indicate that the NAAQS or PSD increment will be violated, and the source's contribution exceeds the SIL at the violation site, the source is determined to "cause or contribute to" that violation and must mitigate its contribution accordingly.

Rationale for Development of Interim SILs

EPA has not published final SILs for 1-hour NO_2 NAAQS, 1-hour SO_2 NAAQS, 24-hour $PM_{2.5}$ NAAQS, or annual $PM_{2.5}$ NAAQS, although they are an inherent part of the

[1] The concept of SILs is grounded on the principle of *de minimis* described in Alabama Power Co. v. Costle, 636 F.2d 323, 360 (D.C. Cir. 1980) where it is stated that "there is likely a basis for an implication of *de minimis* authority to provide exemption when burdens of regulation yield a gain of trivial or no value."

modeling analysis. Without a SIL, permit applicants would be obligated to perform a cumulative analysis in essentially all instances. Also, where exceedances of NAAQS standards are modeled, a SIL is needed to determine whether a proposed source causes or contributes to the modeled exceedance. Therefore, KDHE, along with other state permitting agencies, has developed interim SILs to address this need[2,3]. In the past, EPA has not precluded states from adopting interim *de minimis* impact levels to determine whether a cumulative impact analysis will be necessary, provided that states prepare an appropriate record to support the value used[4].

NO_2 1-hour Interim SIL

On February 9, 2010, the EPA published a new 1-hour nitrogen dioxide (NO_2) NAAQS of 100 ppb (approximately 188 $\mu g/m^3$), effective on April 12, 2010. EPA has stated that any permit issued for a new major source or modification subject to the PSD program must demonstrate that allowable emissions will not cause or contribute to a violation of the 1-hour NO_2 NAAQS if issued after the effective date.

KDHE has established an interim 1-hour NO_2 SIL of 10 $\mu g/m^3$ to be valid until an EPA-promulgated SIL is effective and adopted in Kansas air quality regulations. The interim 1-hour NO_2 SIL is based on the 1-hour carbon monoxide (CO) SIL. It is the only criteria pollutant with an EPA-promulgated 1-hour NAAQS and SIL. The same ratio of the 1-hour CO SIL to the 1-hour CO NAAQS is used to determine the NO_2 SIL: (2000 $\mu g/m^3$ / 40,000 $\mu g/m^3$) x 188 $\mu g/m^3$ = 10 $\mu g/m^3$ (rounded up from 9.4 $\mu g/m^3$). This interim SIL is also the recommended interim SIL from the Northeast States for Coordinated Air Use Management (NESCAUM) Permit Modeling Committee[3]. We derived this interim 1-hour NO_2 SIL by using an impact equal to approximately 5% of the 1-hour NO_2 NAAQS. We have chosen this approach because we believe it is reasonable to base the interim 1-hour NO_2 SIL directly on consideration of impacts relative to the 1-hour NAAQS.

An analysis demonstrating a contribution of 10 $\mu g/m^3$ or less from the proposed project ensures protection of the NAAQS of approximately 188 $\mu g/m^3$ for 1-hour NO_2.

Form of the 1-hour NO_2 Interim SIL

Applicants should compare the interim SIL to the results from the preliminary modeling analysis. To do this, the applicant should determine the maximum 1-hour impact each day at each receptor for each modeled year. This method will yield 365 (366 days for a leap year) daily 1-hour concentration values for each receptor. This process shall be repeated in each of the five years for National Weather Service (NWS) meteorological data or for one year for site-specific meteorological data. If the high first high (H1H)

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[2] *NESCAUM Technical Guidance on Significant Impact Levels (SILs) for PM2.5*, dated December 8, 2006; included as Attachment 1.

[3] *NESCAUM Recommendations on the Use of an Interim Significant Impact Level (SIL) in Modeling the 1-Hour NO2 NAAQS*, dated April 21, 2010; included as Attachment 2.

[4] Stephen Page memo *Modeling Procedures for Demonstrating Compliance with the PM2.5 NAAQS*, dated March 23, 2010; included as Attachment 3.

daily 1-hour maximum concentration is less than the SIL, then no additional analysis is required.

If the H1H concentration exceeds the SIL at any receptor, a cumulative analysis is required. To do this, the applicant should determine the maximum 1-hour impact each day at each receptor for each modeled year. This method will yield 365 (366 days for a leap year) daily 1-hour concentration values for each receptor. This process shall be repeated in each of the five years for NWS meteorological data or for one year for site-specific meteorological data. These values shall be ranked and the eighth highest value ascertained for each year for each receptor. The high eighth high (H8H) daily maximum 1-hour concentration is representative of the 98th percentile of the annual distribution of the daily 1-hour maximum concentrations. Each consecutive three-year block shall be grouped together, and the concentrations at each individual receptor averaged over the three year period. The highest of the three year average H8H concentrations across all receptors represents the modeled 1-hour NO_2 design value. The modeled concentrations shall then be added to the monitored background concentration and compared to the NAAQS. If the NAAQS is exceeded, a new project has a significant contribution to a modeled NAAQS exceedance if its contribution exceeds the SIL at that receptor, day, and time, and must mitigate accordingly. If using site-specific meteorological data, the H8H modeled 1-hour maximum NO_2 concentration for one year of site-specific meteorological data should be used instead.

<u>SO_2 1-hour Interim SIL</u>

On June 22, 2010, the EPA published in the Federal Register a new 1-hour sulfur dioxide (SO_2) NAAQS of 75 ppb (approximately 196 $\mu g/m^3$), effective August 23, 2010. EPA has stated that any permit issued for a new major source or modification subject to the PSD program must demonstrate that allowable emissions will not cause or contribute to a violation of the 1-hr SO_2 NAAQS if issued after the effective date.

KDHE has established an interim 1-hour SO_2 SIL of 10 $\mu g/m^3$ to be valid until an EPA promulgated SIL is effective and adopted in Kansas air quality regulations. The interim 1-hour SO_2 SIL is based on the 1-hour carbon monoxide (CO) SIL, currently, the only other criteria pollutant with EPA-promulgated 1-hour NAAQS. The same ratio of the 1-hour CO SIL to the 1-hour CO NAAQS is used to determine the SO_2 SIL: (2000 $\mu g/m^3$ / 40,000 $\mu g/m^3$) x 196 $\mu g/m^3$ = 10 $\mu g/m^3$ (rounded up from 9.8 $\mu g/m^3$). This interim SIL was determined using the same calculation methodology as the 1-hour NO_2 recommended interim SIL from the NESCAUM Permit Modeling Committee[3]. We derived this interim 1-hour SO_2 SIL by using an impact equal to approximately 5% of the 1-hour SO_2 NAAQS. We have chosen this approach because we believe it is reasonable to base the interim 1-hour SO_2 SIL directly on consideration of impacts relative to the 1-hour NAAQS.

An analysis demonstrating a contribution of 10 $\mu g/m^3$ or less from the proposed project ensures protection of the NAAQS of approximately 196 $\mu g/m^3$ for 1-hour SO_2.

Form of 1-hour SO_2 Interim SIL

Applicants should compare the interim SIL to the results from the preliminary modeling analysis. To do this, the applicant should determine the maximum 1-hour impact each day at each receptor for each modeled year. This method will yield 365 (366 days for a leap year) daily 1-hour concentration values for each receptor. This process shall be repeated in each of the five years for NWS meteorological data or for one year for site-specific meteorological data. If the H1H daily 1-hour maximum concentration is less than the SIL, then no additional analysis is required.

If the H1H concentration exceeds the SIL at any receptor, a cumulative analysis is required. To do this, the applicant should determine the maximum 1-hour impact each day at each receptor for each modeled year. This method will yield 365 (366 days for a leap year) daily 1-hour concentration values for each receptor. This process shall be repeated in each of the five years for National Weather Service (NWS) meteorological data or for one year for site-specific meteorological data. These values shall be ranked and the fourth highest value ascertained for each year for each receptor. The high fourth high (H4H) daily maximum 1-hour concentration is representative of the 99th percentile of the annual distribution of the daily 1-hour maximum concentrations. Each consecutive three-year block shall be grouped together, and the concentrations at each individual receptor averaged over the three year period. The highest of the three year average H4H concentrations across all receptors represents the modeled 1-hour SO_2 design value. The modeled concentrations shall then be added to the monitored background concentration and compared to the NAAQS. If the NAAQS is exceeded, a new project has a significant contribution to a modeled NAAQS exceedance if its contribution exceeds the SIL at that receptor, day, and time, and must mitigate accordingly. If using site-specific meteorological data, the H4H modeled 1-hour maximum SO_2 concentration for one year of site-specific meteorological data represents the modeled 1-hour design value and should be used instead.

$PM_{2.5}$ Annual and 24-hour Interim SILs

On July 18, 1997, EPA revised the NAAQS for particulate matter to add new annual and 24-hour standards for fine particles using $PM_{2.5}$ as the indicator. The 24-hour $PM_{2.5}$ standard was revised by EPA on September 21, 2006, reducing the standard from 65 $\mu g/m^3$ to 35 $\mu g/m^3$. EPA also retained the previous 1997 annual standard of 15 $\mu g/m^3$ while revoking the annual PM_{10} standard. On September 21, 2007 the EPA proposed a rule to establish PSD increments, SILs, and a Significant Monitoring Concentration (SMC) for $PM_{2.5}$. This proposed rule included three options for the 24-hour and annual $PM_{2.5}$ SILs. To date, EPA has not finalized 24-hour and annual $PM_{2.5}$ SILs.

KDHE has established interim 24-hour and annual $PM_{2.5}$ SILs of 5 $\mu g/m^3$ and 1 $\mu g/m^3$ respectively. These SILs are to be valid until EPA promulgated SILs are effective and adopted in Kansas air quality regulations. The interim SILs are based on the original SIL values in the 1996 NSR Reform proposal for PM_{10}, and are interpreted as representing

the minimum amount of ambient impact that is significant. These $PM_{2.5}$ SILs are equivalent to those suggested in option 1 from the proposed rule of 2007.

An analysis demonstrating a contribution of 5 $\mu g/m^3$ and 1 $\mu g/m^3$ or less from the proposed project ensures protection of the NAAQS of approximately 35 $\mu g/m^3$ and 15 $\mu g/m^3$ for 24-hour and annual $PM_{2.5}$, respectively.

Form of 24-hour $PM_{2.5}$ Interim SIL

The EPA memorandum signed on March 23, 2010[4], indicates that, "…due to potentially significant contribution from secondary formation of $PM_{2.5}$, and the more prominent role of monitored background concentrations of $PM_{2.5}$ in the cumulative analysis…", the methodology of utilizing the high eighth high may not be appropriate for demonstrating compliance with the 24-hour $PM_{2.5}$ NAAQS. EPA recommends instead that the high first high value be utilized to demonstrate compliance with the $PM_{2.5}$ NAAQS. Using the average of the highest values across the years modeled preserves one aspect of the form of the NAAQS, while using the average of the first highest 24-hour averages rather than the 98th percentile (8th highest) values from the distribution is consistent with the screening level nature of the analysis.

Applicants should compare the interim SIL to the results from the preliminary modeling analysis. To do this, the applicant should determine the maximum 24-hour impact at each receptor for each modeled year. This method will yield 365 (366 days for a leap year) 24-hour concentration values for each receptor. This process shall be repeated in each of the five years for NWS meteorological data or for one year for site-specific meteorological data.

The highest of the maximum modeled 24-hour averages across 5 years represents the modeled 24-hour $PM_{2.5}$ concentration. This value should be compared to the interim 24-hour $PM_{2.5}$ SIL to determine whether a cumulative impact analysis is necessary. If using site-specific meteorological data, the highest modeled 24-hour $PM_{2.5}$ concentration for one year of site-specific meteorological data represents the modeled 24-hour design value and should be used instead.

If the maximum 24-hour concentration exceeds the SIL at any receptor, a cumulative analysis is required. To do this, the applicant should determine the maximum 24-hour impact at each receptor for each modeled year. This process shall be repeated in each of the five years for NWS meteorological data or for one year for site-specific meteorological data. These modeled concentrations shall then be added to the monitored background concentration and compared to the NAAQS. If the NAAQS is exceeded, a new project has a significant contribution to a modeled NAAQS exceedance if its contribution exceeds the SIL at that receptor and day and must mitigate accordingly. If using site-specific meteorological data, the maximum 24-hour $PM_{2.5}$ concentration for one year of site-specific meteorological data should be used instead.

Form of Annual $PM_{2.5}$ Interim SIL

Applicants should compare the interim SIL to the results from the preliminary modeling analysis. To do this, the applicant should determine the annual average impact at each receptor for each modeled year. This process shall be repeated in each of the five years for NWS meteorological data or one year for site-specific meteorological data.

The highest of the five annual average concentrations across all receptors should be compared to the interim annual $PM_{2.5}$ SIL to determine whether a cumulative impact analysis is necessary. If using site-specific meteorological data, the highest modeled annual $PM_{2.5}$ concentration for one year of site-specific meteorological data should be used instead.

If the highest of the five annual average concentrations across all receptors exceeds the SIL at any receptor, a cumulative analysis is required. To do this, the applicant should determine the annual average impact at each receptor for each modeled year. This process shall be repeated in each of the five years for NWS meteorological data or one year for site-specific meteorological data. These modeled concentrations shall then be added to the monitored background concentration and the highest of the five year average concentrations across all receptors shall be compared to the NAAQS. If the NAAQS is exceeded, a new project has a significant contribution to a modeled NAAQS exceedance if its contribution exceeds the SIL at that receptor and must mitigate accordingly. If using site-specific meteorological data, the highest modeled annual $PM_{2.5}$ concentration for one year of site-specific meteorological data represents the modeled 1-hour design value and should be used instead.

Summary

Until such time that EPA promulgates SILs for 1-Hour NO_2, 1-Hour SO_2, Annual $PM_{2.5}$ and 24-Hour $PM_{2.5}$, KDHE has developed the following interim SILs for the Sunflower Electric Power Corporation PSD construction permit application at Holcomb, Kansas:

- 1-Hour NO_2 = 10 ug/m^3
- 1-Hour SO_2 = 10 ug/m^3
- Annual $PM_{2.5}$ = 1 ug/m^3
- 24-Hour $PM_{2.5}$ = 5 ug/m^3

These interim SILs were developed to facilitate the air quality modeling review of the PSD permit application, in the absence of EPA promulgated SILs for these pollutants. Technical guidance from EPA and NESCAUM was reviewed prior to establishing interim SILs which will ensure protection of the NAAQS. Other SILs and forms of the SIL may be used if approved by KDHE.

Attachment 1

NESCAUM Technical Guidance on Significant Impact Levels (SILs) for $PM_{2.5}$

Background and Importance of SILs

On January 16, 2006 the NESCAUM states commented on the EPA November 1, 2005 Proposed Rule for the implementation of the $PM_{2.5}$ standards, urging EPA to adopt $PM_{2.5}$ Significant Impact Levels (SILs) and PSD increments for $PM_{2.5}$ emissions. SILs currently exist for PM_{10}, CO, SO_2 and NO_2 and if the maximum modeled ambient impacts from a proposed project are less than the respective SIL, the source:

- Is presumed to not cause or significantly contribute to a PSD increment or NAAQS violation, and
- Is not required to perform multiple source cumulative impact assessments.

Without $PM_{2.5}$ SIL levels, applicants would be required to perform a cumulative modeling analysis in essentially all instances – an analysis which could be unnecessarily resource consuming, especially given the limited information on $PM_{2.5}$ emissions. Although EPA recognizes that SILs are important in implementing both attainment and nonattainment NSR requirements and assist both regulatory agencies and applicants in streamlining the permit review process, it has indicated that the final $PM_{2.5}$ NSR rule will not be out until the end of 2006, at the earliest.[1]

In the interim, the current EPA guidance on $PM_{2.5}$ NSR in attainment and nonattainment areas is contained in the April 5, 2005 memo from Steve Page, Office of Air Quality Planning and Standards Director. This memo outlines the requirements of the Clean Air Act, Section 172(c)(5) specifically for the permitting of major sources in non-attainment areas and it also re-affirms a 1997 Seitz memo for attainment areas which, in essence, continues the use of PM10 requirements for PSD sources. The Page memo states that until the $PM_{2.5}$ Implementation Rule is finalized, States should use their PM_{10} nonattainment NSR program as a surrogate or Appendix S of 40 CFR Part 51 to address $PM_{2.5}$ nonattainment NSR for major sources. In almost all cases, the NESCAUM States or their respective EPA regional offices will need to apply Appendix S to $PM_{2.5}$ major source until EPA finalizes the $PM_{2.5}$ Implementation Rule or possibly until EPA approves changes to the States' SIP programs.

One of the requirements of Appendix S is that a source either in or adjacent to a non-attainment area must demonstrate that it does not contribute to the non-attainment status or create a new projected $PM_{2.5}$ non-attainment area. Thus, the use of $PM_{2.5}$ SILs would make the NSR process more straightforward and, therefore, their use is advantageous to both State agencies and applicants.

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1 The situation is similar to the issue of SILs for criteria pollutants in Class I areas which were proposed by EPA in a July 23, 1996 Federal Register Notice, but were never finalized. The NESCAUM Modeling Committee "adopted" the proposed levels, which have been applied in permit actions and accepted by both EPA and the Federal Land Managers. (NESCAUM states have recommended that EPA finalize these SILs in the same action as the $PM_{2.5}$ SIL action).

Development and Consequences of $PM_{2.5}$ SILs.

The NESCAUM Modeling Committee had previously developed and recommended $PM_{2.5}$ SIL levels to EPA in our 1/16/06 comments on the proposed Implementation Rule. The attached table summarizes these values and their derivations (in the last row), as well as presents corresponding SILs for the other pollutants. It is noted that our recommendations used two alternative schemes (the "ratio" and "4% of standards" methods) which have been used previously by EPA to develop SILs and both these methods lead to similar values for the Class I and Class II $PM_{2.5}$ SILs. In addition, corresponding PSD $PM_{2.5}$ increments have been calculated using the ratio method and are included in the Table.

In order to determine the consequences of these proposed SILs, the Modeling Committee has undertaken a review of recent modeling projects in several states and has identified the likely implications of adopting various SIL values. This review has demonstrated that in most instances the annual SIL of 0.3 ug/m^3 and in essentially all instances the 24 hour SIL of 2 μg/m^3 for Class II areas would be exceeded by these projects. This could result in significant numbers of facilities which might have to perform a cumulative $PM_{2.5}$ analysis. However, that determination will be left to the discretion of individual states.

NESCAUM Modeling Committee Policy on Regional SILs.

Given that EPA will not have SILs developed for $PM_{2.5}$ before the NSR final rule, it is important for the NESCAUM states to "adopt" interim values which can be used in the permitting process. These values are needed currently in at least one instance when a modeling assessment is required under the EPA regulations and policy: that is, for major sources of $PM_{2.5}$ (EPA had proposed a 100 tons/year emission rate for the definition of major) in a non-attainment area, there is a requirement to demonstrate a net air quality benefit under the Appendix S provisions of 40 CFR part 51.

The establishment of interim $PM_{2.5}$ SILs will also assist states and applicants in clarifying the instances where a source has a projected impact which might need to be further analyzed. The extent and complexity of any cumulative analysis conducted when the SIL is exceeded will be determined by individual States on a case-by-case basis and it will be left to the discretion of individual NESCAUM states to determine the permitting conditions under which the SILs will be used.

The NESCAUM Permit Modeling Committee therefore adopts the following Regional SILs in lieu of EPA defined $PM_{2.5}$ SILs: ***0.3 μg/m^3 and 2 μg/m^3 for the annual and 24-hour $PM_{2.5}$ levels in Class II areas and 0.06 and 0.13μg/m^3 for the annual and 24-hour $PM_{2.5}$ levels, respectively in Class I areas.*** Each NESCAUM State will have flexibility in determining under what conditions the SILs will benefit the streamlining of the permit review process or addressing concerns about total $PM_{2.5}$ concentrations, including representative background levels. States will also maintain flexibility to revise these SILs after states have an opportunity to assess the extent of nonattainment under the new 24-hour average $PM_{2.5}$ NAAQS (which would result in a Class II 24-hour average SIL of 1.2 ug/m3) or in response to any EPA recommended $PM_{2.5}$ SILs.

Attachment 2

April 21, 2010

NESCAUM Recommendations on the Use of an Interim Significant Impact Level (SIL) in Modeling the 1-Hour NO_2 NAAQS

Background and Importance of SILs

On February 9, 2010, the U.S. Environmental Protection Agency (EPA) published a new 1-hour nitrogen dioxide (NO_2) National Ambient Air Quality Standard (NAAQS) at a level of 100 ppb (approximately 188 $\mu g/m^3$). This new standard became effective on April 12, 2010, which means that permits issued under EPA's prevention of significant deterioration rules (40 CFR 52.21) on or after April 12, 2010, must contain a demonstration that allowable emissions from any new major stationary source or major modification will not cause or contribute to a violation of the new 1-hour NO_2 NAAQS (see EPA's Fact Sheet). EPA has not yet proposed a significant impact level (SIL) for the 1-hour NO_2 NAAQS, yet states are expected to begin implementing the standard immediately. It is EPA's policy to exempt sources from conducting comprehensive, multisource modeling if their estimated maximum ambient impacts for a given pollutant are less than the SIL.

Therefore, it is important for NESCAUM states to allow permit applicants to use an interim 1-hour NO_2 SIL in the permitting process. EPA-defined SILs currently exist for PM_{10}, CO, SO_2 and the annual NO_2 NAAQS. The NESCAUM Permit Modeling Committee previously developed and recommended interim SILs for the $PM_{2.5}$ NAAQS (see *NESCAUM Technical Guidance on Significant Impact Levels (SILs) for $PM_{2.5}$*, dated December 8, 2006; http://www.nescaum.org/topics/permit-modeling).

In practice, if the modeled ambient impacts from a proposed project are less than the respective SIL, the project:

- is presumed to not cause or significantly contribute to a PSD increment or NAAQS violation, and
- is not required to perform multiple source cumulative impact assessments.

Without a 1-hour NO_2 SIL, permit applicants would be obligated to perform a cumulative modeling analysis in essentially all instances – an analysis which may unnecessarily consume regulatory agency resources, especially given the large number of NO_2 major sources that are being proposed across the region. The use of an interim 1-hour NO_2 SIL would also make the NSR process more efficient without a detrimental effect on air quality. Therefore, its use is advantageous to both permit applicants and NESCAUM state agencies.

The recommendations for the use of 1-hour NO_2 SILs, below, were developed by the NESCAUM Permit Modeling Committee to assist permit applicants and states in preparing and reviewing air quality modeling analyses. The technical basis for these recommendations is provided in the Appendix.

Summary of NESCAUM Permit Modeling Committee Recommendations on Use of an Interim 1-hour NO_2 SIL

To facilitate air quality modeling reviews of permit applications and other modeling assessments, the NESCAUM Permit Modeling Committee recommends that the following 1-hour NO_2 SIL can be used by state air agencies until such time that EPA formally adopts a 1-hour NO_2 SIL:

1-hour NO_2 SIL = 10 $\mu g/m^3$, with a form based on:

- the highest five year average of modeled 1-hour maximum NO_2 concentrations predicted each year at a given receptor, if using five years of National Weather Service meteorological data; or

- the highest modeled 1-hour NO_2 concentration for one year of site-specific meteorological data.

Conversion of nitric oxide (NO) to nitrogen dioxide (NO_2) can be approximated with a three tiered screening system similar to the tiered procedures specified in Section 5.2.4 of EPA's Guideline on Air Quality Models:

- tier-1 assumes 100 percent conversion of NO to NO_2,
- tier-2 assumes a NO_2 to NOx (NO + NO_2) ratio of 75 percent, and
- tier-3 allows case-by-case use of a site specific ratio derived using techniques such as the Plume Volume Molar Ratio (PVMRM) or the Ozone Limiting Method (OLM).

The interim 1-hour NO_2 SIL is recommended for use by permit applicants and the states in the NESCAUM region to determine if a proposed source or modification is required to perform a multiple source cumulative impact assessment. The extent and complexity of any cumulative analysis conducted when the interim SIL is exceeded will be determined by individual states. The interim SIL can also be used at the discretion of individual NESCAUM states to determine if a source is causing or significantly contributing to a violation of the 1-hour NO_2 NAAQS.

Appendix

NESCAUM Recommendations on the Use of an Interim Significant Impact Level (SIL) in Modeling the 1-Hour NO_2 NAAQS

Basis for the Recommended Interim 1-Hour NO_2 SIL

The NESCAUM Permit Modeling Committee considered three issues when developing a recommendation for the 1-hour NO_2 SIL: (1) the value of the SIL, (2) the form of the SIL, and (3) the use of a default, or a tiered system of NO to NO_2 conversion rates.

1) Value of Interim 1-Hour NO_2 SIL

Option 1 – Use the existing annual NO_2 SIL (1 $\mu g/m^3$).

Option 2 – Use a value based on the ratio of the annual NO_2 SIL to the annual NO_2 NAAQS ((1 $\mu g/m^3$ / 100 $\mu g/m^3$) x 188 $\mu g/m^3$ = 1.9 $\mu g/m^3$).

Option 3 – Develop a value based on the only other criteria pollutant with a 1-hour NAAQS, carbon monoxide (CO), using the ratio of the 1-hour CO SIL to the 1-hour CO NAAQS ((2000 $\mu g/m^3$ / 40,000 $\mu g/m^3$) x 188 $\mu g/m^3$ = 10 $\mu g/m^3$ (rounded up from 9.4 $\mu g/m^3$)).

Option 4 – Use a value based on the EPA's draft July 23, 1996, NSR Reform proposal recommending 4% of the Class I increment as the Class I SIL, where the 4% value was based on EPA's definition of de minimis emission rates for NAAQS impact demonstration purposes (see 45 FR 52676, August 8, 1980). (188 $\mu g/m^3$ x 0.04 = 7.5 $\mu g/m^3$).

The spatial and temporal variations of short-term 1-hour impacts tend to be much more volatile than longer averaging times such as an annual average. In addition, the new 1-hour NO_2 NAAQS will be applied to hot spot type modeling near major roadways, not unlike the 1-hr CO NAAQS. A very low SIL will result in frequent multisource cumulative modeling for NO_2, a resource intensive activity that in many cases will have limited usefulness.

Recommendation: Option 3, Interim 1-Hour NO_2 SIL = 10 $\mu g/m^3$

2) Form of 1-Hour NO_2 Interim SIL

Option 1 – Use the highest modeled 1-hour NO_2 concentration using five years of NWS meteorological data or using one year of site-specific meteorological data. This form is similar to many of EPA's current SILs.

Option 2 – Use the highest modeled 1-hour NO_2 concentration predicted each year at a receptor, then average over five years if using NWS meteorological data; or use the highest modeled 1-hour NO_2 concentration for one year of site-specific data. This option is similar in form to the 24-hour $PM_{2.5}$ NAAQS, another permit modeled criteria pollutant with a probabilistic, not deterministic, NAAQS (see Stephen Page memo *Modeling Procedures for Demonstrating Compliance with the $PM_{2.5}$ NAAQS*, dated March 23, 2010;

http://www.epa.gov/scram001/Official%20Signed%20Modeling%20Proc%20for%20Demo%20Compli%20w%20PM2.5.pdf).

Option 3 –Use the highest of the modeled 8th highest daily maximum 1-hour average concentrations in a year predicted over five years. This option reflects the approximate form of the 1-hour NO_2 NAAQS (i.e., highest of the 98th percentile of the annual distribution of daily maximum 1-hour average concentrations predicted over five years).

Given the similarities in the form of the 1-hour NO_2 NAAQS with that of the 24-hour $PM_{2.5}$ NAAQS, it would seem likely that when a 1-hour NO_2 SIL is promulgated by EPA it will reflect the form of option 2.

Recommendation: Option 2: The form of the interim 1-hour NO_2 SIL would be the highest five year average of the modeled maximum 1-hour NO_2 concentrations each year at a receptor, if using five years of NWS meteorological data. For one year of site-specific meteorological data, it would be simply the highest modeled 1-hour NO_2 concentration.

3) NOx to NO_2 conversion rate

Option 1 – Assume 100 percent conversion of exhaust gas NO to NO_2.

Option 2 – A two tiered screening approach, where tier-1 assumes 100 percent NO to NO_2 conversion, and tier-2 assumes a NO_2 to NOx (NO + NO_2) ratio of 75 percent (this is EPA's ambient ratio method, ARM, annual national default conversion).

Option 3 – A three tiered system, where tier-1 assumes 100 percent NO to NO_2 conversion, tier-2 assumes a 75 percent NO_2/NOx ratio, and tier-3 allows a case-by-case use of a site specific ratio derived using more refined techniques such as the Ozone Limiting Method (OLM) or the Plume Volume Molar Ratio Method (PVMRM). Both are in AERMOD. Option 3 is similar to the tiered procedures specified for modeling annual NO_2 impacts in Section 5.2.4 of the Guideline on Air Quality Models.

There is also an EPA Clearinghouse memo endorsing application of the 75 percent NO_2/NOx ratio when modeling the annual NO_2 SIL (see Daniel J. deRoeck memo: *Use of the Ambient Ratio Method for Modeling Significant Ambient Impacts of NO_2*, dated March 15, 2002;. http://www.epa.gov/region07/air/nsr/nsrmemos/m200203.pdf)

Option 3 would give the States the most flexibility. It should be noted that PVMRM is a non-Guideline technique, so if used in PSD permit modeling, EPA Regional Office approval should be obtained.

Recommendation: Option 3: A three tiered system would provide maximum flexibility.

Attachment 3

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

MAR 23 2010

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS

FROM: Stephen D. Page, Director
Office of Air Quality Planning and Standards

TO: See Addressees

This memorandum addresses the need for recommendations regarding appropriate dispersion modeling procedures which can be used to demonstrate compliance with $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS). The need for these recommendations arises from several recent regulatory actions and proposals which increase the likelihood that applicants for permits under the new source review (NSR) and prevention of significant deterioration (PSD) programs may be required to demonstrate compliance with $PM_{2.5}$ NAAQS rather than relying upon the PM_{10} surrogate policy established in 1997. These recommendations are intended to facilitate appropriate and consistent implementation of current guidance regarding $PM_{2.5}$ dispersion modeling contained in the *Guideline on Air Quality Models*, Appendix W to 50 CFR Part 51, while acknowledging that such guidance is somewhat limited in detail due to technical issues associated with $PM_{2.5}$ modeling.

This memorandum provides recommendations on two aspects of the modeling procedures for demonstrating compliance with the $PM_{2.5}$ NAAQS. First, this memorandum discusses some of the technical issues that must be addressed by any applicant or permitting authority that is seeking to rely on the PM_{10} surrogate policy. Second, this memorandum provides additional information on modeling procedures to demonstrate compliance with $PM_{2.5}$ NAAQS without relying upon the PM_{10} surrogate policy.

BACKGROUND

On July 18, 1997, EPA revised the NAAQS for particulate matter to add new annual and 24-hour standards for fine particles using $PM_{2.5}$ as the indicator. EPA revised the 24-hour NAAQS for $PM_{2.5}$ on September 21, 2006, reducing the standard from 65 $\mu g/m^3$ to 35 $\mu g/m^3$. EPA also retained the previous 1997 annual standard for $PM_{2.5}$ and the 24-hour standard for PM_{10}, while revoking the previous annual standard for PM_{10}. For attainment of the new 24-hour $PM_{2.5}$ NAAQS based on ambient monitoring, the average of the 98th percentile 24-hour values

over three years of monitoring must not exceed 35 $\mu g/m^3$. The annual $PM_{2.5}$ NAAQS is set at 15 $\mu g/m^3$ based on the average of the annual mean $PM_{2.5}$ concentrations over three years.

Citing significant technical difficulties with respect to $PM_{2.5}$ monitoring, emissions estimation, and modeling, EPA established a policy, known as the PM_{10} surrogate policy, on October 23, 1997. This policy allowed permit applicants to use compliance with the applicable PM_{10} requirements as a surrogate approach for meeting $PM_{2.5}$ NSR requirements until the technical difficulties were resolved. On May 16, 2008, EPA promulgated final rules governing the implementation of the NSR program for $PM_{2.5}$, which included a "grandfathering provision" allowing applicants for federal PSD permits covered by 40 CFR § 52.21, with complete permit applications submitted as of July 15, 2008, to continue relying on the PM_{10} surrogate policy. In response to a petition challenging the continued use of the PM_{10} surrogate policy for issuing PSD permits, on June 1, 2009, EPA issued a 3-month administrative stay of the grandfathering provision for $PM_{2.5}$ affecting federal PSD permits to give EPA time to propose repealing the challenged grandfathering provision. On September 16, 2009, the original 3-month stay was extended to June 22, 2010, to allow additional time for EPA to formally propose repeal of the grandfathering provision from the $PM_{2.5}$ NSR implementation rule for federal PSD permits issues under 40 CFR § 52.21. On February 11, 2010, EPA published its proposal to repeal the grandfathering provision in the *Federal Register* at 75 FR 6827. These actions cite the fact that the technical difficulties which necessitated the PM_{10} surrogate policy have been largely, although not entirely, resolved.

As part of the proposed rulemaking to repeal the grandfathering provision contained in the federal PSD program, EPA has also proposed to end the use of the PM_{10} surrogate policy for state PSD programs that EPA has approved as part of the state implementation plan (SIP) under 40 CFR § 51.166. Under the PSD programs for $PM_{2.5}$ currently in effect for SIP-approved states, states would be allowed to continue using the PM_{10} surrogate policy until May 2011, or until EPA approves the revised SIP for $PM_{2.5}$, whichever occurs first. While we continue to allow states to use the PM_{10} surrogate policy during their transition to the new $PM_{2.5}$ requirements, we have also made it clear that the policy needs to be implemented by taking into account court decisions that address the surrogacy concept. Accordingly, an applicant seeking a PSD permit under a SIP-approved PSD program may still rely upon the PM_{10} surrogate policy as long as (1) the appropriateness of the PM_{10}-based assessment for determining $PM_{2.5}$ compliance has been adequately demonstrated based on the specifics of the project; and (2) the applicant can show that a $PM_{2.5}$ analysis is not technically feasible. Absent such demonstrations, applicants would be required to submit a $PM_{2.5}$-based assessment to demonstrate compliance with the $PM_{2.5}$ standards, in addition to meeting the other requirements under the NSR/PSD programs.

PM_{10} SURROGACY DEMONSTRATIONS

Given the need for applicants that continue to rely on the PM_{10} surrogate policy to demonstrate the appropriateness of the policy based on the specifics of the project, we feel that it is appropriate and timely to address some of the technical issues associated with a surrogacy demonstration. EPA's August 12, 2009, Administrative Order in response to petitions regarding the Title V permit for Louisville Gas and Electric Company (LG&E), Trimble Generating Station, provides a brief summary of the case law history that bears on the PM_{10} surrogacy issue

which suggests that an appropriateness demonstration "would need to address the differences between PM_{10} and $PM_{2.5}$."[1] The LG&E order cites two examples in this regard: 1) "emission controls used to capture coarse particles may be less effective in controlling $PM_{2.5}$"; and 2) "particles that make up $PM_{2.5}$ may be transported over long distances while coarse particles normally only travel short distances." These examples serve to highlight the two main aspects of PSD permitting for which the appropriateness of the surrogate policy should be demonstrated: 1) the Best Available Control Technology (BACT) emission control technology assessment; and 2) the ambient air quality impact assessment to demonstrate compliance with the applicable NAAQS.

While acknowledging "an evolving understanding of the technical and legal issues associated with the use of the PM_{10} Surrogate Policy," the LG&E order offers two steps as possible approaches for making an appropriateness demonstration, without suggesting that the "two steps are necessary or sufficient to demonstrate that PM_{10} is a reasonable surrogate for $PM_{2.5}$" and clearly stating that "these two steps are not intended to be the exclusive list of possible demonstrations" regarding surrogacy. The two steps offered in the LG&E order are primarily relevant to the appropriateness demonstration regarding emission controls under BACT, while the discussion here will be focused on the appropriateness demonstration in relation to ambient air impacts.

Given the range of application-specific factors that may need to be addressed for an appropriateness demonstration in relation to ambient air impacts, it is not practical to provide detailed guidance regarding how to conduct such demonstrations. However, the following list identifies some of the "differences between PM_{10} and $PM_{2.5}$" in relation to ambient air impacts that should be addressed in the development of a surrogacy demonstration:

1. While EPA revoked in 2006 the annual PM_{10} standard that was in effect when the surrogate policy, the surrogacy demonstration would still need to address the appropriateness of the PM_{10} surrogate policy in relation to the annual $PM_{2.5}$ standard, and would likely require a modeling analysis of annual PM_{10} impacts.
2. The current 24-hour NAAQS of 35 $\mu g/m^3$ is well below the previous level of 65 $\mu g/m^3$ that was in effect when the PM_{10} surrogate policy was established. The background monitored levels of $PM_{2.5}$ are, therefore, likely to account for a more significant fraction of the cumulative impacts from a modeling analysis relative to the current 24-hour $PM_{2.5}$ NAAQS than for PM_{10}.
3. Secondary formation of $PM_{2.5}$ from emissions of NO_x, SO_x and other compounds from sources across a large domain will often contribute significantly to the total ambient levels of $PM_{2.5}$, and may be the dominant source of ambient $PM_{2.5}$ in some cases. In contrast, secondarily formed particles are less likely to be significant portion of PM_{10}, which may result in significant differences in the spatial and temporal patterns of ambient impacts between $PM_{2.5}$ and PM_{10}.

[1] A discussion of the case law that bears on the PM_{10} surrogacy issue also appears in the February 11, 2010, proposed rule at 75 FR 6831-6832.

4. The probabilistic form of the $PM_{2.5}$ NAAQS, based on the multiyear average of the 98th percentile for the daily standard, differs from the expected exceedance form of the PM_{10} NAAQS, which allows the standard to be exceeded once per year on average using the high-sixth-high (H6H) value over 5 years. These differences affect the temporal and spatial characteristics of the ambient air impacts of PM_{10} and $PM_{2.5}$. Differences in the form of the NAAQS also complicate the process of combining modeled impacts with monitored background levels to estimate cumulative impacts under the NSR/PSD permitting programs, as well as the determination of whether modeled impacts from the facility will cause a significant contribution to any modeled violations of the NAAQS that may occur.

These factors complicate the viability of demonstrating the appropriateness of the PM_{10} surrogate policy to comply with the requirement for a $PM_{2.5}$ ambient air quality impact assessment. In light of these complications, applicants may elect to use $PM_{2.5}$ dispersion modeling to explicitly meet the requirement of an ambient air quality impact assessment under the PSD permitting program, provided that the technical difficulties with respect to $PM_{2.5}$ monitoring, emissions estimation, and modeling have been sufficiently resolved in relation to the specific application.

For surrogacy demonstrations, it is assumed that as an initial step the applicant will have conducted an appropriate dispersion modeling analysis which demonstrates compliance with the PM_{10} NAAQS, including an analysis of annual PM_{10} impacts to address item 1. A simple example illustrating when a PM_{10} modeling analysis might serve as a surrogate for $PM_{2.5}$ modeling would be if a clearly conservative assumption is made that all PM_{10} emissions are $PM_{2.5}$, and the modeled PM_{10} impacts are taken as a direct surrogate for $PM_{2.5}$ impacts and compared to the $PM_{2.5}$ NAAQS. If an adequate accounting for contributions from background $PM_{2.5}$ concentrations to the cumulative impact assessment can be made, and a reasonable demonstration that the modeled PM_{10} emission inventory adequately accounted for potential nearby sources of $PM_{2.5}$, then the appropriateness of surrogacy could be reasonably found in this example. An analysis of source-specific $PM_{2.5}$/ PM_{10} emission factor ratios may also support the assumption of a more realistic, yet still conservative approach for taking a ratio of modeled PM_{10} ambient impacts to provide conservative estimates of $PM_{2.5}$ impacts.

While additional modeling analyses, short of explicit $PM_{2.5}$ modeling, may also be used to the support the surrogacy demonstration in some cases, it is important to make a clear distinction between modeling analyses for purposes of surrogacy demonstrations and modeling analyses that are intended to explicitly demonstrate compliance with the $PM_{2.5}$ standards. The distinction between these two types of modeling analyses may not always be clear, but one important distinction is whether or not a $PM_{2.5}$ emission inventory has been developed as the basis for the modeling. The distinction between these types of modeling is important because modeling procedures that may be considered appropriate for one type of analysis may not be appropriate for the other. The following section elaborates further on this point.

$PM_{2.5}$ MODELING ANALYSES

The differences between PM_{10} and $PM_{2.5}$ described above in relation to surrogacy demonstrations, especially items 2 through 4, also have implications on how best to conduct an explicit $PM_{2.5}$ NAAQS compliance demonstration through dispersion modeling. Due to the potentially significant contribution from secondary formation of $PM_{2.5}$, and the more prominent role of monitored background concentrations of $PM_{2.5}$ in the cumulative analysis, certain aspects of standard modeling practices used for PM_{10} and other criteria pollutants may not be appropriate for $PM_{2.5}$. Our recommendations for addressing these issues in terms of explicit $PM_{2.5}$ modeling analyses are described in more detail below.

Given the issues listed above, and especially the important contribution from secondary formation of $PM_{2.5}$, which is not explicitly accounted for by the dispersion model, PSD modeling of $PM_{2.5}$ should currently be viewed as screening-level analyses, analogous to the screening nature of the guidance in Section 5.2.4 of Appendix W regarding dispersion modeling for NO impacts given the importance of chemistry in the conversion of NO emissions to ambient NO_2. The screening recommendations presented below for demonstrating compliance with the $PM_{2.5}$ NAAQS through dispersion modeling have been developed with the factors listed above in mind. As with any modeling analysis conducted under Appendix W, alternative models and methods may be considered on a case-by-case basis, subject to approval by the Regional Office in accordance with the recommendations in Section 3.2 on "Use of Alternative Models."

The following sections describe the recommended modeling methods for the two main stages in a typical PSD ambient air quality analysis: 1) preliminary significant impact analysis; and 2) cumulative impact assessment. The rationale for the recommendations is also provided.

Preliminary Significant Impact Analysis

The initial step in air quality impact assessments under NSR/PSD is typically a significant impact level analysis to determine whether the proposed emissions increase from the proposed new or modified source (i.e., project emissions) would have a "significant" ambient impact. Thus, the first step of the ambient impact analysis is to determine whether those emissions would result in ambient air concentrations that exceed a de minimis level, referred to as the Significant Impact Level (SIL). If modeled impacts from the facility do not exceed the SIL, then the permitting authority may be able to conclude, based on this preliminary analysis, that the project would not cause or contribute to a violation of the NAAQS. Under these circumstances, EPA would not consider it necessary for the facility to conduct a more comprehensive cumulative impact assessment that would involve modeling the facility's total emissions along with emissions from other nearby background sources, and combining impacts from the modeled emission inventory with representative ambient monitored background concentrations to estimate the cumulative impact levels for comparison to the NAAQS. The SIL is also used to establish the significant impact area of the facility for purposes of determining the geographic range of the background source emission inventory that would be appropriate should a cumulative impact assessment be necessary.

EPA's 2007 proposed rule to establish PSD increments, SILs, and a Significant Monitoring Concentration (SMC) for $PM_{2.5}$ included three options for the $PM_{2.5}$ SILs for both the 24-hour and annual NAAQS. Until the $PM_{2.5}$ SILs are finalized, the proposed SILs may not be presumed to be appropriate de minimis impact levels. However, EPA does not preclude states from adopting interim de minimis impact levels for $PM_{2.5}$ to determine whether a cumulative impact analysis will be necessary, provided that states prepare an appropriate record to support the value used. Such de minimis levels do not necessarily have to match any of the SILs that have been proposed for $PM_{2.5}$, but the levels proposed by EPA and the record supporting EPA's proposed rule could be considered in the state's determination.

The modeling methods used in this initial significant impact assessment phase of the $PM_{2.5}$ analysis, based on either a state's interim de minimis levels or EPA-finalized SILs, are similar to the methods used for other pollutants, including the use of maximum allowable emissions. However, due to the probabilistic form of the NAAQS, we recommend that the highest average of the modeled annual averages across 5 years for National Weather Service (NWS) meteorological data or the highest modeled annual average for one year of site-specific meteorological data be compared to the annual screening level (SIL). Similarly, the highest average of the maximum 24-hour averages across 5 years for NWS meteorological data or the highest modeled 24-hour average for one year of site-specific meteorological data should be compared to the 24-hour screening level (SIL).

Using the average of the highest values across the years modeled preserves one aspect of the form of the NAAQS, while using the average of the <u>first</u> highest 24-hour averages rather than the 98th percentile (8th highest) values from the distribution is consistent with the screening-level nature of the analysis. In addition, since the $PM_{2.5}$ NAAQS is based on air quality levels averaged over time, it is appropriate to use an average modeled impact for comparison to the SIL since that will more accurately characterize the modeled contribution from the facility in relation to the NAAQS than use of the highest modeled impacts from individual years. At the present time, the dispersion modeling recommendations presented here are based on modeling only the primary or direct $PM_{2.5}$ emissions from the facility.

<u>Cumulative Impact Assessment</u>

Unless modeled ambient air concentrations of $PM_{2.5}$ from the project emissions are shown to fall below the state's de minimis level or EPA's promulgated SIL (when finalized), then a cumulative impact assessment would be necessary to account for the combined impact of facility emissions, emissions from other nearby sources, and representative background levels of $PM_{2.5}$ within the modeling domain. The cumulative impacts are then compared to the NAAQS to determine whether the facility emissions will cause or contribute to a violation of the NAAQS. Several aspects of the cumulative impact assessment for $PM_{2.5}$ will be comparable to assessments conducted for other criteria pollutants, while other aspects will differ due to the issues identified above.

Modeling Inventory

The current guidance on modeling emission inventories contained in Section 8.1 of Appendix W will generally be applicable for the $PM_{2.5}$ modeling inventory, recognizing that these recommendations only address modeling of primary $PM_{2.5}$ emissions. The guidance in Appendix W addresses the appropriate emission level to be modeled, which in most cases is the maximum allowable emission rate under the proposed permit. Nearby sources that are expected to cause a significant concentration gradient in the vicinity of the facility should generally be included in the modeled inventory. Since modeling of $PM_{2.5}$ emissions has not been a routine requirement to date, the availability of an adequate $PM_{2.5}$ emission inventory for background sources may not exist in all cases. Recommendations for developing $PM_{2.5}$ emission inventories for use in PSD applications will be addressed separately, but existing PM_{10} inventories may provide a useful starting point for this effort.

Monitored Background

The determination of representative background monitored concentrations of $PM_{2.5}$ to include in the $PM_{2.5}$ cumulative impact assessment will entail different considerations from those for other criteria pollutants. An important aspect of the monitored background concentration for $PM_{2.5}$ is that the monitored data should account for the contribution of secondary $PM_{2.5}$ formation representative of the modeling domain. As with other criteria pollutants, consideration should also be given to the potential for some double-counting of the impacts from modeled emissions that may be reflected in the background monitoring, but this should generally be of less importance for $PM_{2.5}$ than the representativeness of the monitor for secondary contributions. Also, due to the important role of secondary $PM_{2.5}$, background monitored concentrations of $PM_{2.5}$ are likely to be more homogeneous across the modeling domain in most cases, compared to other pollutants. We plan to address separately more detailed guidance on the determination of representative background concentrations for $PM_{2.5}$.

Comparison to NAAQS

Combining the modeled and monitored concentrations of $PM_{2.5}$ for comparison to the $PM_{2.5}$ NAAQS also entails considerations that differ from those for other criteria pollutants, due to the issues identified above. Given the importance of secondary contributions for $PM_{2.5}$ and the typically high background levels relative to the NAAQS for $PM_{2.5}$, greater emphasis is placed on the monitored background contribution relative to the modeled inventory. Also, given the probabilistic form of the $PM_{2.5}$ NAAQS, careful consideration must be given to how the monitored and modeled concentrations are combined to estimate the cumulative impact levels.

The representative monitored $PM_{2.5}$ design value, rather than the overall maximum monitored background concentration, should be used as a component of the cumulative analysis. The $PM_{2.5}$ design value for the annual averaging period is based on the 3-year average of the annual average $PM_{2.5}$ concentrations; for the 24-hour averaging period, the design value is based on the 3-year average of the 98th percentile 24-hour average $PM_{2.5}$ concentrations for the daily standard. Details regarding the determination of the 98th percentile monitored 24-hour value

based on the number of days sampled during the year are provided in the ambient monitoring regulations, Appendix N to 40 CFR Part 50.

The modeled annual concentrations of (primary) $PM_{2.5}$ to be added to the monitored annual design value should be computed using the same procedure used for the initial significant impact analysis based on the highest average of the modeled annual averages across 5 years for NWS meteorological data or the highest modeled annual average for one year of site-specific meteorological data. The resulting cumulative annual concentration would then be compared to the annual $PM_{2.5}$ NAAQS of 15 $\mu g/m^3$.

For the 24-hour NAAQS analysis, the modeled concentrations to be added to the monitored 24-hour design value should be computed using the same procedure used for the preliminary analysis based on the highest average of the maximum modeled 24-hour averages across 5 years for NWS meteorological data or the maximum modeled 24-hour average for one year of site-specific meteorological data. As noted above, use of the average modeled concentration across the appropriate time period more accurately characterizes the modeled contribution from the facility in relation to the NAAQS than use of the highest modeled impact from individual years, while using the average of the first highest 24-hour averages rather than the 98th percentile (8th highest) values is consistent with the screening nature of $PM_{2.5}$ dispersion modeling. Furthermore, combining the 98th percentile monitored with the 98th percentile modeled concentrations for a cumulative impact assessment could result in a value that is below the 98th percentile of the combined cumulative distribution and would, therefore, not be protective of the NAAQS.

The recommendations provided above constitute a First Tier modeling analysis for $PM_{2.5}$ compliance demonstrations. For applications where impacts from primary $PM_{2.5}$ emissions are not temporally correlated with background $PM_{2.5}$ levels, combining the modeled and monitored contributions as described above may be overly conservative. In these cases, a Second Tier modeling analysis may be considered that would involve combining the monitored and modeled $PM_{2.5}$ concentrations on a seasonal or quarterly basis, and re-sorting the total impacts across the year to determine the cumulative design value. We plan to provide separately additional details regarding this Second Tier, including a discussion of circumstances where this approach may be appropriate.

Determining Significant Contributions to Modeled Violations

If the cumulative impact assessment following these screening recommendations results in modeled violations of the $PM_{2.5}$ NAAQS, then the applicant will need to determine whether the facility emissions are causing a significant contribution to those modeled violations. A "significant contribution" determination is based on a comparison of the modeled impacts from the project emissions associated with the modeled violation to the appropriate SIL. The significant contribution determination should be made following the same procedures used during the initial significant impact analysis, based on a comparison of the average of the modeled concentrations at the receptor location showing the violation, across 5 years for NWS meteorological data and the highest modeled concentration for one year of site-specific meteorological data. For a violation of the annual NAAQS, the average of the annual values at

the affected receptor(s) is compared to the SIL, while the average of the highest 24-hour average concentrations at the affected receptor(s) should be used for the 24-hour NAAQS. Use of the average modeled concentration is appropriate in this context since it is consistent with the actual contribution of the facility to the cumulative impacts at the receptor(s) showing violations and accounts for the fact that modeled violations of the 24-hour NAAQS represent average impacts across the modeling period.

Synopsis

Significant Impact Analysis: Compare the average of the highest modeled individual year's annual averages and the average of the first highest individual year's 24-hour average concentrations from project emissions to their respective screening levels, which may be based on the state's de minimis levels or EPA-finalized SILs. If modeled impacts exceed the screening levels, a cumulative impact assessment would need to be performed.

Cumulative Impact Assessment: Develop an emission inventory of background sources to be included in the modeling analysis using traditional guidance. That would include using the significant impact area established in the initial significant impact analysis, plus a 50-km annular ring to determine the geographic extent of the background emission inventory. From data obtained within this combined area, compare the average of the highest modeled individual year's annual averages and the average of the first highest individual year's 24-hour averages, plus representative background monitored concentrations, to their respective NAAQS. Monitored background concentrations are based on the 3-year average of the annual $PM_{2.5}$ concentrations, and the 3-year average of the 98th percentile 24-hour averages. To determine whether the proposed project's emissions cause a significant contribution to any modeled violations of the NAAQS, the proposed project's impacts at the affected receptor(s) are determined based on the average of the highest modeled individual years' annual averages and average of the first highest individual years' 24-hour averages from the proposed project's emissions, and are compared to the state's de minimis levels or EPA-finalized SILs.

Additional Caveats

A few additional caveats should be considered while implementing these recommendations:

1. The current preferred dispersion model for near-field $PM_{2.5}$ modeling, AERMOD, does not account for secondary formation of $PM_{2.5}$. Therefore, any secondary contribution of the facility's or other modeled source's emissions is not explicitly accounted for. While representative background monitoring data for $PM_{2.5}$ should adequately account for secondary contribution from background sources in most cases, if the facility emits significant quantities of $PM_{2.5}$ precursors, some assessment of their potential contribution to cumulative impacts as secondary $PM_{2.5}$ may be necessary. In determining whether such contributions may be important, keep in mind that peak impacts due to facility primary and secondary $PM_{2.5}$ are not likely to be well-correlated in space or time, and these relationships may vary for different precursors. We plan to issue separately additional guidance regarding this issue.

2. While dry and/or wet deposition may be important processes when estimating ambient concentrations of particulate matter (PM) in general, these factors are expected to be minor for $PM_{2.5}$ due to the small particle size. In addition, there may be additional uncertainty associated with deposition modeling for $PM_{2.5}$ due to the variable makeup of the constituent elements for $PM_{2.5}$ and the fact that deposition properties may vary depending on the constituent elements of $PM_{2.5}$. Therefore, use of deposition algorithms to account for depletion in estimating ambient $PM_{2.5}$ concentrations should be done with caution and only when clear documentation and justification of the deposition parameters is provided.
3. While EPA has proposed PSD increments for $PM_{2.5}$, the increments have not been finalized yet. Until the increments are finalized, no increment analysis is required for $PM_{2.5}$. However, it should be noted that some of the recommendations presented here in relation to NAAQS modeling analyses may need to be modified for $PM_{2.5}$ increment analyses due to the differences between the forms of the NAAQS and increments. We plan to provide further clarification of these differences separately, once the increments are finalized.

This memorandum presents EPA's views on these issues concerning modeling procedures for demonstrating compliance with the $PM_{2.5}$ NAAQS. The statements in this memorandum do not bind State and local governments and the public as a matter of law. If you have any questions concerning this memorandum, please contact Tyler Fox, Leader, Air Quality Modeling Group at (919) 541-5562.

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From: Mindy Bowman [mbowman@kdheks.gov]
Sent: Wednesday, May 25, 2011 10:40 AM
To: Stephanie Salter
Subject: FW: secondary PM2.5
Attachments: PM2 5 SIL 9-29-10.pdf

One of my co-workers pointed this out to me, I think it might be useful in responding to comments concerning PM2.5. See V.E.7.c.

_____

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From: Rick Bolfing
Sent: Monday, May 16, 2011 3:22 PM
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See VE7c

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Part III

Environmental Protection Agency

40 CFR Parts 51 and 52

Prevention of Significant Deterioration (PSD) for Particulate Matter Less Than 2.5 Micrometers ($PM_{2.5}$)—Increments, Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC); Final Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 51 and 52

[EPA–HQ–OAR–2006–0605; FRL–9210–9]

RIN 2060–AO24

Prevention of Significant Deterioration (PSD) for Particulate Matter Less Than 2.5 Micrometers ($PM_{2.5}$)—Increments, Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC)

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: The EPA is amending the requirements for particulate matter less than 2.5 micrometers ($PM_{2.5}$) under the Prevention of Significant Deterioration (PSD) program by adding maximum allowable increases in ambient pollutant concentrations ("increments") and two screening tools, known as the Significant Impact Levels (SILs) and a Significant Monitoring Concentration (SMC) for $PM_{2.5}$. The SILs for $PM_{2.5}$ are also being added to two other New Source Review (NSR) rules that regulate the construction and modification of any major stationary source locating in an attainment or unclassifiable area, where the source's emissions may cause or contribute to a violation of the national ambient air quality standards (NAAQS).

DATES: This final rule is effective on December 20, 2010.

ADDRESSES: The EPA has established a docket for this action under Docket ID No. EPA–HQ–OAR–2006–0605. All documents in the docket are listed on the *http://www.regulations.gov* Web Site. Although listed in the index, some information may not be publicly available, *e.g.,* Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy form. Publicly available docket materials are available either electronically through *http://www.regulations.gov* or in hard copy at the Air Docket, EPA/DC, EPA West, Room 3334, 1301 Constitution Avenue, Northwest, Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566–1744, and the telephone number for the Air Docket is (202) 566–1742.

FOR FURTHER INFORMATION CONTACT: Mr. Dan deRoeck, Air Quality Policy Division, Office of Air Quality Planning and Standards (C504–03), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number: (919) 541–5593, facsimile number: (919) 541–5509, e-mail address: *deroeck.dan@epa.gov*.

SUPPLEMENTARY INFORMATION: The information in this Supplementary Information section of this preamble is organized as follows:

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I. General Information

A. Does this action apply to me?

Entities affected by this rule include sources in all industry groups. The majority of sources potentially affected are expected to be in the following groups:

Industry group	NAICS [a]
Electric services	221111, 221112, 221113, 221119, 221121, 221122
Petroleum refining	32411
Industrial inorganic chemicals	325181, 32512, 325131, 325182, 211112, 325998, 331311, 325188
Industrial organic chemicals	32511, 325132, 325192, 325188, 325193, 32512, 325199
Miscellaneous chemical products	32552, 32592, 32591, 325182, 32551
Natural gas liquids	211112
Natural gas transport	48621, 22121
Pulp and paper mills	32211, 322121, 322122, 32213
Paper mills	322121, 322122
Automobile manufacturing	336111, 336112, 336712, 336211, 336992, 336322, 336312, 33633, 33634, 33635, 336399, 336212, 336213
Pharmaceuticals	325411, 325412, 325413, 325414

[a] North American Industry Classification System.

Entities affected by this rule also include State and local permitting authorities, and tribal authorities that implement these regulations.

B. Where can I get a copy of this document and other related information?

In addition to being available in the docket, an electronic copy of this final rule will also be available on the World Wide Web. Following signature by the EPA Administrator, a copy of this final rule will be posted in the regulations and standards section of our NSR home page located at *http://www.epa.gov/nsr*.

II. Purpose

The purpose of this rulemaking is to finalize certain program provisions under the regulations to prevent significant deterioration of air quality due to emissions of $PM_{2.5}$ (*i.e.,* under the $PM_{2.5}$ PSD regulations). This final rule supplements the final implementation rule for $PM_{2.5}$, known as the Clean Air Fine Particle Implementation Rule (CAFPIR) that we promulgated on April 25, 2007 (72 FR 20586), and the $PM_{2.5}$ NSR Implementation Rule that we promulgated on May 16, 2008 (73 FR 28321). Together, these three rules encompass the elements necessary for implementation of a $PM_{2.5}$ program in any area. This final rule is important because it establishes increments, SILs, and an SMC for $PM_{2.5}$ to facilitate ambient air quality monitoring and modeling under the PSD regulations for areas designated attainment or unclassifiable for $PM_{2.5}$.

III. Overview of Final $PM_{2.5}$ PSD Regulations

A. Increments

This rulemaking establishes increments for $PM_{2.5}$ pursuant to the legal authority contained in section 166(a) of the Clean Air Act (CAA or Act) for pollutants for which NAAQS are promulgated after 1977. The final $PM_{2.5}$ increments were identified as Option 1 in the 2007 Notice of Proposed Rulemaking (NPRM) for this action, and are as follows:

Averaging period	NAAQS ($\mu g/m^3$)	Increments ($\mu g/m^3$)		
		Class I	Class II	Class III
Annual	15	1	4	8
24-hour	35	2	9	18

As discussed in more detail in sections V.F and VIII, the increments for $PM_{2.5}$ will become applicable on October 20, 2011 in order to comply with section 166(b) of the Act (providing that regulations under section 166(a) "shall become effective one year after the date of promulgation").

This final rule does not revoke the annual increments for particulate matter less than 10 micrometers (PM_{10}) as proposed under Option 1 in the 2007 NPRM. Thus, we are retaining the 24-hour and annual PM_{10} increments in addition to adding $PM_{2.5}$ increments. This outcome is discussed in greater detail in section V.H of this preamble.

B. Significant Impact Levels

This rule establishes SILs for $PM_{2.5}$ for evaluating the impact a proposed new source or modification may have on the NAAQS and PSD increments for $PM_{2.5}$. The SILs for $PM_{2.5}$ were developed by scaling the existing PM_{10} SILs using a $PM_{2.5}$-to-PM_{10} NAAQS ratio. The final SILs were identified as Option 3 in the 2007 NPRM, and are as follows:

Averaging period	SILs (μg/m³)		
	Class I	Class II	Class III
Annual	0.06	0.3	0.3
24-hour	0.07	1.2	1.2

These values will be added to the State implementation plan (SIP) provisions for PSD at 40 CFR 51.166 (as an optional screening tool) and the Federal PSD program at 40 CFR 52.21, as well as under the preconstruction review permit requirements at 40 CFR 51.165(b) and part 51, Appendix S. *See* a more detailed discussion of the SILs, as well as the relevant comments and our responses to them, in section VI of this preamble. The SILs for $PM_{2.5}$ are incorporated into the Federal PSD program as well as into the regulations for State-implemented PSD programs, although they are regarded as optional for State programs. The effective date for implementing the SILs under the Federal PSD program is the effective date of this final rule. *See* section VIII of this preamble for further discussion of the effective date.

C. Significant Monitoring Concentration

This final rule establishes the SMC for $PM_{2.5}$ as 4 μg/m³ $PM_{2.5}$ (24-hour average). This value has been developed pursuant to proposed Option 1; however, it should be noted that the value being established in this final rule is lower than the proposed value of 10 μg/m³ that was originally developed under Option 1. A more detailed discussion of the proposed SMC is presented in section VII of this preamble, describing the rationale for altering the proposed SMC, and the relevant comments on the proposed SMC and our responses to them. The SMC for $PM_{2.5}$ is incorporated into the Federal PSD program as well as into the regulations for State-implemented PSD programs, although they are regarded as optional for State programs. As with the SILs for $PM_{2.5}$, the effective date for implementing the SMC under the Federal PSD program is the effective date of this final rule. *See* section VIII of this preamble for further discussion of the effective date.

IV. Background

A. PSD Program

The NSR provisions of the Act are a combination of air quality planning and air pollution control technology program requirements for new and modified stationary sources of air pollution. In brief, section 109 of the Act requires us to promulgate primary NAAQS to protect public health and secondary NAAQS to protect public welfare. Once we have set these standards, states must develop, adopt, and submit to us for approval SIPs that contain emission limitations and other control measures to attain and maintain the NAAQS and to meet the other requirements of section 110(a) of the Act. Part C of title I of the Act contains the requirements for a component of the major NSR program known as the PSD program. This program sets forth procedures for the preconstruction review and permitting of new and modified major stationary sources of air pollution locating in areas meeting the NAAQS ("attainment" areas) and areas for which there is insufficient information to classify an area as either attainment or nonattainment ("unclassifiable" areas). Most states have SIP-approved preconstruction permit (major NSR) programs. The Federal PSD program at 40 CFR 52.21 applies in some states that lack a SIP-approved permit program, and in Indian country.[1] The applicability of the PSD program to a major stationary source must be determined in advance of construction and is a pollutant-specific determination. Once a major source is determined to be subject to the PSD program (PSD source), among other requirements, it must undertake a series of analyses to demonstrate that it will use the best available control technology (BACT) and will not cause or contribute to a violation of any NAAQS or increment. For the latter demonstration, the PSD regulations generally require sources to submit for review and approval a source impact analysis and an air quality analysis.

The source impact analysis is primarily a modeling analysis designed to show that the allowable emissions increase from the proposed project, in conjunction with other emissions increases from existing sources, will not result in a violation of either the NAAQS or increments. In cases where the source's emissions may adversely affect an area classified as a Class I area, additional review is conducted to protect the increments and special attributes of such an area defined as "air quality related values" (AQRVs).

The air quality analysis must assess the ambient air quality in the area that the proposed project would affect. For this analysis, the owner or operator of the proposed project must submit as part of a complete permit application air quality monitoring data that represent the air quality in the area affected by the proposed source for the 1-year period preceding receipt of the application. Where data may already exist to represent existing air quality, it may be used by the applicant; otherwise, the source owner or operator is responsible for the installation and operation of monitors to collect the necessary data.

Historically, EPA has allowed the use of several types of screening tools to facilitate implementation of the preconstruction review process to reduce the permit applicant's burden and streamline the permitting process for *de minimis* circumstances. These tools include a significant emissions rate (SER), SILs, and a SMC. The SER, defined in tons per year (tpy) for each regulated pollutant, is used to determine whether the emissions increase from any proposed source or modification can be excluded from review on the grounds that the increase of any particular pollutant is *de minimis.* An emission increase for a particular pollutant that is greater than the SER defined in the NSR regulations for that pollutant is considered to be a significant increase.

The SIL, expressed as an ambient pollutant concentration (micrograms per cubic meter (μg/m³)), is used to determine whether the ambient impact of a particular pollutant (once it is determined to be emitted in significant amounts) is significant enough to warrant a complete source impact analysis involving modeling the collective impacts of the proposed project and emissions from other existing sources.

The PSD regulations generally require each PSD applicant to collect 1 year of continuous air quality monitoring data for any pollutant determined to be subject to preconstruction review as part of complete PSD permit application. Using the SMC as a screening tool, expressed as an ambient pollutant concentration (μg/m³), sources may be able to demonstrate that the modeled air

[1] We have delegated our authority to some states to implement the Federal PSD program. The EPA remains the reviewing authority in non-delegated states lacking SIP-approved programs and in Indian country.

quality impact of emissions from the new source or modification, or the existing air quality level in the area where the source would construct, is less than the SMC, *i.e., de minimis,* and may be allowed to forego the preconstruction monitoring requirement for a particular pollutant at the discretion of the reviewing authority.[2] *See* 40 CFR 51.166(i)(5) and 52.21(i)(5).

When the reviewing authority reaches a preliminary decision to authorize construction of a proposed major new source or major modification, it must provide notice of the preliminary decision and an opportunity for comment by the general public, industry, and other persons that may be affected by the emissions of the proposed major source or major modification. After considering these comments, the reviewing authority may issue a final determination on the construction permit in accordance with the PSD regulations.

B. History of Particulate Matter (PM) NAAQS

1. Total Suspended Particulate (TSP) and PM_{10} NAAQS

The EPA initially established NAAQS for PM in 1971, measured by the TSP indicator. Based on the size of the particles collected by the "high-volume sampler," which at that time was the reference method for determining ambient concentrations, TSP included all PM up to a nominal size of 25 to 45 micrometers. We established both annual and 24-hour NAAQS for TSP.

On July 1, 1987, we revised the NAAQS for PM and changed the indicator from TSP to PM_{10}; the latter indicator includes particles with a mean aerodynamic diameter less than or equal to 10 micrometers. The PM_{10} particles are the subset of inhalable particles small enough to penetrate to the thoracic region (including the tracheobronchial and alveolar regions) of the respiratory tract (referred to as thoracic particles). We established annual and 24-hour NAAQS for PM_{10}, and revoked the NAAQS for TSP. (52 FR 24634).

2. $PM_{2.5}$ NAAQS

On July 18, 1997, we again revised the NAAQS for PM in several respects. While we determined that the NAAQS should continue to focus on particles less than or equal to 10 micrometers in diameter, we also determined that the fine and coarse fractions of PM_{10} should be considered separately. We established new annual and 24-hour NAAQS using $PM_{2.5}$ (referring to particles with a nominal mean aerodynamic diameter less than or equal to 2.5 micrometers) as the indicator for fine particles. The 1997 NAAQS rule also modified the PM_{10} NAAQS for the purpose of regulating the coarse fraction of PM_{10} (referred to as thoracic coarse particles or coarse-fraction particles; generally including particles with a nominal mean aerodynamic diameter greater than 2.5 micrometers and less than or equal to 10 micrometers, or $PM_{10-2.5}$); however, this part of the rulemaking was vacated during subsequent litigation, leaving the pre-existing 1987 PM_{10} NAAQS in place (62 FR 38652).

3. Revised $PM_{2.5}$ and PM_{10} NAAQS

On October 17, 2006, we promulgated revisions to the NAAQS for $PM_{2.5}$ and PM_{10} with an effective date of December 18, 2006 (71 FR 61144). We lowered the 24-hour NAAQS for $PM_{2.5}$ from 65 μg/m³ to 35 μg/m³, and retained the existing annual $PM_{2.5}$ NAAQS of 15 μg/m³. In addition, we retained the existing PM_{10} 24-hour NAAQS of 150 μg/m³, and revoked the annual PM_{10} NAAQS (set at 50 μg/m³).

C. Implementation of NSR for $PM_{2.5}$

After we established new annual and 24-hour NAAQS based on $PM_{2.5}$ as the indicator for fine particles in July 1997, we issued a guidance document titled "Interim Implementation for the New Source Review Requirements for $PM_{2.5}$," John S. Seitz, Director, Office of Air Quality Planning and Standards, EPA, October 23, 1997. As noted in that guidance, section 165 of the Act implies that certain PSD requirements become effective for a new NAAQS upon the effective date of the NAAQS. Section 165(a)(1) of the Act provides that no new or modified major source may be constructed without a PSD permit that meets all of the section 165(a) requirements with respect to the regulated pollutant. Moreover, section 165(a)(3) provides that the emissions from any such source may not cause or contribute to a violation of any increment or NAAQS. Also, section 165(a)(4) requires BACT for each pollutant subject to PSD regulation. The 1997 guidance stated that sources would be allowed to use implementation of a PM_{10} program as a surrogate for meeting $PM_{2.5}$ NSR requirements until certain difficulties were resolved. These difficulties included the lack of necessary tools to calculate the emissions of $PM_{2.5}$ and related precursors, the lack of adequate modeling techniques to project ambient impacts, and the lack of $PM_{2.5}$ monitoring sites.

On April 5, 2005, we issued a guidance document entitled "Implementation of New Source Review Requirements in PM–2.5 Nonattainment Areas," Stephen D. Page, Director, Office of Air Quality Planning and Standards, EPA. This memorandum provided guidance on the implementation of the nonattainment major NSR provisions in $PM_{2.5}$ nonattainment areas in the interim period between the effective date of the $PM_{2.5}$ NAAQS designations (April 5, 2005) and when we promulgate regulations to implement nonattainment major NSR for the $PM_{2.5}$ NAAQS. In addition to affirming the continued use of the John S. Seitz guidance memo in $PM_{2.5}$ attainment areas, this memo recommended that, until we promulgated the $PM_{2.5}$ major NSR regulations, states should use a PM_{10} nonattainment major NSR program as a surrogate to address the requirements of nonattainment major NSR for the $PM_{2.5}$ NAAQS.

On November 1, 2005, we proposed a rule to implement the $PM_{2.5}$ NAAQS, including proposed revisions to the NSR program. For those states with EPA-approved PSD programs, we proposed to continue the 1997 NSR guidance to use PM_{10} as a surrogate for $PM_{2.5}$, but only during the SIP development period. We also indicated in that proposal that we would be developing increments, SILs, and an SMC in a separate rulemaking, *i.e.,* this final rule. Since there was an interim surrogate NSR program in place, *i.e.,* the PM_{10} Surrogate Policy, EPA decided to first promulgate the non-NSR part of the implementation rule (including attainment demonstrations, designations, control measures, *etc.*). This rule was promulgated as the CAFPIR on April 25, 2007 (72 FR 20586).

The NSR part of the implementation rule was issued separately as a final rule on May 16, 2008 (73 FR 28321), and included sets of NSR regulations for both attainment (PSD) and nonattainment areas (nonattainment NSR) for $PM_{2.5}$. In the May 16, 2008 rule we added one of the important screening tools—the SER—for $PM_{2.5}$. The SER for $PM_{2.5}$ is defined as an emissions rate of 10 tpy for direct $PM_{2.5}$ emissions. We also listed sulfur dioxide (SO_2) and nitrogen oxides (NO_X) as precursors of ambient $PM_{2.5}$ and defined "significant" as 40 tpy or more of either precursor pollutant. States were allowed up to 3 years from the date of publication in the **Federal Register** to

[2] The basic monitoring exemption provision is part of the original monitoring requirements adopted in the 1980 PSD rulemaking. 45 FR 52676, 52710, August 7, 1980.

revise their SIPs and submit their revised NSR programs to EPA for approval.

D. Increments Under the PSD Program

Under section 165(a)(3) of the Act, a PSD permit applicant must demonstrate that emissions from the proposed construction and operation of a facility "will not cause, or contribute to, air pollution in excess of any (A) maximum allowable increase or maximum allowable concentration for any pollutant * * *." The "maximum allowable increase" of an air pollutant that is allowed to occur above the applicable baseline concentration for that pollutant is known as the PSD increment. By establishing the maximum allowable level of ambient pollutant concentration increase in a particular area, an increment defines "significant deterioration" of air quality in that area.

For PSD baseline purposes, a baseline area for a particular pollutant emitted from a source includes the attainment or unclassifiable area in which the source is located, as well as any other attainment or unclassifiable area in which the source's emissions of that pollutant are projected (by air quality modeling) to result in a significant ambient pollutant increase. *See, e.g.,* 40 CFR 52.21(b)(15)(i). Once the baseline area is established, subsequent PSD sources locating in that area need to consider that a portion of the available increment may have already been consumed by previous emissions increases.

In general, the submittal date of the first complete PSD permit application in a particular area is the operative "baseline date." [3] On or before the date of the first complete PSD application, emissions generally are considered to be part of the baseline concentration, except for certain emissions from major stationary sources, as explained in the following discussion of baseline dates. Most emissions increases that occur after the baseline date will be counted toward the amount of increment consumed. Similarly, emissions decreases after the baseline date restore or expand the amount of increment that is available.

In practice, three dates related to the PSD baseline concept are important in understanding how to calculate the amount of increment consumed—(1) Trigger date; (2) major source baseline date; and (3) minor source baseline date. The first relevant date is the trigger date. The trigger date, as the name implies, triggers the overall increment consumption process nationwide. Specifically, this is a fixed date, which must occur before the minor source baseline date can be established for the pollutant-specific increment in a particular attainment area. *See,* 40 CFR 51.166(b)(14)(ii) and 52.21(b)(14)(ii). For PM (regulated as TSP) and SO_2, Congress defined the applicable trigger date as August 7, 1977—the date of the 1977 amendments to the Act when the original statutory increments were established by Congress. For nitrogen dioxide (NO_2), we selected the trigger date as February 8, 1988—the date on which we proposed increments for NO_2. *See* 53 FR 40656, 40658; October 17, 1988. In this final rule, as described later, we are establishing a separate trigger date for purposes of implementing the $PM_{2.5}$ increments. *See* section V.F of this preamble for additional discussion of the trigger date for $PM_{2.5}$.

The two remaining dates—"minor source baseline date" and "major source baseline date"—as described later, are necessary to properly account for the emissions that are to be counted toward the amount of increment consumed following the national trigger date, in accordance with the statutory definition of "baseline concentration" in section 169(4) of the Act. The statutory definition provides that the baseline concentration of a pollutant for a particular baseline area is generally the air quality at the time of the first application for a PSD permit in the area. Consequently, any increases in actual emissions occurring after that date (with some possible exceptions that we will discuss later) would be considered to consume the applicable PSD increment. However, the statutory definition in section 169(4) also provides that "[e]missions of sulfur oxides and particulate matter from any major emitting facility on which construction commenced after January 6, 1975, shall not be included in the baseline and shall be counted in pollutant concentrations established under this part."

To make this distinction between the date when emissions resulting from the construction at a major stationary source consume the increment and the date when emissions changes in general (*i.e.,* from both major and minor sources) begin to consume the increment, we established the terms "major source baseline date" and "minor source baseline date," respectively. *See* 40 CFR 51.166(b)(14) and 52.21(b)(14). Accordingly, the "major source baseline date," which precedes the trigger date, is the date after which actual emissions increases associated with construction at any major stationary source consume the PSD increment. In accordance with the statutory definition of "baseline concentration," the PSD regulations define a fixed date to represent the major source baseline date for each pollutant for which an increment exists. Congress defined the major source baseline date for the statutory increments for PM and SO_2 as January 6, 1975. For the NO_2 increments, which we promulgated in 1988 under our authority to establish an increment system under section 166(a) of the Act, the major source baseline date we selected was February 8, 1988—the date on which we proposed increments for NO_2. 53 FR 40656. In both instances, the major source baseline date for the individual increments was set as a date which preceded the date on which the regulations pertaining to those increments were issued. In this final rule, as described later, we are establishing a separate major source baseline date for implementing the $PM_{2.5}$ increments. *See* section V.F of this preamble for further discussion of the major source baseline date for $PM_{2.5}$.

The "minor source baseline date" is the earliest date after the trigger date on which a source or modification submits the first complete application for a PSD permit in a particular area. After the minor source baseline date, any increase in actual emissions (from both major and minor sources) consumes the PSD increment for that area.

Once the minor source baseline date is established, the new emissions increase from that major source consumes a portion of the increment in that area, as do any subsequent actual emissions increases that occur from any new or existing source in the area. When the maximum pollutant concentration increase defined by the increment has been reached, additional PSD permits cannot be issued until sufficient amounts of the increment are "freed up" via emissions reductions that may occur voluntarily, (*e.g.,* via source shutdowns) or by mandatory control requirements imposed by the reviewing authority. Moreover, the air quality in a region cannot deteriorate to a level in excess of the applicable NAAQS, even if all the increment in the area has not been consumed. Therefore, new or modified sources located in areas where the air pollutant concentrations are near the level allowed by the NAAQS may not have full use of the amount of

[3] Baseline dates are pollutant specific. That is, a complete PSD application establishes the baseline date only for those regulated NSR pollutants that are projected to be emitted in significant amounts (as defined in the regulations) by the applicant's new source or modification. Thus, an area may have different baseline dates for different pollutants.

pollutant concentration increase allowed by the increment.

Under EPA guidance, the actual increment analysis that a proposed new or modified source undergoing PSD review must complete depends on the area impacted by the source's new emissions. We have provided approved air quality models and guidelines for sources to use to project the air quality impact of each pollutant (over each averaging period) for which an increment analysis must be done.[4] In addition, we established SILs for each pollutant under the permit requirements applicable to new and modified major stationary sources locating in attainment areas that would cause or contribute to a violation of any NAAQS. *See* 40 CFR 51.165(b) and part 51, Appendix S, section III.A. These SILs have also been used for implementing the PSD program to identify levels below which the source's modeled impact of a particular pollutant is regarded as *de minimis.* In this final rule, we are establishing SILs (24-hour and annual) for $PM_{2.5}$ that are being added to the aforementioned regulations containing SILs for other pollutants, as well as to the PSD regulations in 40 CFR 51.166 and 52.21. *See* further discussion of the SILs for $PM_{2.5}$ in section VI of this preamble.

In the event that a source's modeled impacts of a particular pollutant are below the applicable SIL at all ambient air locations modeled, *i.e., de minimis* everywhere, EPA's policy for PSD provides that no further modeling analysis is required for that pollutant. Our longstanding policy under the PSD program is that when a preliminary screening analysis based on the SIL is sufficient to demonstrate that the source's emissions throughout the area modeled will not cause or contribute to a violation of the increment, there is no need for a comprehensive source impact analysis involving a cumulative evaluation of the emissions from the proposed source and other sources affecting the area.

Within the impact area of a source subject to PSD, that is, the area within which the proposed project's emissions increase does have a significant impact, increment consumption is calculated using the source's proposed emissions increase, along with other actual emissions increases or decreases of the particular pollutant from any sources in the area, which have occurred since the minor source baseline date established for that area. In addition, the emissions increases or decreases from any major source that has commenced construction since the major source baseline date (which precedes the minor source baseline date) will consume or expand increment. Thus, an emissions inventory of sources whose emissions, in whole or in part, of a particular pollutant consume or expand the available increment in the area must be compiled. The inventory of increment-consuming emissions includes not only sources located directly in the impact area, but sources outside the impact area that affect the air quality for the particular pollutant within the impact area.

The inventory of increment-consuming emissions includes emissions from increment-affecting sources at two separate time periods—the baseline date and the current period of time. For each source that was in existence on the relevant baseline date (major source or minor source), the inventory includes the source's actual emissions on the baseline date and its current actual emissions. The change in emissions over these time periods represents the emissions that consume increment (or, if emissions have gone down, expand the available increment). For sources constructed since the relevant baseline date, all their current actual emissions consume increment and are included in the inventory.

When the inventory of increment-consuming emissions has been compiled, computer modeling is used to determine the change in ambient concentration that will result from these emissions when combined with the proposed emissions increase from the new major source or major modification that is undergoing PSD review. The modeling has generally been guided by the "Guideline on Air Quality Models" (40 CFR part 51, Appendix W), which includes provisions on air quality models and the meteorological data input into these models. The model output (expressed as a change in concentration) for each relevant averaging period is then compared to the corresponding allowable PSD increment.

E. Historical Approaches for Developing Increments

1. Congressional Enactment of Increments for PM and SO_2

Congress established the first increments defining significant deterioration of air quality in the 1977 Amendments to the Act. These amendments, among other things, added part C to title I, setting out the requirements for PSD. In section 163, Congress included numerical increments for PM and SO_2 for Class I, II, and III areas.

The three area classes are part of the increment system originally established by Congress. Congress designated Class I areas (including certain national parks and wilderness areas) as areas of special national concern, where the need to prevent deterioration of air quality is the greatest. Consequently, the allowable level of incremental change is the smallest relative to the other area classes, *i.e.,* most stringent, in Class I areas. The increments of Class II areas are larger than those of Class I areas and allow for a moderate degree of emissions growth. For future redesignation purposes, Congress defined a "Class III" classification to allow the redesignation of any existing Class II area for which a State may desire to promote a higher level of industrial development (and emissions growth). Thus, Class III areas are allowed to have the greatest amount of pollutant increase of the three area classes while still achieving the NAAQS. To date, there have been no redesignations made to establish a Class III area.

In establishing these PSD increments, Congress used the then-existing NAAQS for those pollutants as the benchmark for determining what constitutes "significant deterioration." Congress established the increments for PM as a percentage of the then-existing PM NAAQS. At the time the Act was amended in 1977, the NAAQS for PM were expressed in terms of ambient concentrations of TSP. Thus, EPA interpreted the statutory increments for PM using the same ambient TSP "indicator."

2. EPA's Promulgation of Increments for NO_2 and PM_{10}

Congress also provided authority for EPA to promulgate additional increments and to update the original PM increments created by statute. The EPA has promulgated two regulations pursuant to this authority.

a. Increments for NO_2 Using the "Contingent Safe Harbor" Approach Under Section 166(a) of the Act

Based on section 166(a) of the Act, on October 17, 1988, EPA promulgated increments for NO_2 to prevent significant deterioration of air quality due to emissions of NO_X (53 FR 40656). The EPA based these increments on percentages of the NAAQS in the same way that Congress derived the statutory increments for PM and SO_2. Those NO_2 increments were challenged in 1988 by the Environmental Defense Fund (EDF) when EDF filed suit in the U.S. Court of

[4] *See* EPA's "Guideline on Air Quality Models" at 40 CFR part 51, Appendix W.

Appeals for the District of Columbia Circuit against the Administrator (*Environmental Defense Fund, Inc.* v. *Reilly,* No. 88–1882). The EDF successfully argued that we failed to sufficiently consider certain provisions in section 166 of the Act. The court remanded the case to EPA "to develop an interpretation of section 166 that considers both subsections (c) and (d), and if necessary to take new evidence and modify the regulations." *See Environmental Defense Fund* v. *EPA,* 898 F.2d 183, 190 (D.C. Cir. 1990) (*EDF* v. *EPA*). Section 166(c) of the Act requires the PSD regulations to, among other things, meet the goals and purposes set forth in sections 101 and 160 of the Act. Section 166(d) requires these regulations be at least as effective as the increments established for PM (in the form of TSP) and SO_2 in section 163 of the Act. The court considered the NO_2 increment values determined using the percentage-of-NAAQS approach as "safe harbor" increments which met the requirements of section 166(d) of the Act. However, the court also determined that EPA's reliance on such increment levels was contingent upon our completing the analyses required under section 166(c), which provided that the final increment values must address the goals of sections 101 and 160 of the Act to protect public health and welfare, parks, and AQRVs [5] and to insure economic growth.

In response to the court's decision, we proposed rulemaking on increments for NO_2 on February 23, 2005 (70 FR 8880) and finalized the rule on October 12, 2005 (70 FR 59582). In the final rule, we established our policy on how to interpret and apply the requirements of sections 166(c) and (d) of the Act. In accordance with the court ruling, we conducted further analyses (considering the health and welfare effects of NO_X) and concluded that the existing NO_2 increments were adequate to fulfill the requirements of section 166(c). *See* 70 FR 59586 for our detailed analysis of how pollutant regulations satisfy the requirements of section 166 of the Act. Hence, we retained the existing NO_2 increments along with other parts of the existing framework of pollutant-specific NO_2 increment regulations. We also amended the PSD regulations under 40 CFR 51.166 to make it clear that states may seek EPA approval of SIPs that utilize a different approach than EPA used to establish these NO_2 increments. To receive our approval of an alternative program, a State must demonstrate that its program satisfies the requirements of sections 166(c) and 166(d) of the Act and prevents significant deterioration of air quality from emissions of NO_X.[6]

b. Increments for PM_{10} Using "Equivalent Substitution" Approach Under Section 166(f) of the Act

On October 5, 1989, we proposed PM_{10} increments. *See* 54 FR 41218. Although section 163 did not expressly define the existing statutory increments for PM in terms of a specific indicator, EPA reasoned that Congress' knowledge that TSP was the indicator for the PM NAAQS, and that the TSP standards were the starting point for the increments levels when the increments were established in 1977, meant that TSP was also the appropriate measure for the PM increments in section 163. As a consequence, EPA believed that the statutory PM increments could not simply be administratively redefined as PM_{10} increments, retaining the same numerical values, following the revision of the PM NAAQS. Rather, we stated our belief that with the promulgation of the PM_{10} NAAQS, EPA had both the responsibility and the authority under sections 166 and 301 of the Act to promulgate new increments for PM to be measured in terms of PM_{10}. We further concluded that promulgating PM_{10} increments to replace, rather than supplement, the statutory TSP increments under section 163 represented the most sensible approach for preventing significant deterioration with respect to PM. *See* 54 FR 41220–41221.

We promulgated PM_{10} increments to replace the then-existing TSP increments on June 3, 1993 (58 FR 31622). In the interim between proposal and promulgation, Congress enacted the 1990 CAA Amendments. As part of these amendments, Congress amended section 166 to add a new section 166(f). This section specifically authorized EPA to substitute PM_{10} increments for the existing section 163 PM increments based on TSP, provided that the substituted increments are "of equal stringency in effect" as the section 163 increments.

Thus, we were able to replace the TSP increments under section 163 of the Act using PM_{10} increments based directly on the newly enacted authority under section 166(f) of the Act. In the PM_{10} rule, we maintained the existing baseline dates and baseline areas for PM that had been previously established using the TSP indicator. Also, as proposed, we promulgated PM_{10} increments based on an approach we called the "equivalent to statutory increments" approach. Under this approach, we used the original TSP increments as a benchmark for calculating the PM_{10} increments, thereby retaining roughly the same limitations on future deterioration of air quality as was allowed under the TSP increments.

In using this approach, we considered the historical consumption of TSP increment by a sample population of permitted PSD sources, and then determined the PM_{10} increments for each area classification and averaging time that would provide approximately the same percentage of PM_{10} increment consumption, on average, by the same population of sources. Then, all future calculations of increment consumption after the PM_{10} implementation date would be based on PM_{10} emissions. *See* 58 FR 31622 and 31625.

V. Final Action on $PM_{2.5}$ Increments

In this section of the preamble, we will summarize the considerations that went into our proposed action and describe the final action being taken regarding new regulations for preventing significant deterioration of $PM_{2.5}$ air quality—including $PM_{2.5}$ increments (sections V.A through V.E, baseline dates and other permit requirements for $PM_{2.5}$ (section V.F), baseline areas for $PM_{2.5}$ (section V.G), and PM_{10} increments (section V.H).

A. Decision To Establish $PM_{2.5}$ Increments Using "Contingent Safe Harbor Approach" Under Section 166(a)

The EPA's 2007 NPRM contained three options for developing numerical $PM_{2.5}$ increments. Option 1 used the authority of section 166(a) of the Act to establish increments for $PM_{2.5}$ as a new pollutant for which NAAQS were established after August 7, 1977, and established 24-hour and annual $PM_{2.5}$ increments (Class I, II, and III) based on the "contingent safe harbor" approach. Options 2 and 3 used the contingent safe harbor approach under section 166(a) to only develop 24-hour $PM_{2.5}$ increments (Class I, II, and III), while using the "equivalent substitution"

[5] The term "air quality related values" is not defined in the Act, but the legislative history provides language saying that "The term 'air quality related values' of Federal lands designated as Class I includes the fundamental purposes for which such lands have been established and preserved by the Congress and the responsible Federal agency. For example, under the 1916 Organic Act to establish the National Park Service (16 U.S.C. 1), the purpose of such national park lands 'is to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.'" S. Rep. No. 95–127 at 36 (1977).

[6] Under the 2005 NO_X regulation, states can adopt measures other than increments as long as they can demonstrate that the measures selected comply with the same criteria and goals of sections 166(c) and (d) of the Act that must be met for increments.

approach under section 166(f) of the Act to develop annual $PM_{2.5}$ increments. Each of these options is discussed in detail in the 2007 NPRM. 72 FR 54123–54138. In addition, significant comments on each of the three options, and our responses to them, are provided in this section V of this preamble.

In this final rule, after considering the available information and comments from interested parties, EPA has decided to select Option 1 and establish increments for $PM_{2.5}$ using the "contingent safe harbor" approach in accordance with the authority provided in section 166(a) of the Act.

This final rule establishes increments for $PM_{2.5}$ at the following levels:

Averaging period	NAAQS (μg/m³)	Increments (μg/m³)		
		Class I	Class II	Class III
Annual	15	1	4	8
24-hour	35	2	9	18

B. Rationale for the Applicability of Section 166(a)

In the 2007 NPRM, we expressed our belief that it is permissible to interpret section 166(a) to apply to $PM_{2.5}$. Section 166(a) requires EPA to develop regulations to prevent the significant deterioration of air quality due to emissions of certain named pollutants, and to develop such regulations for any pollutants for which NAAQS are subsequently promulgated. Although EPA has generally characterized the NAAQS for $PM_{2.5}$ as a NAAQS for a new indicator of PM, EPA did not replace the PM_{10} NAAQS with the NAAQS for $PM_{2.5}$ when the latter NAAQS were promulgated in 1997. Rather, EPA retained the annual and 24-hour PM_{10} NAAQS (retaining PM_{10} as an indicator of coarse particulate matter), and established new annual and 24-hour NAAQS for $PM_{2.5}$ as if $PM_{2.5}$ was a new pollutant, even though EPA had already developed air quality criteria for PM generally. Thus, for purposes of section 166(a), the promulgation of a NAAQS for $PM_{2.5}$ established a NAAQS for an additional pollutant after 1977.

Nine commenters supported our proposed Option 1, although only three of these explicitly expressed support for the use of section 166(a) authority to promulgate $PM_{2.5}$ increments. Ten other commenters specifically opposed the use of section 166(a) authority and/or supported the use of section 166(f) authority (on which the annual increments under Options 2A and 2B were based).

One of the commenters who explicitly agreed with our proposed use of section 166(a) authority stated that it is the only option that is legally available. This commenter asserted that section 166(a) plainly applies to $PM_{2.5}$ because $PM_{2.5}$ is a pollutant for which NAAQS were promulgated after August 7, 1977. This commenter held that EPA's rulemaking duty under section 166(a) is not confined to "new pollutants," but is triggered by post-1977 NAAQS promulgations, regardless of whether for new or previously regulated pollutants. On the other hand, this commenter noted that by its terms, section 166(f) is limited to authorizing the adoption of PM_{10} increments as a substitute for the statutory TSP increments and does not provide for substitution of $PM_{2.5}$ increments for TSP or PM_{10} increments.

The opposing commenters did not believe that section 166(a) provides a legal basis for EPA to promulgate $PM_{2.5}$ increments. One of these commenters stated that section 166(a) can only be used for a new pollutant, and $PM_{2.5}$ is not a new pollutant.

Another commenter who opposed the use of section 166(a) authority argued that nothing in section 166(a) of the Act can be interpreted to allow it to be used as the basis of increments when EPA revises an existing NAAQS. The commenter explained that, on its face, section 166(a) can only be interpreted to apply to pollutants other than PM and SO_2 since increments for these pollutants were enacted by Congress in section 163 of the Act. The commenter added that it can be argued that Congress intended to have section 166(a) apply to the four other pollutants specifically listed there.

This commenter found unpersuasive our argument that we are not "substituting" increments (as section 166(f) requires for PM_{10}) but rather adding $PM_{2.5}$ increments to the existing PM_{10} increments, and that only section 166(a) allows such an approach (72 FR 54121). The commenter asserted that if EPA had defined a coarse fraction to the particulate matter standards, then that fraction, together with the $PM_{2.5}$ standards, would form the set of "substituted" new standards for the existing PM_{10} standards, and, thus, the increments.

The commenter also disagreed with EPA's argument that it can treat $PM_{2.5}$ as a new pollutant under section 166(a) of the Act since it has been demonstrated that sub-$PM_{2.5}$ particles have distinctly different health and welfare effects than the other forms of PM (*i.e.,* coarse or PM_{10}). The commenter indicated that just as EPA replaced the TSP standards by PM_{10} as a better indicator of health effects, ongoing research has led to establishment of the $PM_{2.5}$ standards as a better indicator of certain health effects, and it is the natural outcome of such research that has enabled EPA to separate the effect of total particulate matter into two fractions with distinct effects. The commenter added that given that the definition of particulate matter includes a vast conglomeration of solids and liquids, the finding of differing effects should not come as a surprise. The commenter explained that as is the case of different pollutants having similar effects that are, nonetheless, treated as separate pollutants, the same concept should apply to a range or fraction of particulate matter found to have different effects in establishing it as another indicator and not a different pollutant.

The commenter did not disagree with the specific numerical increments proposed by EPA under Option 1, but did have concerns with the potential consequences of the section 166(a) approach. The commenter's primary concern was the proposal to allow states to substitute other measures in the place of uniform national increments for $PM_{2.5}$. (This is discussed further in section V.C.5 of this preamble.) Another commenter also expressed this concern.

Another commenter who opposed the section 166(a) approach believes that the legal and congressional history regarding the establishment of PM increments shows that Congress added section 166(f) to the Act based on the conviction that without it, EPA had no authority to revise the PM increments for PM_{10} (citing and quoting from S. Rep. No. 228, 101st Cong., 2nd Sess. 75 (1990), reprinted in 1990 U.S.C.C.A.N. 3385, 3461). The commenter concluded that EPA did not have authority in 1987 under section 166(a) to adopt PM_{10} increments, and does not have authority now under section 166(a) to adopt $PM_{2.5}$ increments.

We read section 166(a) to authorize EPA to promulgate pollutant-specific PSD regulations meeting the

requirements of sections 166(c) and 166(d) for any pollutant for which EPA promulgates a NAAQS after 1977. Most of the pollutants identified in section 166(a) (NO_X, photochemical oxidants, carbon monoxide) are pollutants for which EPA had established NAAQS in 1977 when Congress adopted section 166 of the Act. There was no need for Congress to list other criteria pollutants, SO_2 and PM, in section 166(a) because Congress had already established increments for these pollutants in section 163 of the Act. In addition to requiring regulations for the enumerated pollutants, we conclude that under section 166 of the Act Congress intended to authorize EPA to establish additional pollutant-specific PSD regulations, potentially containing increments, for any additional pollutants for which EPA promulgated a NAAQS under section 109 of the Act. Furthermore, because the Act refers to pollutants for which EPA promulgates NAAQS after 1977, and does not use the phrase "additional pollutants," section 166(a) provides authority for EPA to promulgate new increments after revising an existing NAAQS (including NAAQS first promulgated before 1977), when we find that such action is appropriate.

Moreover, any new increments developed pursuant to section 166(a) have no effect on existing increments, as there is no indication therein that an existing increment should be revoked or replaced when additional increments are promulgated. This was the situation following the promulgation of new NAAQS for PM in 1987 when EPA replaced the old NAAQS based on TSP with new ones based on PM_{10}. Had Congress not added new section 166(f) in 1990, increments for PM_{10} could have been developed pursuant to section 166(a) of the Act, but such increments would have had no effect on the original statutory increments for PM (based on TSP). Consequently, seeing no basis for retaining the original increments, Congress added section 166(f) which explicitly provides for the replacement of the existing increments with PM_{10} increments.

One commenter asserted that if EPA establishes increments for $PM_{2.5}$ under the authority of section 166(a) on the basis that $PM_{2.5}$ is a new pollutant, then it must also establish PM_{10} increments under section 166(a) because (according to the commenter's analysis) PM_{10} is also a new pollutant. In the same analysis, the commenter concluded that EPA must adopt new measures to prevent significant deterioration from coarse PM based on section 166(a).

In this final rule, EPA is not setting or amending any increments for PM_{10} or otherwise taking action with respect to PM_{10} increments. The preexisting annual and 24-hour increments for PM_{10} are being retained. *See* section V.H. Similarly, EPA is not taking any action with respect to coarse PM in this rule. For these reasons, the commenter's arguments on what authority must be used to set increments for PM_{10} and/or coarse PM, and that EPA has some obligation to take action with respect to coarse PM, are not on point for this rule. Thus, no substantive response to this comment is needed. Nevertheless, as mentioned earlier, Congress provided explicit authority under section 166(f) of the Act to address increments for PM_{10}, because it intended for such increments to be substitute increments for the original statutory increments for PM measured as TSP. Thus, the PM_{10} increments legally supersede the original statutory increments for PM. Had the PM_{10} increments been developed under section 166(a), which prior to the 1990 Act Amendments was the only authority available for developing new increments, then the original statutory PM increments would have remained in effect in addition to the PM_{10} increments.

One commenter expressed general objections to EPA's legal rationale for the $PM_{2.5}$ increments proposal, asserting that we failed to expressly state and support our legal authority for the $PM_{2.5}$ increments, offering two possible sources of authority ("contingent safe harbor," "equivalent substitution," or possibly a combination of the two) but never stating our legal position with clarity. The commenter agreed with EPA's assessment that the $PM_{2.5}$ increments should and must fulfill the legal requirements of the Act (72 FR 54121), and added that it is the government's burden of proof to establish its legal authority for action. The commenter stated that it would be arbitrary and capricious to promulgate these regulations for which EPA has not stated legal authority.

We do not disagree that the 2007 NPRM described two different legal authorities for the two different options for establishing increments, but we disagree that these discussions did not clearly present the alternative legal bases that the Agency was considering for taking action in this rule. In particular, we clearly described our legal authority for developing the 24-hour and annual $PM_{2.5}$ increments under section 166(a) of the Act, which is the basis on which we are taking final action in this rule.[7] First, we expressly stated that Option 1 was based on the statutory authority of section 166(a) of the Act. *See* 72 FR 54123 (Under the first option, "we would use the authority of section 166(a) of the Act to develop new increments for $PM_{2.5}$"). Second, we provided a discussion of this authority both in general (*see* 72 FR 54118–54119 and 54120–54123), and how it would be applied to establish increments for $PM_{2.5}$ (*see* 72 FR 54119–120 and 54123–136).

We now believe that section 166(a) provides the most straightforward approach for developing increments for a pollutant or pollutant indicator for which no increments have yet been established. Our position is also consistent with the comments we received which supported the delay in implementation of the $PM_{2.5}$ increments, opposed the potential for two sets of definitions for "major source baseline date" and "trigger date" for the $PM_{2.5}$ increment system, and highlighted the complexities involved with having to establish and maintain two sets of emissions inventories for the 24-hour and annual $PM_{2.5}$ increments. (*See* further description of relevant comments in section VIII of this section.)

C. EPA's Interpretation of the Requirements Under Sections 166(a)–(d) of the Act

In section 166(a) of the Act, Congress directed EPA to develop pollutant-specific regulations to prevent significant deterioration of air quality. Congress further specified that such regulations meet specific requirements set forth in sections 166(c) and 166(d) of the Act. We stated in the 2007 NPRM that because we believed that section 166(a) could be applied to the development of increments for $PM_{2.5}$, we would follow the interpretation of sections 166(a)–(d) that the Agency adopted in its most recent NO_2 increments rule. 70 FR 59582, October 12, 2005. That particular interpretation and application was upheld in *Environmental Defense* v. *EPA,* 489 F.3d 1320 (D.C. Cir. 2007).

The EPA's interpretation of these provisions is grounded on five principles and conclusions. First, we read section 166 of the Act to direct EPA to conduct a holistic analysis that considers how a complete system of regulations will collectively satisfy the

[7] We also believe that we sufficiently described how section 166(f) might provide alternative authority for establishing increments for $PM_{2.5}$ (see, *e.g.,* 72 FR 54120–54121), but will not address that in detail here because the increments in this rule are not based on section 166(f) authority.

applicable criteria, rather than evaluating one individual part of a regulatory scheme in isolation. Second, we use a "contingent safe harbor" approach which calls for EPA to first determine an increment that is at least as effective as the increments in section 163 of the Act, as required under section 166(d) and then to conduct further analysis to determine if additional measures are necessary to fulfill the requirements of section 166(c). Third, we interpret section 166(c) of the Act to identify eight statutory factors that EPA must apply when promulgating pollutant-specific regulations to prevent significant deterioration of air quality. Fourth, where these factors are at odds with each other, we interpret the statute to require EPA to use its judgment to balance the conflicting factors. Fifth, we recognize that the requirements of section 166 may be satisfied by adopting other measures besides an increment and that EPA may allow states to demonstrate that alternatives to increments contained in a SIP meet the requirements of sections 166(c) and 166(d). Below is a brief discussion of each of these five principles and conclusions. A more detailed description of each of these is contained in the 2007 NPRM at 72 FR 54121–54123.

1. Regulations as a Whole Should Fulfill Statutory Requirements

Section 166(a) of the Act directs EPA to develop pollutant-specific regulations to prevent the significant deterioration of air quality. Sections 166(c) and 166(d) provide detail on the contents of those regulations, but do not necessarily require the same type of increment system Congress created in section 163 of the Act. The EPA interprets section 166 to require that the entire system of PSD regulations (the framework and details, as described in section V.D of this preamble) for a particular pollutant must, as a whole, satisfy the criteria in sections 166(c) and 166(d) of the Act.

2. Contingent Safe Harbor Approach

Section 166(c) of the Act describes the kinds of measures to be contained in the regulations to prevent significant deterioration of air quality called for in section 166(a) and specifies that these regulations are to "fulfill the goals and purposes" set forth in sections 160 and 101 of the Act. Section 166(d) of the Act directs EPA to "fulfill such goals and purposes" by providing "specific measures at least as effective as the increments established in section 163 * * *." Thus, EPA reads section 166(d) to require that the Agency identify "safe harbor" pollutant-specific PSD regulations adopted under section 166.

The EPA reads section 166(c) to require that the Agency conduct further review to determine whether, based on the criteria in section 166(c), EPA's pollutant-specific PSD regulations under section 166 should contain measures that are different from the "safe harbor" identified under section 166(d). The EPA construes section 166(d) to require that the measures be "at least as effective" as the statutory increments set forth in section 163.

To apply the "contingent safe harbor" approach for $PM_{2.5}$, we first identified "safe harbor" increments for each area classification (Class I, II, or III), using: (1) Equivalent percentages of the NAAQS as the percentages used for developing the statutory increments; (2) the same pollutant as the NAAQS, *i.e.,* $PM_{2.5}$, and (3) the same time (averaging) periods as were used for the $PM_{2.5}$ NAAQS. We concluded that this approach would ensure that the increments would be "at least as effective as the increments established in section 163," as required by section 166(d). Second, EPA conducted further review to determine whether the "safe harbor" increments, in conjunction with existing elements of the PSD program or additional measures proposed under section 166 to augment the increments, sufficiently fulfill the criteria in subsection (c) of section 166.

In this review, we weighed and balanced the criteria set forth in subsection (c) (and, as provided in subsection (c), the incorporated goals and purposes of the Act in section 101 and the PSD program in section 160) to determine whether additional measures might be needed to satisfy the criteria in subsection (c). *See* section V.E.6 of this preamble for further discussion of our evaluation, comments on the evaluation, and our response to them.

3. The Statutory Factors Applicable Under Section 166(c)

The EPA interprets section 166(c) of the Act to establish eight factors to be considered in the development of PSD regulations for the pollutants covered by this provision. These eight factors included the three criteria stated in section 166(c) and the five goals and purposes identified in section 160 of the Act (which, as noted below, also cover the goals and purposes set forth in section 101). The three stated criteria in section 166(c) indicate that PSD regulations for specific pollutants should provide: (1) Specific numerical measures for evaluating permit applications; (2) a framework for stimulating improved control technology, and (3) protection of air quality values. The five goals and purposes in section 160 are incorporated into the analysis by virtue of the fourth criterion in section 166(c), which directs that EPA's pollutant-specific PSD regulations "fulfill the goals and purposes" set forth in sections 160 and 101 of the Act. We construed the term "fulfill the goals and purposes," as used in section 166(c), to mean that EPA should apply the goals and purposes listed in section 160 as factors applicable to pollutant-specific PSD regulations established under section 166. The Agency's view is that PSD measures that satisfy the specific goals and purposes of section 160 also satisfy the more general purposes and goals identified in section 101 of the Act. *See* 72 FR 54122.

One commenter disagreed with our interpretation that the goals and purposes of section 160 also satisfy all of those in section 101. This commenter asserted that although there is some overlap between the two sections, they are not identical. As an example, the commenter noted that section 101 expressly states that a primary goal of the Act is to promote pollution prevention—a goal not stated in section 160. The commenter asserted that, although the proposed increments would limit some pollution increases, there was no provision in the proposal that would require or promote pollution prevention.

We disagree with the commenter and continue to believe that measures that satisfy the specific goals and purposes of section 160 also satisfy the more general purposes and goals identified in section 101 of the Act. As we stated in the 2005 NO_2 increment rulemaking, the overall goals and purposes of the Act listed in sections 101(b) and 101(c) are general goals regarding protecting and enhancing the nation's air resources and controlling and preventing pollution. Because these broad goals are given more specific meaning in section 160, EPA does not believe it is necessary to consider them in detail when evaluating whether PSD regulations satisfy the criteria in section 166(c). 70 FR 59587 FN 3.

Regarding pollution prevention specifically, we believe that this general goal is encompassed in, and given more specific meaning by, sections 160(1), 160(2), and 160(4) of the Act. These sections spell out the specific purposes under the PSD program for the general section 101 goals of controlling and preventing pollution. We believe that any requirement to limit or reduce emissions serves to promote pollution prevention, which is often the most cost

effective means of lowering pollutant emissions.

In addition to citing the purposes set out in section 160, section 166(c) includes the criterion that pollutant-specific PSD regulations should provide a framework for stimulating improved control technology. As discussed subsequently in sections V.D.1 and V.D.6 of this preamble, we believe that this criterion is fulfilled by the system of increments for $PM_{2.5}$ and by the requirement for PSD permittees to apply BACT to minimize $PM_{2.5}$ emissions. In stimulating improved control technology generally, these elements of the PSD program also promote pollution prevention. As noted previously, pollution prevention is often the most cost effective means of control, particularly for new sources and new process lines at existing sources. In addition, because BACT is a case-by-case determination that considers cost and collateral environmental impacts, pollution prevention, where technically feasible, often fairs well in BACT analyses because it is typically free from the negative environmental impacts that result from the use of add-on air pollution control devices.

4. Balancing the Factors Applicable Under Section 166(c)

While the eight factors in section 166(c) are generally complementary, there are circumstances where some of the objectives may be in conflict with each other. In these situations, some degree of balance or accommodation is inherent in the requirement to establish regulations that satisfy all of these factors. As first discussed in our 2005 NO_2 increments rulemaking (70 FR 59582 at 59587), we believe this balancing test derives primarily from the third goal and purpose set forth in section 160: To insure economic growth consistent with the preservation of existing clean air resources. A more detailed discussion of how the balancing of factors should be interpreted is contained in the 2007 NPRM at 72 FR 54122–54123.

One commenter claimed that EPA "incorrectly and repeatedly asserts" that a goal of section 160 of the Act is to insure economic growth. The commenter claimed that neither section 160 nor section 101 of the Act uses language to support a goal of promoting or maximizing opportunities for economic growth. Instead, the commenter asserted that both sections state only that any growth that does occur must be consistent with protection of air quality. The commenter concluded that "EPA's notion that the need to satisfy the other requirements of Section 166 and other goals and purposes in Sections 101 and 160 can never preclude additional emissions from economic growth unlawfully elevates such growth over all other statutory factors."

The language in section 160(3) provides that one of the purposes of the PSD program is "to insure that economic growth will occur in a manner consistent with the preservation of existing clean air resources." The commenter suggests that this language can only be read as if the statutory phrase "economic growth" actually said "any economic growth that does occur" such that section 160(3) says "to insure that any economic growth that does occur will occur in a manner consistent with the preservation of existing clean air resources." We disagree; the phrasing used by Congress is "to insure that economic growth will occur." Thus, we believe the plain language of the statute supports EPA's reading that section 160(3) requires a balancing of the goals of (1) economic growth and (2) preservation of existing clean air resources. At a minimum, if the language were to be considered ambiguous enough to allow the commenter's reading, then the Agency's interpretation is also a reasonable reading of the statutory language.

5. Authority for States To Adopt Alternatives to Increments

While section 166 of the Act authorizes EPA to promulgate increments for pollutants listed under section 166(a), we have also interpreted the section to allow states to employ approaches other than increments to prevent significant deterioration of air quality, so long as such an approach otherwise meets the requirements of sections 166(c) and 166(d). This interpretation was explained in the 2005 NO_2 increment rulemaking (70 FR 59611–59612), in which we amended the PSD regulations at 40 CFR 51.166 by adding new paragraph (c)(2) to codify this statutory authority. Under the existing provision in 40 CFR 51.166(c)(2), states may seek EPA approval of SIPs that use an alternative approach to increments if the State can demonstrate that the alternative program satisfies the requirements of sections 166(c) and 166(d). However, the current language at paragraph (c)(2) states the authority for states to adopt alternative measures only with respect to increments for NO_2. To clarify our interpretation that the authority to adopt alternative measures covers any pollutant listed in section 166(a), we are revising 40 CFR 51.166(c)(2) to make it inclusive to all applicable pollutants rather than just NO_2.

Two commenters supported our proposal to revise paragraph (c)(2) to include $PM_{2.5}$, while four State/local agency commenters expressed opposition. An environmental commenter agreed that the Act allows for other approaches, but believes that such approaches must be in addition to the national increments. Specifically, this commenter stated that "although EPA can provide for states to adopt approaches in addition to increments in order to fulfill the statutory purposes, the agency must make clear that states cannot adopt approaches that are less protective that the national increments." This commenter further stated that "to the extent that EPA is suggesting that it can allow states to adopt PSD programs that do not include the minimum Federal increments, that position is contrary to the statute."

As in the 2005 NO_2 increment rulemaking, we are codifying the basic principle that states can seek to use alternative measures without defining any specific type of alternative program that would be approved or otherwise creating standards beyond the requirements of sections 166(c) and 166(d). Instead, we plan to make determinations on a case-by-case basis when a State submits a specific alternative approach for EPA to approve as part of a SIP. In making those determinations, we will address the specific alternative measures as states propose them to the Agency in light of the requirements of sections 166(c) and 166(d), including whether the alternative program is "at least as effective as the increments established in section 163," as required in section 166(d).

The four State/local agency commenters opposing the revision to 40 CFR 51.166(c)(2) expressed the importance of using uniform national increments for $PM_{2.5}$. One commenter argued that a nationally inconsistent approach to $PM_{2.5}$ in attainment areas could result in a patchwork of State PSD regulations—and the exact kinds of economic repercussions that Congress wished to avoid. The same commenter argued that varying increment-equivalent measures could also result in an uneven playing field for industry and could exacerbate difficulties between states experiencing transport problems.

Another opposing commenter was concerned that allowing states to adopt alternatives to increments would likely lead to a "mish-mash" of State approaches which defeats the intention of Congress that there be uniformity in PSD rules to avoid economic

dissimilarities from State to State that could allow interstate competition for industry based upon which State offers the best (least expensive) environmental compliance regulations. Another commenter objected to allowing the use of alternatives to increments by stating that such alternative allowances undermine the desired national consistency, and EPA has failed to even identify any Act programs which would benefit from this approach.

While we acknowledge the potential problems identified by the commenters associated with allowing states to adopt alternative approaches to the numerical increments that we are establishing, we also note that section 166(d) expressly gives EPA some latitude in promulgating regulations that will be at least as effective as the increments in section 163, by stating that such regulations "may contain air quality increments, emission density requirements, or other measures." Thus, EPA is authorized to provide that states may consider alternatives to the increments established in this rule. That said, the statutory authority is not a blank check for states to do as they please, but enables states to consider options that may provide a meaningful way for them to manage their air resources within the framework allowed by the statutory PSD requirements.

D. Framework for Pollutant-Specific PSD Regulations for $PM_{2.5}$

In the 2007 NPRM, we proposed to apply the same basic framework for pollutant-specific PSD regulations for $PM_{2.5}$ that we used in our 2005 NO_2 increments regulations. Specifically, we proposed adopting an increment and area classification system for $PM_{2.5}$ and applying the statutory AQRV review process to $PM_{2.5}$ as well. We also indicated that while some of the factors applicable under section 166(c) are fulfilled by using this type of framework for pollutant-specific PSD regulations under section 166(a) of the Act, this framework of regulations also needs to satisfy the other applicable factors. Thus, the details of our regulations (such as the characteristics of the increments themselves) are important, and we evaluated the effectiveness of the framework in conjunction with more detailed elements of our regulations. As discussed in the following subsections, we believe our obligations under section 166(c) of the Act are satisfied when the PSD regulations collectively satisfy the factors applicable under 166(c) of the Act.

1. Increment System

An increment-based program satisfies the requirements under 166(c) to provide "specific numerical measures against which permit applications may be evaluated." An increment is the maximum allowable level of ambient pollutant concentration increase that is allowed to occur above the applicable baseline concentration in a particular area. As such, an increment defines "significant deterioration." Establishing an increment system for $PM_{2.5}$ will fulfill two of the factors applicable under section 166(c): (1) Providing specific numerical measures to evaluate permit applications, and (2) stimulating improved control technology.

First, under section 165(a)(3) of the Act, a permit applicant must demonstrate that emissions from the proposed construction and operation of a facility "will not cause, or contribute to, air pollution in excess of any (A) maximum allowable increase or maximum allowable concentration for any pollutant * * *." Once the baseline date associated with the application for the first new major stationary source or major modification in an area is established, the new emissions from that source consume a portion of the increment in that area, as do any subsequent emissions increases that occur from any source in the area. When the maximum pollutant concentration increase defined by the increment has been reached, additional PSD permits cannot be issued until sufficient amounts of the increment are "freed up" via emissions reductions that may be required by the reviewing authority. Thus, an increment is a quantitative value that establishes a "maximum allowable increase" for a particular pollutant. It functions, therefore, as a specific numerical measure that can be used to evaluate whether an applicant's proposed project will cause or contribute to air pollution in excess of allowable levels.

Increments also satisfy the second factor in section 166(c) by providing "a framework for stimulating improved control technology." Increments establish an incentive to apply improved control technologies in order to avoid violating the increment and to "free up" available increment to promote continued economic growth. These control technologies may become the basis of BACT determinations elsewhere, as the technologies become more commonplace and the costs tend to decline.

One commenter stated that, although increments may encourage the use of existing control technologies, EPA has not cited any evidence that increments actually stimulate the development of improved technologies. Moreover, the commenter asserted that even if increments provide the incentive asserted by EPA, any encouragement of improved control technology is wholly incidental and hardly amounts to a "framework" whose purpose is to stimulate such technology.

We continue to believe that the total program, encompassing increments and BACT, does provide an appropriate framework to stimulate BACT in such a way that it is not simply "wholly incidental," as the commenter claims. The fact that economic growth in an area must occur within a defined amount of allowable air quality deterioration should logically lead to the application of improved pollution control technology as the amount of deterioration increases, and should not be regarded as an incidental consequence. As stated in the 2007 NPRM, Congress envisioned that the increments they originally established would serve as an incentive: "The incremental ceiling should serve as an incentive to technology, as a potential source may wish to push the frontiers of technology in a particular case to obtain greater productive capacity with the limits of the increments." S. Rep. 95–127 at 18, 30 (3 LH at 1392, 1404). We, too, believe that as the available increment in an area becomes smaller, and as states try to preserve some of the remaining increments for future growth, it will be necessary to require sources to install more stringent controls in that area. Such levels of control ultimately must be considered in subsequent BACT evaluations in other PSD areas throughout the country. Admittedly, the increasing stringency of control technologies over time, as observed in EPA's BACT/Lowest Achievable Emission Rate (LAER) Clearinghouse, supports but cannot in itself conclusively demonstrate that the PSD program has already stimulated development of improved control technology; there are undoubtedly a number of factors that could cause such trends. Nevertheless, even the need to require a more stringent BACT determination in only a few PSD areas (due to dwindling increment availability) necessitates consideration of that level of control for all other PSD sources wherever they may decide to locate. In any event, while the commenter generally questions the effectiveness of the increments as an incentive for tightening BACT, they provided no evidence that more stringent BACT is not related to the

increment system established as an integral part of the PSD program.

2. Area Classifications

In this final rule, EPA is establishing the same three-tiered area classification system for $PM_{2.5}$ that is applicable to the increments for NO_2 and other pollutants under the PSD program and the Act. Accordingly, areas that are currently Class I for other pollutants will also be Class I for $PM_{2.5}$ and all other areas will be Class II for $PM_{2.5}$ unless we redesignate the area based on a request by a State or tribe pursuant to the process in section 164 of the Act and EPA's regulations at 40 CFR 51.166(g) and 52.21(g).

As explained earlier in section IV.E.1, Class I areas are areas where very clean air is most desirable. In contrast, Class III areas are designed as those areas in which a State wishes to permit the highest relative level of industrial development, and thus allow the largest incremental increase in pollution. Areas that are not especially sensitive and where states have not provided for a higher level of industrial growth are classified as Class II. When Congress established this three-tiered scheme for SO_2 and PM, it intended that Class II areas be subject to an increment that allows "moderately large increases over existing pollution." H.R. Rep. 95–294, 4 LH at 2609.

Establishing increments at different levels for each of the three area classifications helps to fulfill two of the factors applicable under section 166(c) of the Act. First, establishing the smallest increments in Class I areas helps fulfill EPA's obligation to establish regulations that "preserve, protect, and enhance the air quality" in parks and special areas. Class I areas are primarily the kinds of parks and special areas covered by section 160(2) of the Act. Second, by providing for two additional area classifications with increment levels that are higher but still protective, the area classification system helps satisfy the goal in section 160(3) of the Act that EPA "insure that economic growth will occur in a manner consistent with preservation of clean air resources." In those areas where clean air resources may not require as much protection, more growth is allowed. By employing an intermediate level (Class II areas) and higher level (Class III areas), this classification scheme helps ensure that growth can occur where it is needed (Class III areas) without putting as much pressure on existing clean air resources in other areas where some growth is still desired (Class II areas).

By requesting that EPA redesignate an existing Class II area to Class III, states may accommodate economic growth and air quality in areas where the Class II increment is too small to allow the siting of new or modified sources. The procedures specified by the Act for such a redesignation require a commitment by the State government to create such an area, extensive public review, local government participation in the SIP area redesignation process, and a finding that the redesignation will not result in the applicable increment being exceeded in a nearby Class I or Class II area. *See* sections 164(a) and (b) of the Act. (No State has yet requested a Class III redesignation.) The EPA believes that the three-tiered classification system has allowed for economic growth, consistent with the preservation of clean air resources.

However, an area classification system alone may not completely satisfy the factors applicable under section 166(c) of the Act. The increment that is employed for each class of area is also relevant to an evaluation of whether the area classification system achieves the goals of the PSD program. We briefly discuss the characteristics of increments in section V.E.5.

One commenter took issue with our assessment of the two factors that we believe a classification system helps to fulfill. As discussed previously in section V.C.4, the commenter asserted that EPA has unlawfully interpreted section 160(3) of the Act to elevate economic growth over all other statutory factors. As explained in greater detail in section V.C.4, we disagree that our interpretation elevates economic growth over other factors, and believe that the plain language of the statute supports EPA's reading that section 160(3) requires a balancing of the goals of (1) economic growth and (2) preservation of existing clean air resources.

The commenter also stated that EPA has failed to demonstrate that the classification system and safe harbor increments, in combination with the other elements of the regulatory framework, will "preserve, protect, and enhance the air quality" in parks and special areas as required under section 160(2) of the Act. These comments and our response to them are found in section V.E.6 of this preamble where we discuss our evaluation of the safe harbor increments.

3. Permitting Procedures

Two of the factors applicable under section 166(c) are fulfilled by the case-by-case permit review procedures that are built into our existing PSD regulations. The framework of our existing PSD regulations employs the preconstruction permitting system and procedures required under section 165 of the Act. These requirements are generally reflected in 40 CFR 51.166 and 52.21 of EPA's PSD regulations. These permitting and review procedures, which apply to construction of new major sources and to major modifications, fulfill the goals set forth in sections 160(4) and 160(5) of the Act. These goals require that PSD programs in one State not interfere with the PSD programs in other states and that PSD programs assure that any decision to permit increased air pollution is made after careful evaluation and public participation in the decision-making process. For the same reasons discussed in our proposal for the pollutant-specific NO_2 increments regulations (70 FR 8896, February 23, 2005), we believe these factors are also fulfilled for $PM_{2.5}$ by employing the permit review procedures.

4. AQRV Review by Federal Land Manager and Reviewing Authority

In this final rule, we apply the existing requirements to evaluate impacts on AQRVs in Class I areas (*see* existing 40 CFR 51.166(p) and 52.21(p)) to $PM_{2.5.}$ The existing requirements for an AQRV review, which Congress applied to SO_2 and TSP, provide Federal land managers (FLMs) with the responsibility to review source impacts on site-specific AQRVs in Class I areas and to bring any alleged adverse impacts to the attention of the reviewing authority. Under an increment approach, we consider this review to be an additional measure that helps satisfy the factors in sections 166(c) and 160(2) which require EPA's pollutant-specific PSD regulations to protect (1) air quality values, and (2) parks and other special areas, respectively.

Two State/local agency commenters supported our proposal to apply the requirements to evaluate impacts on AQRV in Class I areas to $PM_{2.5}$ review. However, one commenter indicated that FLM review does not and cannot assure the prevention of all significant $PM_{2.5}$-related deterioration because it applies only to the construction or modification of very large stationary sources (*e.g.,* factories and power plants) affecting Class I areas. This commenter pointed out that Class I areas do not include Bureau of Land Management wilderness and wilderness study areas (encompassing more than 15 million acres), 341 of the nation's 390 national park units (only 49 national parks are Class I), and many U.S. Forest Service lands (including a number of wilderness areas). The commenter added that FLM

review does not help to fulfill section 160(2)'s goal of preserving and protecting air quality in "other areas of special national or regional natural, recreational, scenic, or historic value," such as State and local parks, wildlife refuges, recreation areas, lakes, and historic areas, none of which are Class I areas. In addition, the commenter noted that FLM review does not apply to emissions increases from sources of $PM_{2.5}$ and precursor pollution other than major stationary sources, such as motor vehicles and non-major industrial sources (which are sources that emit substantial amounts of $PM_{2.5}$ and precursors). *Alabama Power* v. *Costle,* 636 F.2d 323, 362 (D.C. Cir. 1979) (*Alabama Power*) (expressly recognizing that "[s]ignificant deterioration may occur due to increased emissions from unregulated minor sources.").

The commenter also asserted that FLM review is of limited reach even where it does apply. Under the current PSD regulations, a State must consider an FLM's objections and must justify its decision in writing when it disagrees with those objections, but the State can still issue a PSD permit over those objections unless emissions are predicted to cause an exceedance of the applicable increment. The commenter believes that, given these limitations, EPA cannot plausibly claim that the existing provision for FLM review ensures the preservation, protection, and enhancement of air quality for parks and natural areas throughout the nation as required by section 160(2) of the Act.

In our rulemakings addressing PSD for NO_X, EPA extended the AQRV review procedures set forth in 40 CFR 51.166(p) and 52.21(p) to cover NO_2. These AQRV review procedures were established based on section 165(d) of the Act, and they were originally applied only in the context of the statutory increments for PM and SO_2. However, because they also address many of the factors applicable under section 166(c) of the Act, EPA also applied them to NO_X through regulation. In this final rule, we are amending the existing PSD regulations to extend, as proposed, the AQRV review procedures to include $PM_{2.5}$ by explicitly including $PM_{2.5}$ in the regulatory text that now simply references "particulate matter." *See* new 40 CFR 51.166(p)(4) and 52.21(p)(5).

Section 165(d) creates a scheme in which the FLM and reviewing authority must review the impacts of a proposed new or modified source's emissions on AQRVs. The Act assigns to the FLM an "affirmative responsibility" to protect the AQRVs in Class I areas. This is in notable contrast to the reviewing authority's responsibility for protecting the increments—including Class I increments. The FLM may object to or concur in the issuance of a PSD permit based on the impact, or lack thereof, that new emissions may have on any affected AQRV that the FLM has identified and for which information is available to the general public. If the proposed source's emissions are shown not to cause or contribute to a violation of a Class I increment, the FLM may still prevent issuance of the permit by demonstrating to the satisfaction of the reviewing authority that the source or modification will have an adverse impact on AQRVs. Section 165(d)(2)(C). On the other hand, if the proposed source is shown to cause or contribute to a violation of a Class I increment, the reviewing authority (State or EPA) shall not issue the permit unless the owner or operator demonstrates to the satisfaction of the FLM that there will be no adverse impact on AQRVs.[8] Thus, the showing of compliance with the increment determines whether the FLM or the permit applicant has the burden of satisfactorily demonstrating whether or not the proposed source's emissions would have an adverse impact on AQRVs.[9] In any event, the FLM plays an important and material role by raising these issues for consideration by the reviewing authority, which in the majority of cases will be the State.

Extending the AQRV review procedures of the PSD regulations to $PM_{2.5}$ helps to provide protection with respect to potential adverse effects from $PM_{2.5}$ for parks and special areas (which are generally the Class I areas subject to this review) not afforded by the increment system alone. As discussed later, we believe the factors applicable under section 166(c) of the Act can be fulfilled when the review of AQRVs is applied in conjunction with increments and other aspects of our PSD regulations. In those cases where the increment is not violated and the reviewing authority agrees that a proposed project will adversely affect AQRVs, the parks and other special areas will be protected by denying issuance of the permit or by requiring the applicant to modify the project to alleviate the adverse impact.

We read the legislative history to show that Congress intended the AQRV review provisions of section 165(d) to provide a special layer of protection, beyond that provided by increments. The Senate committee report stated the following:

> A second test of protection is provided in specified Federal land areas (Class I areas), such as national parks and wilderness areas; these areas are also subjected to a review process based on the effect of pollution on the area's air quality related values."

S. Rep. 95–127, at 17, 4 LH at 1401.

As we stated in the NO_2 increment rule, we believe the term "air quality values" should be given the same meaning as "air quality related values." Legislative history indicates that the term "air quality value" was used interchangeably with the term "air quality *related* value" (AQRV) regarding Class I lands.[10]

The commenter is correct that the FLM (or AQRV) review applies only to Class I areas, and not to other "special" areas such as the numerous State and local parks and some other areas that could be seen as being covered by the protective purposes of section 160(2) of the Act. This level of coverage by FLM review to protect AQRVs was established by Congress when it enacted the PSD program, including the purposes set out in section 160(2). Thus, we conclude that Congress believed that the special areas not designated as Class I areas were properly addressed by the other elements of the PSD program. As discussed further in the next section, one such element is the requirement for sources to conduct an "additional impacts analysis," which includes an

[8] Even if such a waiver of the Class I increment is allowed upon a finding of no adverse impact, the source must comply with such emissions limitations as may be necessary to ensure that alternative increments specified in the rules for SO_2 or PM are not exceeded. The alternative increments are generally at the level of the Class II increments, with the lone exception being a more restrictive 3-hour increment for SO_2. Section 165(d)(2)(C)(iv). The EPA made this provision applicable to the PSD provisions for NO_X at the level of the NO_2 Class II increment (53 FR 3704; 53 FR 40656) and substituted the PM_{10} Class II increments for the statutory alternative PM increments, which were based on TSP (58 FR 31622). This final rule expands this provision to include the $PM_{2.5}$ Class II increments as well. *See* 40 CFR 51.166(p)(4) and 52.21(p)(5).

[9] In response to concerns that Class I increment would hinder growth in areas surrounding the Class I area, Congress established Class I increments as a means of determining where the burden of proof should lie for a demonstration of adverse effects on AQRVs. *See* Senate Debate, June 8, 1977 (3 LH at 725).

[10] *See* S. Rep. 95–127, at 12, reprinted at 3 LH at 1386, 1410 (describing the goal of protecting "air quality values" in "Federal lands—such as national parks and wilderness areas and international parks," and in the next paragraph and subsequent text using the term "air quality related values" to describe the same goal); *id.* at 35, 36 ("The bill charges the Federal land manager and the supervisor with a positive role to protect *air quality values* associated with the land areas under the jurisdiction of the [FLM]" and then describing the statutory term as "air quality related values"). H.R. Report 95–564 at 532 (describing duty of Administrator to consider "air quality values" of the tribal and State lands in resolving an appeal of a tribal or State redesignation, which is described in the final bill as "air quality related values").

analysis of the impacts on visibility, soils, and vegetation of the proposed source and associated growth, regardless of the classification of the area impacted by the source. Note also that states have the option under the Act of designating additional areas as Class I areas and providing for AQRV review for these State Class I areas if they believe that there are areas within their borders that merit such protection.

The commenter is not correct in saying that the review to protect AQRVs does not apply to emissions increases from sources other than major stationary sources. While it is generally true that a major stationary source may trigger the analysis as part of the required PSD review for new major stationary sources and major modifications where such source's emissions increase may affect a Class I area, the review itself includes the impacts on an AQRV of other emissions in the area, including emissions from non-major sources. In addition, states may adopt requirements in their State implementation plans to require certain minor sources seeking a permit to undergo an AQRV analysis if they choose to do so.

We agree with the commenter that the AQRV review has certain limitations in that a State can, under some circumstances, issue a PSD permit over the objection of the FLM. Here again, Congress enabled this outcome when it provided that a permit would not be issued when the FLM demonstrates "to the satisfaction of the State" that the source will have an adverse impact on AQRVs in a Class I area. Section 165(d)(2)(C)(ii). We read this provision to reflect Congress's judgment on the appropriate balance between State and FLM discretion in the reach of AQRV review. That said, when a reviewing authority declines to follow a determination of adverse impact by the FLM, the reviewing authority is expected to provide a rational basis for doing so, and a reviewing authority's rejection of an FLM's finding may not be arbitrary and capricious. As stated by EPA's Environmental Appeals Board in *In the Matter of: Hadson Power 14—Buena Vista,* 4 E.A.D. 258, 1992 WL 345661 (October 5, 1992)(in Section II.A):

> States do not have unfettered discretion to reject an FLM's adverse impact determination. If a State determines that an FLM has not satisfactorily demonstrated an adverse impact on AQRVs from the proposed facility, the State must provide a "rational basis" for such a conclusion, "given the FLMs' affirmative responsibility and expertise regarding the Class I areas within their jurisdiction." 50 FR 28549, July 12, 1985. Arbitrary and capricious rejections of adverse impact determinations are not sustainable. (citations omitted).

In sum, the commenter correctly enumerated some of the limitations of the AQRV review under the Act. However, such review is only one element of the full PSD program, which must be evaluated against the statutory requirements in their entirety. We continue to believe, as previously stated, that under an increment approach, FLM review for AQRV impacts is an additional measure that helps satisfy the factors in sections 166(c) and 160(2) of the Act (which require EPA's pollutant-specific PSD regulations to protect (1) air quality values, and (2) parks and other special areas, respectively) in balance with the other statutory factors. We add that the AQRV review requirements of the existing regulations mirror these requirements in the Act, which reflect Congress' judgment of how AQRV review should properly be used to promote the purposes of the program as set out in section 160 of the Act.

5. Additional Impacts Analysis

The "additional impacts analysis" requirements set forth in our part 51 and 52 PSD regulations also help fulfill the criteria and goals and purposes in sections 166(c) and 160. The additional impacts analysis involves a case-by-case review of potential harm to visibility, soils, and vegetation in Class II and III areas that could occur from the construction or modification of a PSD source.

Sections 51.166(o)(1) and 52.21(o)(1) of the PSD regulations require that a permit provide the following analysis:

> An analysis of the impairment to visibility, soils and vegetation that would occur as a result of the source or modification and general commercial, residential, industrial and other growth associated with the source or modification. The owner or operator need not provide an analysis of the impact on vegetation having no significant commercial or recreational value.

This requirement was based on section 165(e)(3)(B) of the Act, which provides that EPA establish regulations that require "an analysis of the ambient air quality, climate and meteorology, terrain, soils and vegetation, and visibility at the site of the proposed major emitting facility and in the area potentially affected by emissions from such facility * * *."

As mentioned in the previous section, one commenter argued that the provisions for protection of Class I areas are of no help in fulfilling the goal set forth in section 160(2) of the Act to preserve and protect air quality in the countless "other areas of special national or regional natural, recreational, scenic, or historic value" such as State and local parks, wildlife refuges, recreation areas, lakes and historic areas, none of which were originally defined by Congress as Class I areas.

We acknowledge that the special provisions for protecting Class I areas are not applicable for protecting areas that are not designated as "Class I." However, we believe that the "additional impacts analysis" provisions are especially helpful for satisfying the requirements of section 166(c) in Class II and Class III areas, including the types of areas described by the commenter, that are not Class I areas but are worthy of special protection beyond what might be provided by the NAAQS and increments. 40 CFR 51.166(o) and 52.21(o). These areas are not subject to the special AQRV review that applies only in Class I areas. While the additional impacts analysis is not as intensive a review as the AQRV analysis required in Class I areas, the requirement to consider impairments to visibility, soils, and vegetation through the additional impacts analysis contributes to satisfying the factors applicable under section 166(c) of the Act in all areas, including Class II and Class III areas.

6. Installation of BACT

The requirement that new sources and modified sources subject to PSD apply BACT is an additional measure that helps to satisfy the factors in sections 166(c), 160(1), and 160(2) of the Act. This requirement, based on section 165(a)(4) of the Act, is already included in EPA's PSD regulations for all pollutants generally and thus, in the 2007 NPRM we considered it to be a part of the regulatory framework for the Agency's pollutant-specific regulations for $PM_{2.5}$. 40 CFR 51.166(j) and 52.21(j). Our existing regulations define "best available control technology" as "an emission limitation * * * based on the maximum degree of reduction for each pollutant subject to regulation under the Act * * * which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source through application of production processes or available methods, systems, and techniques * * *." 40 CFR 51.166(b)(12) and 52.21(b)(12). This pollutant control technology requirement, in practice, has required significant reductions in the pollutant emissions increases from new and modified sources while also stimulating the on-going improvement of control

technology. The control of $PM_{2.5}$ emissions through the application of BACT helps to protect air quality values, public health and welfare, and parks and other special areas.

E. Final $PM_{2.5}$ Increments

Based on our evaluation of the effects of $PM_{2.5}$ and a balancing of the criteria in section 166(c) of the Act (and the incorporated goals and purposes of the Act contained in section 101 and the statutory PSD program in section 160 of the Act), EPA has concluded that the "safe harbor" increments for $PM_{2.5}$ (which satisfy section 166(d) of the Act) are sufficient to fulfill the criteria in section 166(c) when combined with the other measures described earlier that we apply to $PM_{2.5}$. Since several of the eight factors applicable under section 166(c) are satisfied by adopting the framework and other measures described earlier, our development of these increments for $PM_{2.5}$ was guided by the four remaining factors that may not be fully satisfied by the framework and other measures: (1) Protecting AQRVs; (2) protecting the public health and welfare from reasonably-anticipated adverse effects; (3) protecting the air quality in parks and special areas, and (4) insuring economic growth.[11] In accordance with the "contingent safe harbor" approach, to determine the specific characteristics of the proposed increments, we first established safe harbor increments representing the level of effectiveness necessary to satisfy the "at least as effective as" requirement in section 166(d) of the Act and then conducted further analysis to determine if additional measures are necessary to fulfill the requirements of section 166(c).

1. Identification of Safe Harbor Increments

Using the percentage-of-NAAQS approach under proposed Option 1, as explained in section V.C.2 of this preamble, we derived the following safe harbor increments for $PM_{2.5}$:

Averaging period	NAAQS (μg/m³)	Increments (μg/m³)		
		Class I	Class II	Class III
Annual	15	1	4	8
24-hour	35	2	9	18

The table shows $PM_{2.5}$ NAAQS levels (primary and secondary NAAQS) at 15 μg/m³ for the annual averaging time and 35 μg/m³ for the 24-hour averaging time. *See* 40 CFR 50.7. From these NAAQS levels, we calculated the safe harbor increments based on the same percentages that were used by Congress to establish the original PM increments (measured as TSP) in section 163 of the Act, *i.e.,* 6.6 percent of the NAAQS for Class I areas, 25 percent of the NAAQS for Class II areas, and 50 percent of the NAAQS for Class III areas. We have concluded that increments with these characteristics are sufficient to satisfy the requirement in section 166(d) that we adopt increments (or other PSD regulations) that are "at least as effective as" the increments established in section 163 of the Act. *See EDF* v. *EPA,* 898 F.2d at 188, 190.

Nine commenters supported proposed Option 1, either explicitly or implicitly supporting our method of calculating the safe harbor increments used to develop increments for $PM_{2.5}$. One of these commenters, while agreeing with the safe harbor increment approach under Option 1, disagreed with our analysis of the adequacy of the safe harbor increments, as discussed in other sections of this preamble. One commenter who opposed Option 1 (based on the belief that section 166(a) of the Act is not the appropriate basis for $PM_{2.5}$ increments) nevertheless supported the percentage-of-NAAQS approach for developing $PM_{2.5}$ increments under the statutory authority at section 166(f).

A commenter who opposed our proposal to calculate increments using percentages of the NAAQS argued that this approach for setting the $PM_{2.5}$ increments is not scientifically supported. This commenter indicated that basing the $PM_{2.5}$ increments on the same percentage of the NAAQS that were used to set PM_{10} increments based on the TSP NAAQS ignores the relationship between PM_{10} and $PM_{2.5}$ emissions, which may be much different than the relationship between TSP and PM_{10} emissions. The commenter argued that, because the ratio of $PM_{2.5}$ to PM_{10} emissions is 0.8, it appears that using the percentages proposed by EPA would indirectly restrict PM_{10}/TSP emissions and air quality impacts to proportionally lower levels than the PM_{10} increments in order to avoid exceeding the $PM_{2.5}$ increments. The commenter conceded that using the 0.8 factor to set $PM_{2.5}$ increments may seem too high, but asserted that using the safe harbor approach would set increments for $PM_{2.5}$ that are too low.

We conclude that the commenter is mistaken in saying that the $PM_{2.5}$ increments use the same percentage of the NAAQS that were used to set the PM_{10} NAAQS. We adopted the PM_{10} increments using the "equivalent substitution" approach set forth under section 166(f) of the Act. Under that approach, rather than calculating the PM_{10} increments as specific percentages of the PM_{10} NAAQS (using the same percentages that Congress used for setting the statutory increments for PM and SO_2), EPA determined the levels of the PM_{10} increments that could represent an equivalent amount of increment consumed, as if the TSP increments were still in effect. *See* 58 FR 31622, June 3, 1993, at 31626–31627. Nevertheless, the commenter is correct that, in cases where the ratio of $PM_{2.5}$ to PM_{10} emissions is 0.8 for an individual source, the source may have to reduce its PM_{10} emissions more than would otherwise be necessary to meet the PM_{10} increments in order to control its $PM_{2.5}$ emissions sufficiently to meet the safe harbor $PM_{2.5}$ increments.[12] This is because the safe harbor $PM_{2.5}$ increments are less than 80 percent of the PM_{10} increments. For example, the Class II 24-hour $PM_{2.5}$ safe harbor increment (9 μg/m³) is only 30 percent of the corresponding PM_{10} increment (30 μg/m³).

The underlying reason that the safe harbor $PM_{2.5}$ increments are so much less than the PM_{10} increments is that the $PM_{2.5}$ NAAQS are much less than the PM_{10} NAAQS.[13] This is the result of the evolution in our knowledge about the health and welfare effects of PM, in particular the effects of the fine PM

[11] We have paraphrased these factors here and in other sections to facilitate the explanation of our reasoning. However, we recognize, as we did in our regulation for NO_X, that the statutory language is broader than the shorthand we use here for convenience.

[12] Note that the PM_{10} increment may still be more limiting in areas where much of that increment has already been consumed.

[13] The 24-hour $PM_{2.5}$ NAAQS (35 μg/m³) is about 23 percent of the 24-hour PM_{10} NAAQS (150 μg/m³).

represented by $PM_{2.5}$. We believe that it is fitting for $PM_{2.5}$ increments to reflect our greater knowledge about $PM_{2.5}$ effects (as embodied in the NAAQS), rather than to simply maintain the control level required by the PM_{10} increments as suggested by the commenter. If this results in $PM_{2.5}$ increments that are more limiting than PM_{10} increments, we believe that this outcome is appropriate in light of our statutory requirement to prevent significant deterioration of air quality as it relates to $PM_{2.5}$.

2. Data Used by EPA for the Evaluation of the Safe Harbor Increments for $PM_{2.5}$

We evaluated whether measures other than the safe harbor increments are necessary by analyzing primarily the scientific and technical information on the health and welfare effects of $PM_{2.5}$ contained in the June 2005 OAQPS Staff Paper which accompanied the last full review of the PM NAAQS completed in 2006.[14]

Section 166(a) of the Act provides that EPA establish pollutant-specific PSD regulations, such as increments, after the establishment of a NAAQS for the applicable pollutants. The Act provides that EPA will promulgate new PSD regulations under section 166, including new increments if appropriate, within 2 years from the promulgation of any NAAQS after 1977. Within that time frame, the health and welfare information used for the setting of the NAAQS would also be "current" for purposes of establishing pollutant-specific PSD regulations. We believe this timing reflects congressional intent that EPA consider the same body of information concerning a pollutant's health and welfare effects when it promulgates the NAAQS and subsequent PSD increments (or other measures) defining significant air quality deterioration for the same pollutant. However, when we used that same information as the basis for our proposed pollutant-specific PSD regulations, we evaluated that information under the legal criteria in section 166 of the Act rather than the criteria in section 109 applicable to the promulgation of NAAQS. *See EDF* v. *EPA,* 898 F.2d at 190.

At the time of our proposal of $PM_{2.5}$ increments, we had just completed a review of the $PM_{2.5}$ NAAQS. Thus, the information used in the NAAQS review was current and timely for purposes of establishing pollutant-specific PSD regulations for $PM_{2.5}$. On October 17, 2006, based primarily on considerable new data on the air quality and human health effects for $PM_{2.5}$ directly, EPA revised the primary and secondary NAAQS to provide increased protection of public health and welfare by retaining the level of the annual standard and tightening the level of the 24-hour standard from 65 to 35 $\mu g/m^3$ while retaining the 24-hour PM_{10} NAAQS and revoking the annual PM_{10} NAAQS. The information contained in both the 2004 Criteria Document and 2005 Staff Paper that was used for the latest review of the PM NAAQS was also considered for the purpose of evaluating the $PM_{2.5}$ increments that we have established in this final rule.

The 2004 Criteria Document and 2005 Staff Paper are the products of a rigorous process that is followed to validate and interpret the available scientific and technical information, and provided the basis for recommending the $PM_{2.5}$ NAAQS. In accordance with the Act, the NAAQS process begins with the development of "air quality criteria" under section 108 for air pollutants that "may reasonably be anticipated to endanger public health or welfare" and that come from "numerous or diverse" sources. Section 108(a)(1). For each NAAQS review, the Administrator must appoint "an independent scientific review committee composed of seven members of the National Academy of Sciences, one physician, and one person representing State air pollution control agencies," known as the Clean Air Scientific Advisory Committee (CASAC). Section 109(d)(2)(A). The CASAC is charged with recommending revisions to the criteria document and NAAQS, and advising the Administrator on several issues, including areas in which additional knowledge is required to appraise the adequacy and basis of existing, new, or revised NAAQS. Section 109(d)(2)(B),(C).

"Air quality criteria" must reflect the latest scientific knowledge on "all identifiable effects on public health or welfare" that may result from a pollutant presence in the ambient air. Section 108(a)(2). The scientific assessments constituting air quality criteria generally take the form of a "criteria document," a rigorous review of all pertinent scientific studies and related information. The EPA also develops a "staff paper" to "bridge the gap" between the scientific review and the judgments the Administrator must make to set standards. *See Natural Resources Defense Council* v. *EPA* ("*NRDC*"), 902 F.2d 962, 967 (D.C. Cir. 1990). Both documents undergo extensive scientific peer review as well as public notice and comment. *See, e.g.,* 62 FR 386542.

3. Scope of Effects Considered

The effects of ambient $PM_{2.5}$ concentrations may include effects from secondarily-formed $PM_{2.5}$. Thus, when we analyzed the data in this rulemaking, we evaluated the health and welfare effects of both direct $PM_{2.5}$ and secondarily-formed $PM_{2.5}$ that may result from the transformation of other pollutants such as SO_2 and NO_X. This was consistent with the approach we described for addressing these effects in the review of our pollutant-specific NO_2 increments regulations. 70 FR 59590.

4. Evaluation of the Health and Welfare Effects of $PM_{2.5}$

Airborne PM is not a specific chemical entity, but rather is a mixture of liquid and solid particles from different sources and of different sizes, compositions, and properties. Particle size distributions show that atmospheric particles exist in two classes: Fine particles and coarse particles. The indicator for fine particles is $PM_{2.5}$, which represents that population of particles that is mostly less than 2.5 micrometers in size. The indicator for thoracic coarse particles is "$PM_{10-2.5}$," which represents particles sized between 2.5 and 10 micrometers. In the last two reviews of the PM NAAQS, EPA concluded that these two indicators, because of their different sources, composition, and formation processes, should be treated as separate subclasses of PM pollution for purposes of setting ambient air quality standards.

Fine PM is derived directly from combustion material that has volatilized and then condensed to form primary PM or from precursor gases, such as SO_2 and NO_X, reacting in the atmosphere to form secondary PM. Major components of fine particles are sulfates, strong acid, ammonium nitrate, organic compounds, trace elements (including metals), elemental carbon, and water. Primary and secondary fine particles have long lifetimes in the atmosphere (days to weeks) and travel long distances (hundreds to thousands of kilometers). They tend to be uniformly distributed over urban areas and larger regions, especially in the eastern United States. As a result, they are not easily traced back to their individual sources.

a. Health Effects

The EPA reported important progress since the last PM NAAQS review in advancing our understanding of potential mechanisms by which ambient $PM_{2.5}$, alone and in combination with other pollutants, is causally linked to a

[14] The review completed in 2006 updated the previous review, which began in 1994 and resulted in revised standards for PM in 1997.

number of key health effects. The more extensive and stronger body of evidence used by EPA to study the health effects of $PM_{2.5}$ in our latest review identified a broader range of effects than those previously documented, involving premature mortality and indices of morbidity (including respiratory hospital admissions and emergency room visits, school absences, work loss days, restricted activity days, effects on lung function and symptoms, morphological changes, and altered host defense mechanisms) associated with both long-term and short-term exposure to $PM_{2.5}$. A more detailed discussion of the health effects associated with $PM_{2.5}$ is contained in the 2007 NPRM. 72 FR 54127–54128. In addition, an overview of the scientific and technical evidence considered in the 2004 Criteria Document and 2005 Staff Paper can be found in our proposed rule for revising the NAAQS for PM (71 FR 2619, January 17, 2006).

b. Welfare Effects

Ambient PM alone, and in combination with other pollutants, can have a variety of effects on public welfare. While visibility impairment is the most noticeable effect of fine particles present in the atmosphere, both fine and coarse particles can have other significant welfare-related effects, including effects on vegetation and ecosystems, materials (*e.g.,* soiling and corrosion), and climate change processes.

In reaching our decision in 2006 to revise the suite of PM secondary standards, EPA factored in several key conclusions from the scientific and technical information contained in the 2004 Criteria Document and 2005 Staff Paper. These conclusions included the following: (1) PM-related visibility impairment is principally related to fine particle levels, and most directly related to instantaneous levels of visual air quality associated with short-term averaging periods; (2) $PM_{2.5}$ concentrations can be used as a general surrogate for visibility impairment in urban areas; (3) any secondary NAAQS for visibility protection should be considered in conjunction with the regional haze program as a means of achieving appropriate levels of protection against PM-related visibility impairment in urban, non-urban, and Class I areas nationwide; (4) the available evidence is not sufficient to support distinct secondary standards for fine or coarse particles for any non-visibility related welfare effects; and (5) the secondary standards should be considered in conjunction with protection afforded by other programs intended to address various aspects of air pollution effects on ecosystems and vegetation, such as the acid deposition program and other regional approaches to reducing pollutants linked to nitrate or acidic deposition.

In this rulemaking, EPA has reviewed the scientific and technical information concerning welfare related effects considered in the 2004 Criteria Document and 2005 Staff Paper to determine whether there is any basis for modifying the safe harbor increments developed for $PM_{2.5}$ to satisfy the criteria under sections 166(c) and 160 of the Act. Our review included information on visibility impairment, and effects on vegetation and other ecosystem components, materials and soiling, and climate changes. A detailed discussion of the various welfare effects we considered for evaluating the safe harbor increments for $PM_{2.5}$ is contained in the 2007 NPRM. 72 FR 54128–54133.

5. Fundamental Elements of Increments

As we have previously noted, under the model established in the Act and prior EPA regulations, the function of an increment is not like that of the NAAQS in that an increment is not intended to set a uniform ambient pollutant concentration "ceiling" across the United States. *See* 70 FR 59600. Instead, while both increments and NAAQS generally serve to limit ambient air pollution levels, increments are designed to allow a uniform amount of pollutant concentration increase for each area in the United States having a particular classification, *i.e.,* Class I, II, or III. The amount of the allowable increase is measured against a baseline air quality level that is typically different for each particular area.[15] Because the baseline air quality level varies from one location to another, and is not established for a particular area until a source proposing to construct in that area submits a complete PSD permit application, it is not possible to determine what the maximum ambient pollutant concentration attainable will be for a given area (to be used to determine the protection afforded by an increment against potential adverse environmental effects) until the specific baseline air quality level is known.

For the reasons described in our NO_2 increments rule, our objective is to establish uniform increments, consistent with the increments for SO_2 and PM originally established by Congress, that allow the same level of deterioration for each area of the country having the same classification. 70 FR 59601. It is important to understand that increments are not intended to reduce ambient concentrations of an air pollutant below existing baseline levels in each area, but rather to define a level of allowable increase in pollutant concentrations above baseline levels, and to identify the level at which "significant" deterioration occurs for each area, in accordance with its specific classification. 70 FR 59600.

6. Evaluation of the Safe Harbor Increments

As indicated earlier (in section V.E.2 of this preamble), mindful of the considerations made about the fundamental characteristics of the increments, we reviewed the scientific and technical evidence available for the 2005 review of the NAAQS for PM in order to determine whether, and to what extent, the "safe harbor" increments might need to be modified in order to protect air quality values, health and welfare, and parks while insuring economic growth consistent with the preservation of clean air resources in accordance with sections 166(c) and 160 of the Act. As we did in our evaluation of the safe harbor NO_2 increments (70 FR 59603–59606), we relied on an approach that evaluates how protective the safe harbor $PM_{2.5}$ increments are by comparing the marginal pollutant concentration increases allowed by the safe harbor increment levels against the pollutant concentrations at which various environmental responses occur.

We analyzed the available evidence from both a quantitative and qualitative perspective to reach a decision about whether we should modify the contingent safe harbor $PM_{2.5}$ increments and whether we have sufficient information to select a specific alternative level, averaging time, or pollutant indicator for the increments. As a result of our analysis, we proposed to conclude that it was not necessary to modify the safe harbor increments to protect human health, address non-visibility welfare effects, or further protect visibility. This analysis is described in detail in the 2007 NPRM.

After considering the comments on our evaluation of the safe harbor increments and the conclusions we reached in the 2007 NPRM (summarized in the following paragraphs), we continue to believe that the safe harbor increments for $PM_{2.5}$ (which satisfy section 166(d) of the Act) are sufficient to fulfill the criteria in section 166(c) of the Act (and the incorporated goals and purposes of the Act in section 101 and the PSD program in section 160) when

[15] It should be noted, however, that an increment does not allow air pollution levels in an area to increase beyond the ambient concentration of a pollutant that would exceed the level allowed by the NAAQS.

combined with the other measures described earlier that we apply to $PM_{2.5}$. Consequently, this final rule establishes the $PM_{2.5}$ increments at the level of the proposed safe harbor increments.

An environmental group submitted extensive comments arguing that the $PM_{2.5}$ safe harbor increments are not sufficient to meet the Act's requirements for PSD and that our analysis was inadequate, and two other commenters submitted more narrowly targeted comments in this area. A summary of the major comments, along with our responses, follows. A more detailed treatment of the comments can be found in the Response to Comments document for this rulemaking, which is available in the rulemaking docket.[16]

The environmental group commenter stated that EPA has not complied with section 166(c) of the Act because the Agency has not made a finding or demonstrated that the $PM_{2.5}$ PSD rules will (as required by section 160(2) of the Act) preserve, protect, and enhance the air quality in parks and special areas. The commenter asserted that EPA offered only vague assertions that the proposed increments would "satisfy" the statutory factors and that they, along with other programs, would "help" to fulfill the statutory purposes. The commenter went on to argue that EPA sought to excuse its failure to show fulfillment of the statutory purposes by asserting that it cannot develop a uniform, quantitative, dose-response relationship between fine particle levels and certain ecosystem impacts (citing 72 FR 54134), but that, even if true, such a claim does not excuse the agency from satisfying its statutory duty under section 166(c).

We conclude that the 2007 NPRM demonstrated that the safe harbor increments, in combination with the other aspects of the regulatory framework, fulfill the statutory requirements despite the scientific uncertainties. We reiterate that finding today. The fact that we did not, in the 2007 NPRM, explicitly state this as a finding does not diminish the demonstration made there and reiterated in this preamble.

The environmental group commenter believes that the relationship between $PM_{2.5}$ and adverse effects can be quantified to a greater extent than stated by EPA. Regarding acid rain and other adverse ecological impacts, the commenter asserted that critical loads can be established as a way of quantifying and limiting the $PM_{2.5}$ contribution to degradation, and noted that critical loads are now used by authorities in Europe, have been endorsed by leading North American scientists, and have been used by Federal land management agencies. To comply with section 166(c), the commenter believes that EPA must establish a mechanism to supplement the nationally uniform increments with additional measures, including a requirement to establish area-specific critical loads or equally protective limits, where necessary to protect and enhance air quality in specific parks and natural areas.

With regard to the critical load concept, we agree conceptually with the commenter that critical loads could be used to supplement the existing increments, especially as a means of protecting the known sensitive ecosystems within Class I areas. While we disagree that the critical loads concept can be used as an effective replacement to increments for limiting air quality degradation, we believe that the concept offers considerable promise in helping to protect sensitive receptors in specific Class I areas. However, we do not believe that it would be appropriate at this time to establish a requirement for area-specific critical loads under the PSD program. In our 2005 PSD rule for NO_2 increments, we indicated that states could propose using information on critical loads as part of their approach for managing air quality in their individual SIP-approved PSD programs, but sufficient information was not yet available for EPA to incorporate the use of critical loads into the national PSD program. *See* 70 FR 59613.

The concept of critical loads is useful for estimating how much pollution a particular ecosystem can experience on a prolonged basis without showing adverse effects. In addition to addressing the opportunity for using critical loads under its NO_2 increment rule, EPA has addressed the concept of critical loads in the last review of the PM NAAQS and currently in the secondary NO_2/SO_2 NAAQS review.[17] To date in the United States, critical loads have had their primary application in the area of atmospheric deposition of sulfur (S) and nitrogen (N). In the last review of the PM NAAQS, EPA found that ambient PM was contributing to the total load of pollutants entering the U.S. ecosystem annually. However, the review also concluded that there were "insufficient data for the vast majority of U.S. ecosystems that differentiate the PM contribution to total N [nitrate] or S [sulfate] deposition to allow for practical application of this approach as a basis for developing national standards to protect sensitive U.S. ecosystems from adverse effects related to PM deposition." The 2005 Staff Paper for the PM NAAQS, in reaching this conclusion, addressed various important factors, including (1) the lack of a long-term, historic database of annual speciated PM deposition rates to establish relationships between PM deposition and ecosystem responses; (2) uncertainty in predicting the amount of PM deposited to sensitive receptors from measured concentrations of PM in the ambient air; and (3) the unique nature of each ecosystem and the current inability to extrapolate with confidence any effect from one ecosystem to another. The 2005 Staff Paper recommended that EPA give serious attention to the critical load concept and recommended the collection of data from a "greater variety of ecosystems over longer time scales to determine how ecosystems respond to different loading rates over time." 2005 Staff Paper at page 7–19.

The review of the secondary NAAQS for NO_X and sulfur oxides (SO_X), which is currently underway, is evaluating ecological effects due to the atmospheric deposition of NO_X and SO_X. The two main targeted effects are acidification and nutrient enrichment in both aquatic and terrestrial ecosystems. This review is attempting to use critical loads to evaluate the impact of current depositional loads and alternative loads in several case study areas. However, as mentioned earlier, the estimation of ecosystem critical loads expressed in terms of PM requires long-term ecosystem-level data on speciated PM deposition rates for which an adequate database is currently lacking for most sites in the United States.

The environmental group commenter also asserted that the safe harbor increments would allow $PM_{2.5}$ air quality to deteriorate to the level of the NAAQS in many locations. According to the commenter's analysis, at 55 percent of the locations with $PM_{2.5}$ monitors that were not already exceeding the $PM_{2.5}$ NAAQS, 24-hour $PM_{2.5}$ concentrations would be allowed to increase up to the level of the NAAQS. In addition, the analysis showed that for 84 percent of locations not already exceeding the NAAQS, the 24-hour $PM_{2.5}$ concentrations would be allowed to increase to a level of 30 μg/

[16] Docket No. EPA–HQ–OAR–2006–0605 can be accessed on line at *http://www.regulations.gov.*

[17] In the 2005 OAQPS Staff Paper reviewing the NAAQS for PM, EPA cited the following accepted definition of "critical load": "quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge." *See* page 6–45.

m^3 or more. The commenter believes that allowing such levels would not be protective of public health, given that we stated in the 2007 NPRM that we had previously found that $PM_{2.5}$ concentrations less than a range of 30–35 μg/m^3 (24-hour average) were protective of public health (citing 72 FR 54128).

The environmental group commenter's analysis showed similar results for the proposed annual $PM_{2.5}$ increments. The commenter asserted that $PM_{2.5}$ concentrations would be allowed to increase up to the level of the annual NAAQS in 55 percent of the locations that are currently in attainment, and that 87 percent of these sites would be allowed $PM_{2.5}$ concentrations of 12 μg/m^3 or higher. Again, the commenter believes that allowing annual concentrations at or above 12 μg/m^3 would not be protective of public health, based on our statement in the 2007 NPRM that we had previously found that $PM_{2.5}$ concentrations less than a range of 12–15 μg/m^3 (annual average) were protective of public health (citing 72 FR 54128).

We do not believe that increments must be set at levels that ensure that the full amount of increment will be available in all locations. The statutory provisions in the PSD program have always been clear that a source must demonstrate that it will comply with both the NAAQS and increments for any pollutant. Consistent with congressional intent, the PSD program does not allow a source to violate the NAAQS just because its emissions will not cause the increments to be exceeded. If the increments were to be developed in such a way that all areas, taking into account current ambient air quality status, would be able to utilize the full amount of increment, then the increment levels would have to be unnecessarily stringent in areas that are substantially cleaner than levels allowed by the NAAQS.

Congress recognized that all areas of the country might not be able to utilize the full amount of increment when they provided provisions within the Act requiring that both the NAAQS and increments must continue to be met at all times. In areas where the full amount of increment is not available due to levels of pollution approaching the NAAQS, states may need to require emissions reductions at existing sources to accommodate the desired amount of economic growth. Hence, we do not believe it is reasonable to unduly restrict economic growth in cleaner areas by setting more restrictive increments to help maintain air quality levels below the NAAQS in areas which are currently only marginally attainment.

In addition, we disagree with the commenter's assertion that the increments will not protect public health. In setting the $PM_{2.5}$ NAAQS at 35 μg/m^3 (24-hour) and 15 μg/m^3 (annual), EPA concluded that these levels protect public health with an adequate margin of safety. Regardless of the level at which the increments are set, no source is permitted to cause the NAAQS to be exceeded. That is, as noted previously, the upper bound on the permissible concentration of $PM_{2.5}$ is determined by the increment or the NAAQS, whichever is more restrictive in each particular case. Thus, the entire framework of the $PM_{2.5}$ regulations, including the safe harbor increments, is protective of public health. In asserting otherwise, the commenter has misconstrued our statements in this regard.

In the 2007 NPRM section on the health effects of $PM_{2.5}$ (72 FR 54127–54128), we discussed the fact that we considered setting the 24-hour NAAQS in the range of 30 to 35 μg/m^3 and the annual NAAQS in the range of 12 to 15 μg/m^3. However, we concluded in setting the NAAQS that 35 μg/m^3 (24-hour) and 15 μg/m^3 (annual) are protective of public health with an adequate margin of safety. We did not say, nor do we believe, that $PM_{2.5}$ concentrations must be below 30 μg/m^3 (24-hour average) or 12 μg/m^3 (annual average) to protect public health.

The environmental group commenter believes that there is a quantifiable relationship between visibility impairment and $PM_{2.5}$ levels, citing the 2007 NPRM discussion (72 FR 54135) as well as the most recent Criteria Document and Staff Paper for $PM_{2.5}$. The commenter pointed out that in the 2007 NPRM (72 FR 54135), EPA observed that the proposed Class II short-term safe harbor increment of 9 μg/m^3, if combined with the estimated daily background levels in most areas (*i.e.,* 10 μg/m^3), would be below the minimum values recommended in the 2005 Staff Paper for the secondary short-term standard for $PM_{2.5}$ (which was 20 μg/m^3). Rather than supporting the adequacy of 9 μg/m^3 as an increment level to protect visibility, the commenter believes that this shows that the safe harbor increment is inadequate because consumption of an increment of 9 μg/m^3 combined with background levels alone would cause an area to reach within 1 μg/m^3 of the staff-recommended value of 20 μg/m^3. The commenter added that most areas would have $PM_{2.5}$ pollution from motor vehicles and stationary sources in concentrations substantially greater than background levels, easily placing these areas above 20 μg/m^3 (citing the 2005 Staff Paper at 2–77).

The environmental group commenter went on to assert that the safe harbor $PM_{2.5}$ increments will not be sufficient to protect visibility in parks and other natural areas. In the 2007 NPRM, we stated that a 24-hour average $PM_{2.5}$ concentration of 20 μg/m^3 correlates to a visual range of approximately 25 to 35 kilometers. 72 FR 54129. The commenter asserted that this visual range distance falls far short of what the National Park Service considers to be good visibility for national parks, adding that the National Park Service has stated that visibility used to be 90 miles (145 km) on average in eastern parks, and 140 miles (225 km), on average in western parks.[18] The commenter stated that the safe harbor increments would allow parks and other natural areas to experience $PM_{2.5}$ pollution that is correlated with a 25–35 km visual range.

The visibility impairment issue is more complex than suggested by the environmental group commenter. In addition to predicting what the maximum ambient change in air quality is for a particular area, a visibility impairment assessment considers such things as the frequency, magnitude, and duration of visibility impacts in order to conclude that an adverse impact will occur.

In addition, the environmental group commenter misconstrued the illustration we included in the 2007 NPRM. We noted that the lowest level we considered as a secondary $PM_{2.5}$ NAAQS was 20 μg/m^3, which was considered to address visibility issues in urban areas. We also noted that in most areas, the estimated 98th percentile of daily background concentrations is less than 10 μg/m^3. In adding the Class II safe harbor increment (9 μg/m^3) to the 98th percentile of background levels, we were simply showing that even in the worst case, the combination of the safe harbor increment and background $PM_{2.5}$ would not exceed the most stringent level we considered for the secondary $PM_{2.5}$ NAAQS. The commenter presented this rough, worst-case calculation as if it represented the typical situation that would result from the safe harbor increments. In addition, the environmental group commenter's statements do not apply to parks and special areas that are classified as Class

[18] The commenter cited *http://www.nps.gov/shen/naturescience/visibility_and_haze.htm* for historic visibility in national parks.

I areas because the safe harbor increments for such areas are much lower.

Another commenter stated that the proposed 24-hour Class I increment (2 μg/m^3) would not be protective of AQRVs, particularly visibility. This commenter noted that the National Park Service uses a 5 percent change in light extinction from estimated natural conditions as the threshold for "adverse impacts" to Class I visibility. The commenter indicated that depending on the constituents of the ambient $PM_{2.5}$ and the humidity, a concentration of 2 μg/m^3 in a typical Class I area would result in a change in light extinction ranging from 13 to 80 percent in the Western United States and from 8 to 50 percent in the Eastern United States and, therefore, would likely constitute "adverse impacts" to Class I visibility. While acknowledging that the FLM may still determine that the visibility in the Class I area is adversely affected by an increase in concentration that is less than the increment, this commenter pointed out that we stated in the 2007 NPRM that "generally speaking an increment should not be so large that it routinely results in substantially more pollution in Class I areas than is generally acceptable under the AQRV approach" (citing 72 FR 54135). The commenter concluded that the proposed 24-hour $PM_{2.5}$ increment does not meet this test and recommended that EPA set a lower $PM_{2.5}$ 24-hour increment.

This commenter appears to have identified a worst-case scenario in terms of increment concentrations, and although we agree with the visibility impacts related to those concentrations discussed in the comment, we do not believe the proposed increment level compromises the protection of visibility or other AQRVs. Although the "AQRV test" uses 5 percent light extinction as a screening threshold, the determination of adverse impact is made on a case-by-case basis taking into account the geographic extent, intensity, duration, frequency, and time of visibility impairment and how these factors correlate with visitation to the Class I area. The suggestion that the 5 percent threshold is routinely exceeded by PSD sources or that an absolute worst-case scenario is occurring to the geographic extent, intensity, duration, and frequency that would warrant an adverse impact determination is unsupported, especially considering the relatively few adverse impact determinations that have been made in the past. It is, however, important to note that the AQRV analysis is independent of the PSD increment analysis; whether or not the increment is projected to be exceeded does not determine the need for an AQRV analysis. The determination that a facility does or does not cause an adverse impact on a Class I area is not solely contingent upon the PSD increment, so we do not believe that lowering the proposed increment is necessarily more protective of the AQRV.

With respect to these two commenters' concerns about visibility protection, we continue to believe that the increments cannot be expected to be the sole means of protecting various welfare concerns. In the 2007 NPRM, we stated that "visibility protection in Class I areas is more adequately provided by the AQRV process." Congress defined AQRVs to specifically include visibility and left it for the FLMs to define other special attributes of Class I areas that warranted special protection. We also noted that Congress has established several visibility programs that target emissions reductions to achieve desired visibility benefits. *See* 72 FR 54135. Collectively, these protective programs, along with the totality of the PSD program, offer an effective means of addressing unique local problems that cannot be addressed solely by uniform national increments.

However, the environmental group commenter asserted that these other programs will not fulfill the statutory purposes. As discussed previously in sections V.D.4 and 5, the commenter does not believe that FLM review in the AQRV process and the air quality impacts analysis required by section 165(a) of the Act are adequate. We disagree; *see* sections V.D.4 and 5 for more detail on the comments and our responses.

The environmental group commenter also noted that we cited the regional haze program as a justification for adopting less protective PSD rules (referring to 72 FR 54135), but the commenter pointed out that the haze program applies only to Class I areas and does not apply at all to the majority of the nation, which is Class II. The commenter further noted that we stated in the 2007 NPRM that "some State and local governments have also developed programs to improve visual air quality in specific urban areas" (citing 72 FR 54135), and pointed out that we gave no specific information on such programs, nor any information about the visibility protection that they provide beyond that provided by the proposed increments. The commenter asked that we identify the specific State and local programs, and that we specify how much visibility protection such programs are providing.

The commenter is correct that the regional haze program directly addresses only Class I areas. As we have discussed before, these are the areas that Congress defined as deserving of the most protection under PSD, including the visibility protection provisions in subpart 2 of title I, part C of the Act, which is the statutory basis for the regional haze program. While Class I areas are the target for the regional haze program, we believe that many areas of the nation will receive collateral visibility benefits from this program. As emissions of the pollutants that cause regional haze are reduced, many areas in the paths of transport will benefit. In addition, as discussed previously in section V.D.5 of this preamble, PSD applicants must prepare an analysis of "other impacts," including visibility impacts, in areas other than Class I areas.

Regarding State and local visibility programs, in the 2005 Staff Paper EPA described several existing programs to improve visual air quality in urban areas. These programs were located in Denver, CO; Phoenix, AZ; and Lake Tahoe, CA. Also, the states of California and Vermont have each established standards to protect visibility. *See* the 2005 Staff Paper, pages 6–17 through 6–23.

The environmental group commenter cited the 2007 NPRM (72 FR 54135) where we said that the use of "distinct PM increments for visibility protection is not the most effective means of addressing the visibility problem." The commenter believes that this claim is based on false premises, including the idea (discussed previously) that other programs effectively protect visibility nationwide, and the idea that the only option is a "distinct" PM increment for visibility protection. As to the latter, the commenter stated that EPA can strengthen the safe harbor increment to ensure visibility protection and need not adopt a separate "visibility" increment. In addition, the commenter asserted that EPA has ignored the statutory mandate that the PSD rules fulfill the statutory goals and purposes, and that we cannot shirk that statutory duty merely because we claim some other type of action would be "more effective."

We continue to believe that Class I area visibility protection under the PSD program is appropriately addressed via the AQRV process. As mentioned previously, Congress explicitly included "visibility" as an AQRV for which FLMs would have an affirmative responsibility to protect in Class I areas under their jurisdictions. Where the FLM successfully demonstrates that there

would be an adverse impact on the AQRV (*e.g.,* visibility), a State cannot issue a PSD permit, even when the source's emissions do not violate the $PM_{2.5}$ increments. In addition, we continue to believe that the analysis of other impacts, including visibility, in non-Class I areas is the appropriate means of addressing visibility protection in these areas, as envisioned by Congress when it enacted the PSD provisions of the Act.

As a result, we do not believe it is necessary to create a distinct increment (*e.g.,* with a different averaging period) or to lower the safe harbor increments to protect visibility in urban, non-urban, or Class I areas across the United States. We reach this conclusion in proper consideration of the other, more direct approaches being used to address visibility problems in the United States. The primary such approach, the regional haze program, is within the PSD framework for $PM_{2.5}$. Note that part C of title I of the Act, "Prevention of Significant Deterioration of Air Quality," includes subpart 2, which is the statutory basis for the regional haze program. Regarding our consideration of other State and local visibility protection measures that are outside the PSD framework, we do not believe it is reasonable to disregard these area-specific measures that focus on the preferences of individual communities where a uniform national increment for visibility protection generally cannot.

The environmental group commenter also stated that the proposed PSD rules fail to ensure fulfillment of the "enhancement goal" set out in the Act. The commenter noted that section 101(a) states as the Act's first purpose: "to protect and enhance the quality of the Nation's air resources," while section 160(2) states that the purpose of the PSD program is to "preserve, protect, and enhance" air quality in parks and other special areas. The commenter asserted that the proposed rule did not address these enhancement requirements or explain how the proposed increments would fulfill those requirements.

This same issue was raised in the 2005 PSD rule affirming the NO_2 increments. At that time we expressed our belief that the goal to enhance air quality in national parks and wilderness areas is implemented through the regional haze program while the PSD program focuses on preserving and protecting air quality in these areas. However, when a PSD increment violation is identified, we agree that EPA may require a State to revise its SIP to correct the violation. *See* 40 CFR 51.166(a)(3). Otherwise, we do not interpret these PSD provisions to authorize us to direct states in their SIPs to achieve reductions in emissions from existing sources for PSD purposes.

We recognized at that time, and continue to believe, that the growth management goals of PSD may also be fulfilled when the states adopt controls on existing sources that would reduce emissions and allow growth from new sources and major modifications to existing sources without causing significant deterioration. Under the increment approach, we have interpreted the PSD rules to allow states to require reductions from existing sources in order to expand the allowable increments and, thereby, allow for more growth under the PSD program. However, we have never required states to do so because, in the absence of an increment violation, we do not believe section 166 and other provisions in part C of title I of the Act give us the legal authority to mandate such reductions for PSD purposes.

Another commenter stated that the $PM_{2.5}$ increments should be twice the recommended levels because scientific studies do not support the need for such low levels for protection of health and welfare. The commenter believes that increments at the proposed levels would jeopardize the goal of providing opportunities for economic growth. The commenter expressed concern over EPA's use of epidemiologic studies and questioned the ability of such studies to provide a reliable evaluation of health risks. The commenter claimed that epidemiologic studies are capable of finding association between a substance or exposure and a health effect but rarely capable of determining if there is causation, while toxicological studies using randomized trials are specifically designed to determine causation. The commenter added that other factors providing evidence for causation include dose-response relationships, consistency, and repeatability of studies, which the commenter said are not present in the studies cited by EPA. The commenter specifically referred to two studies, acknowledged by EPA to show no evidence of a dose-response relationship gradient between $PM_{2.5}$ and specific health related effects.

We disagree with the commenter's recommendation that the increments should be twice the proposed (and final) levels. The scientific studies to which the commenter referred pertain to studies that EPA used to determine the health-based NAAQS for $PM_{2.5}$, and we do not believe it is relevant to this rule to respond to comments related to the setting of the NAAQS. The NAAQS are designed to protect public health and welfare; increments then are intended to insure that air quality in clean areas is not allowed to deteriorate significantly, and the PSD regulations insure that any such deterioration does not lead to air pollution levels that exceed the levels defined by the NAAQS.

As discussed previously, we are finalizing this rulemaking using the safe harbor approach under section 166(a) of the Act. Using this approach, we calculated the "safe harbor" increments as percentages of the NAAQS comparable to the percentages that Congress used to establish the original statutory increments for PM and SO_2. These values represent the level of effectiveness necessary to satisfy section 166(d) of the Act, and could be tightened if necessary based on further analysis to determine if additional measures are necessary to fulfill the requirements of section 166(c) of the Act. Thus, under this approach and on this record, we do not conclude that it is appropriate to finalize increments at levels any less stringent than the safe harbor increments, as the commenter recommends.

7. Compliance Determinations for the $PM_{2.5}$ Increments

a. Modeling Compliance With $PM_{2.5}$ Increments

Section 163(a) of the Act provides that "In the case of *any* maximum allowable increase * * * for a pollutant based on concentrations permitted under the national ambient air quality standards for any period other than an annual period, such regulations shall permit such maximum allowable increase to be exceeded during one such period per year [emphasis added]." Accordingly, the existing PSD rules allow one exceedance per year of each short-term increment defined by the rules. *See* 40 CFR 51.166(c) and 52.21(c). With the addition of the $PM_{2.5}$ increments to the list of maximum allowable concentrations in the PSD rules, the existing provision allowing one exceedance per year applies equally to the 24-hour $PM_{2.5}$ increments as well. Thus, when modeling increment compliance, the highest value of the second-highest modeled increase in estimated $PM_{2.5}$ concentrations at each model receptor for the 24-hour averaging time should be less than or equal to the maximum allowable increase for $PM_{2.5}$. For the annual increments, the modeled annual averages should not exceed the annual maximum allowable increase for $PM_{2.5}$. *See* EPA's "Guideline on Air Quality Models" at 40 CFR part 51 appendix W, section 10.2.3.3.

We did not expressly state in the 2007 NPRM the implications of adding $PM_{2.5}$ increments to the existing list of increments in 40 CFR 51.166(c) and 52.21(c) of the PSD regulations. Nevertheless, it should have been clear at the time that, in the absence of alternative language for $PM_{2.5}$, the existing provision allowing one exceedance for the short-term increments would apply to the increments for $PM_{2.5}$ along with the increments already listed. We did not receive any comments either supporting or opposing these methods for determining compliance with the $PM_{2.5}$ increments.

We recognize that the above approach for determining compliance with the 24-hour $PM_{2.5}$ increments differs from the approach contained in guidance that we provided in a March 23, 2010 memo titled "Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS," which sets forth a procedure designed to demonstrate compliance with a statistically based standard that is met when the 98th percentile 24-hour concentration is less than or equal to 35 ug/m^3. A similar dichotomy exists for the 24-hour PM_{10} increments and NAAQS, where compliance with the 24-hour PM_{10} NAAQS is based on an expected exceedance form of the standard.

b. Condensable PM

Initially, the EPA will not require PSD applicants under the Federal PSD program to consider condensable PM in emissions calculations to determine whether a proposed project is subject to the PSD requirements. In addition, we will not require the condensable portion to be considered in the required $PM_{2.5}$ air quality analyses. In our May 2008 $PM_{2.5}$ NSR Implementation Rule, we announced that we would not require that states address condensable PM in establishing enforceable emissions limits for either PM_{10} or $PM_{2.5}$ in NSR permits until the completion of a transition period. Further, we indicated that the transition period would end January 1, 2011 unless EPA advanced the date through the rulemaking process. We also indicated that such rulemaking would involve the assessment and possible revision of test methods for measuring condensable emissions and taking comment on an earlier closing date for the transition period in the NSR program if we are on track to meet our expectations to complete the test methods rule much earlier than January 1, 2011.[19] In addition, states that have developed the necessary tools are not precluded from acting to include condensable PM emissions in NSR permit actions prior to the end of the transition period, especially if it is required in an applicable SIP. *See* 73 FR 28334–28336.

c. $PM_{2.5}$ Precursors

In the 2007 NPRM, we proposed to add SILs for $PM_{2.5}$ to the PSD regulations at 40 CFR 51.166 and 52.21. (The SILs are described more fully in section VI of this preamble.) Accompanying these SILs, we proposed to add a new paragraph to the regulations explaining that the requirements for a source impact analysis for $PM_{2.5}$ would be considered to be satisfied, without further air quality modeling, if it were to be shown that the increase in direct $PM_{2.5}$ emissions from the source or modification will cause air quality impacts less than the prescribed SILs for $PM_{2.5}$. The reasoning at the time was that state-of-the-art modeling would not be available to adequately account for secondary $PM_{2.5}$ impacts resulting from emissions of precursors of $PM_{2.5}$, *e.g.,* SO_2 and NO_X. Nevertheless, the existing PSD rules currently define potential precursors of $PM_{2.5}$. Based on the proposed language, the required compliance demonstration for the $PM_{2.5}$ NAAQS and the $PM_{2.5}$ increments (when promulgated) would be limited by regulation to an analysis of direct $PM_{2.5}$ emissions, and would not include consideration of emissions of $PM_{2.5}$ precursors for comparing the modeled source impacts to the prescribed SILs for $PM_{2.5}$.

The impacts of $PM_{2.5}$ precursors on ambient concentrations of $PM_{2.5}$ cannot be determined from the dispersion models that EPA has currently approved for modeling individual PSD sources. Such models are not designed to consider chemical transformations that occur in the atmosphere after the precursor emissions have been released from the source. Consideration of these transformations is necessary to be able to add precursor impacts into the total modeled ambient $PM_{2.5}$ concentrations for comparison to the SILs for $PM_{2.5}$.

The technical tools needed to complete a comprehensive analysis of all emissions that contribute to ambient concentrations of $PM_{2.5}$ are only in the developmental stage; nevertheless, we believe that it would be inappropriate to restrict the regulatory language in such a way that future regulatory amendments would be required to enable the inclusion of precursor impacts in the $PM_{2.5}$ analysis as the necessary technical tools become available. Estimating techniques are being developed that will be able to be applied to the $PM_{2.5}$ analysis in the near future, which could not be required if the regulatory language precluded them. We acknowledge the concerns that have been expressed by some commenters about the shortcomings of not considering the impacts of $PM_{2.5}$ precursors under the $PM_{2.5}$ air quality analyses. Accordingly, we believe that the new provision for applying the SILs for $PM_{2.5}$ to the required analyses for the NAAQS and increments should not be self-limiting by specifying the use of only direct $PM_{2.5}$ emissions. Instead, the new provision contained in this final rule provides that the test will be based on whether "the emissions increase * * * would cause * * * air quality impacts less than [the $PM_{2.5}$ SILs]." *See* new 40 CFR 51.166(k)(2) and 52.21(k)(2). We believe that it would be more effective to rely on interim policy and guidance as appropriate to help determine the best methods available to make the required assessment of source impacts on ambient $PM_{2.5}$ resulting from any emissions.

F. Final Action on Trigger and Baseline Dates for $PM_{2.5}$ Increments

In the 2007 NPRM, we proposed as part of Option 1 to require the implementation of the $PM_{2.5}$ increment system (annual and 24-hour increments) with new baseline areas, baseline dates, and trigger date. Specifically, we proposed that the major source baseline date and trigger date, both fixed dates, would be defined as the effective date of the final rule and would reflect a date 1 year from the date of promulgation, in accordance with section 166(b) of the Act. In contrast, under Option 2 (both 2A and 2B), we proposed to establish new baseline dates for the 24-hour $PM_{2.5}$ increments, but to retain the existing baseline areas and dates for the annual $PM_{2.5}$ increments because the annual increments would be equivalent substitutes for the existing annual PM_{10} increments.

In light of the then-current and expected trends in $PM_{2.5}$ concentrations, our judgment was that starting with new baseline dates on or after the effective date of this rule would make the PSD increments for $PM_{2.5}$ more protective. We proposed that any emissions reductions occurring prior to the effective date of this rule would lower

[19] We proposed test methods for measuring PM_{10} and $PM_{2.5}$, including condensable PM emissions, from stationary sources on March 25, 2009 (74 FR 12970). In the same notice, we sought comments on whether to end the NSR transition period for condensable PM earlier than January 1, 2011. We anticipate publication of a final rule announcing our decision on the NSR transition period in July 2010.

the baseline concentration rather than be used for expanding the $PM_{2.5}$ increment. If a retroactive baseline date were to apply, emissions reductions occurring prior to the effective date of this rule would serve to expand the available increments, enabling more new pollution than would otherwise be allowed to occur.

We also expressed our belief that starting with different baseline dates to implement increments for $PM_{2.5}$ would be appropriate because Option 1 treats $PM_{2.5}$ essentially as a "new" pollutant for purposes of PSD and section 166 of the Act. We continue to believe that establishing a new baseline also overcomes significant implementation concerns that would otherwise exist if the existing PM baseline were maintained. In particular, if we were to require sources and reviewing authorities to conduct $PM_{2.5}$ increment analyses based on the minor source baseline dates previously established years or even decades ago under the TSP or PM_{10} program, they would have to attempt to recreate the $PM_{2.5}$ emissions inventory as of the minor source baseline date in order to determine the baseline $PM_{2.5}$ concentration for the area. For early minor source baseline dates in particular (*e.g.,* 1976 in some areas of the United States), establishing the emissions inventory for $PM_{2.5}$ would be extremely difficult, cumbersome, and potentially inaccurate because historic emissions inventories did not include $PM_{2.5}$ emissions. For all of these reasons, we proposed Option 1 as our preferred option and requested comment on this contingent safe harbor approach for annual and 24-hour $PM_{2.5}$ increments under Option 1.

Under Option 1, we proposed that the $PM_{2.5}$ increments would be subjected to a 1-year delay consistent with the procedures under section 166(b) of the Act, which provides in general that these rules "shall become effective one year after the date of promulgation." Alternatively, we sought comment on a 60-day delay as part of our proposal under Option 1. In the proposal we requested comment on the argument that, while the Act includes a 1-year implementation delay for new increments, the same provision calls for EPA to promulgate new increments within 2 years of the promulgation of the NAAQS. Given that these $PM_{2.5}$ increments are being promulgated more than 2 years after promulgation of the NAAQS, we expressed our belief that the overall congressional intent reflected in section 166 of the Act could possibly be met by setting the effective date of the $PM_{2.5}$ increments earlier than the "one year after the date of promulgation" provided in section 166(b) of the Act.

Twelve commenters supported our proposal under Option 1 to establish new trigger and baseline dates for $PM_{2.5}$, regardless of the particular increment option that they otherwise supported. These commenters generally saw new dates as being the best approach because of various problems that would result from retaining existing trigger and baseline dates. Some commenters claimed that it would be technically difficult to try to reconstruct old inventories to determine the amount of $PM_{2.5}$ emitted by sources in the past.

One commenter stated that establishing $PM_{2.5}$ increment inventories using existing PM_{10} baseline dates would be "extremely difficult, cumbersome, and necessarily inaccurate and unreliable as historic emissions did not speciate $PM_{2.5}$ emissions." A State/local agency commenter said that it would be "virtually impossible for States to calculate the $PM_{2.5}$ component of previously consumed PM_{10} increments because data on the fine and coarse fractions of source emissions are largely unavailable."

Yet another commenter claimed that "resurrecting $PM_{2.5}$ inventories based on the PM_{10} baseline dates would be insurmountable." Similar comments were echoed by several commenters who supported the use of legal authority set forth in section 166(f) ("equivalent substitution" approach) for developing the numerical values for the $PM_{2.5}$ increments. One of these commenters stated that he did not "believe the establishment of new baseline dates for $PM_{2.5}$ would abandon past cases of increment consumption for PM_{10}, because the 24-hour PM_{10} increments would still be in effect * * *."

One commenter suggested that "EPA establish the trigger date as of the date when it officially established the non-attainment and attainment areas for $PM_{2.5}$; that is, April 5, 2005." The commenter explained that this approach is consistent with the PSD regulations from their inception and partially mitigates EPA's delays in implementing the PSD program for $PM_{2.5}$. The commenter believes "that States should be required to use the baseline areas previously established for their PSD program, unless the process for redefining these areas strictly follow procedures in the PSD regulations and EPA policy." The commenter claimed, "this will minimize any inconsistent applications of the regulations for $PM_{2.5}$."

One commenter noted that our proposed $PM_{2.5}$ increments were very low and "facilities may find themselves immediately out of compliance with the $PM_{2.5}$ increments upon promulgation of the rule, based on a January 1975 or 1977 baseline date."

One commenter indicated that the historic TSP/PM_{10} baseline dates should be retained. This commenter favored the equivalent substitution approach under section 166(f) and, consistent with that approach, retention of the existing baseline dates.

Having considered all the comments, we believe that the most reasonable approach for addressing the relevant dates associated with the $PM_{2.5}$ increments is to start anew with the baseline date concept. As already mentioned, the commenters have identified difficulties that would occur if the $PM_{2.5}$ emissions inventory for increment analyses had to be created for an earlier period of time, and the existence of these difficulties supports the approach under Option 1 to establish new dates for implementing the $PM_{2.5}$ increments. Also, these new baseline dates for $PM_{2.5}$ increments will not undo the current protection provided by the existing increments for PM because we are not revoking the 24-hour or annual PM_{10} increments under this new rule. Accordingly, this final rule establishes independent $PM_{2.5}$ increments using a "trigger date" and "major source baseline date" that are separate from the dates defined for the PM_{10} increments. Consequently, new minor source baseline dates and the corresponding baseline areas will be used for the annual and 24-hour $PM_{2.5}$ increments, and will be established when a source applies for a PSD permit any time on or after the new trigger date for $PM_{2.5}$. (See also the discussion about changes to the definition of "baseline area" in section V.G of this preamble.)

The "major source baseline date" for $PM_{2.5}$ is being set as October 20, 2010—the date of publication of this final rule. The setting of this date differs from previous major source baseline dates which were set as the date of publication of the proposed rule, but is similar to the major source baseline date set for the other increments in that the date precedes the effective date for implementing the increments, and thereby requires that certain major source emissions increases that occur before the trigger date retroactively count toward the amount of increment consumed.

The "trigger date" is being set at October 20, 2011, which is 1 year after the date of promulgation of this final rule. We are using this approach to define the date on which the $PM_{2.5}$ increments become effective as 1 year

from the date of publication, consistent with the 1-year delay required under section 166(b) of the Act. This date for the "trigger date" separates the applicability date of the $PM_{2.5}$ increments from the effective date of this final rule in general, but also ensures that the "minor source baseline date" for $PM_{2.5}$ for any particular $PM_{2.5}$ attainment or unclassifiable area cannot be established until after the increments become effective in this final rule. The implementation of these dates as part of the $PM_{2.5}$ increment system is discussed in greater detail in section VIII of this preamble.

We recognize that some may still have a concern about our decision to set the major source baseline date as the date of publication of this final rule in light of the fact that the $PM_{2.5}$ NAAQS have been in place since 1997; however, we believe that the selection of possible earlier dates would require states to retroactively establish $PM_{2.5}$ emissions inventories for increment analyses during a period when sources were generally not required to conduct $PM_{2.5}$ air quality analyses. Hence, given the lack of information, and considering the technical difficulties in doing so, we do not believe that it would be appropriate to require states and sources to retroactively account for $PM_{2.5}$ increment consumption by setting the major source baseline date at an earlier date than the date we have selected.

G. Definition of "Baseline Area" for $PM_{2.5}$

No changes were proposed with respect to the definition of "baseline area" for $PM_{2.5}$ increments. One commenter, however, noted that fact in claiming that we did not adequately account for significant impacts of $PM_{2.5}$ for purposes of defining the "baseline area" for the $PM_{2.5}$ increments. Under the existing regulations, the establishment of a baseline area for any PSD increment results from the submittal of the first complete PSD application, and is based on both the location of the proposed source and the impact of the source's emissions on the area. In accordance with the definition, the attainment or unclassifiable area in which the proposed source would construct is always part of the baseline area in which the minor source baseline date is established and the increment analysis is conducted. In addition, the definition provides that any surrounding attainment or unclassifiable area in which the proposed source's impact is greater than 1 $\mu g/m^3$, annual average, would also become part of the baseline area, assuming the area had not already been established as a baseline area by a previous application for a PSD permit. *See* 40 CFR 51.166(b)(15) and 52.21(b)(15).

As explained in the preamble for the 1980 PSD regulations, EPA selected an impact of 1 $\mu g/m^3$, annual average, for the definition of "baseline area" because that value was considered the level of significance for both SO_2 and PM when the definition was originally established.[20] There was no mandate at that time that a 1 $\mu g/m^3$ impact be used to determine the baseline area for increments for other pollutants; however, the use of a 1 $\mu g/m^3$ impact in the definition of "baseline area" was not changed when EPA developed increments for NO_2 in 1988 because EPA also defined "significant" for NO_2 using the same annual average concentration of 1 $\mu g/m^3$. The EPA has determined, however, that "significant" for $PM_{2.5}$ ambient impacts should be considered to occur at a lower concentration than 1 $\mu g/m^3$. Elsewhere in this preamble, we have indicated that the SIL for $PM_{2.5}$ in this final rule is 0.3 $\mu g/m^3$, annual average. Consequently, although no change to the definition of "baseline area" was proposed in this rule, we believe it is necessary and appropriate to define in this final rule a level of significance of 0.3 $\mu g/m^3$, annual average, for establishing a new baseline area for purposes of $PM_{2.5}$ increments. *See* revised 40 CFR 51.166(b)(15)(i) and 52.21(b)(15)(i).

Had we established the SIL at 1 $\mu g/m^3$, annual average, as proposed under Option 1 for SILs, then the definition of "baseline area" would not need to be revised. However, the revised definition in this final rule is consistent with our decision to establish a SIL of 0.3 $\mu g/m^3$, annual average, for $PM_{2.5}$. We consider this action to be a logical outgrowth of our decision to establish a SIL for $PM_{2.5}$ and the comment concerning the effect of that action on the definition of "baseline area." Thus, we believe that our failure to initially propose this change to the definition of "baseline area," based on the possibility of selecting Option 3 for defining the SIL for $PM_{2.5}$, does not warrant a reproposal.

H. No Final Action With Respect to the Proposed Revocation of PM_{10} Annual Increments

In the 2007 NPRM, we proposed to either revoke or replace the annual increments (Class I, II, and III) for PM_{10} to conform to the earlier revocation of the annual PM_{10} NAAQS. We proposed to revoke the annual increments, based on the same technical evidence that led us to revoke the annual PM_{10} NAAQS, if we decided to use Option 1 for adopting $PM_{2.5}$ increments, and discussed our authority and rationale for doing so. 72 FR 54136.

As an alternative, under Options 2A and 2B we proposed to replace the existing annual PM_{10} increments with equivalent substitute $PM_{2.5}$ increments using the authority under section 166(f) of the Act. After further analysis and consideration of the comments on this issue, we have decided not to take any final action on our proposal to revoke the existing increments for PM_{10} as part of this rulemaking. The effect of not taking final action with respect to the PM_{10} annual increments is to leave those increments in place and unchanged.

Three commenters agreed with EPA's proposal to "adopt the 24-hour and annual $PM_{2.5}$ increments and to revoke the annual PM_{10} increments." One commenter stated, "counting and tracking increment is confusing enough without adding the confusion of potentially overlapping PM standards." The commenter noted that the "cleanest approach is to establish a single new $PM_{2.5}$ increment and work from there." The commenter suggested that EPA first "develop a coarse fraction increment, once EPA establishes coarse PM NAAQS." The commenter added that the removal of the PM_{10} annual increment is supported by the removal of the "health based standard for annual PM_{10}."

One of the commenters agreed, "it makes no sense for EPA's regulations to contain an annual increment for PM_{10} even though an annual PM_{10} NAAQS no longer exists." The commenter added, "EPA is without authority under Section 166(f) to retain the PM_{10} annual increment if it adopts a $PM_{2.5}$ annual increment." This commenter explained, "EPA is compelled by law to eliminate the PM_{10} annual increment."

We agree with this commenter that section 166(f) is a "substitution" approach; however, as we stated in our 2007 NPRM, we expressed some concern about using section 166(f) to substitute $PM_{2.5}$ increments for PM_{10} increments. In fact, some commenters challenged our authority under section 166(f) to replace the PM_{10} increments. In our response to the following comments, we address the legal issues that we believe prevent us from simply revoking the PM_{10} increments.

[20] "A source will be considered to impact an area if it has an impact of 1 $\mu g/m^3$ or more of SO_2 or PM on an annual basis. This figure has been selected because it corresponds to levels of significance used in previous Agency determinations for SO_2 and PM. 45 FR 52716.

One environmental commenter claimed, "the agency has no authority to repeal an existing PM_{10} increment without at the same time restoring the corresponding TSP increment." The commenter noted, "Congress established the TSP increments by statute and gave EPA no authority to revoke them," and "instead, Congress gave EPA only limited authority to substitute PM_{10} increments for TSP increments under the conditions specified in Section 166(f)." The commenter explained, "EPA cannot revoke the annual PM_{10} increments, either by "replacing" them with $PM_{2.5}$ increments or otherwise, unless EPA at the same time restores the annual TSP increment." The commenter noted, "retention of the PM_{10} annual increment is also entirely compatible with the statutory purposes, notwithstanding EPA's revocation of the annual PM_{10} NAAQS." The commenter further noted the following examples/evidence that retention of the annual PM_{10} increments is important to achieving the goals of the Act's PSD provisions:

- "While EPA attributes the visibility impairing impacts of PM pollution primarily to elevated short term fine particle concentrations, EPA recognizes that PM_{10} plays a significant role in the other welfare related impacts of PM pollution." 72 FR 54136.
- "EPA also states that the most significant PM-related ecosystem-level effects result from long term cumulative deposition * * * that exceeds the natural buffering or storage capacity of the ecosystem and/or affects the nutrient status of the ecosystem." 72 FR 54131.

Five State/local agency commenters opposed the revocation of PM_{10} annual increments "until EPA makes a determination on a PM-coarse NAAQS" and/or "establishes equivalent increments for PM-coarse." One of these commenters added, "it is prudent to maintain the PM_{10} increments until EPA makes a determination on the health and environmental effects of the coarse fraction of PM." The commenter claimed that, "if EPA retains the annual PM_{10} increments" "then the determination of $PM_{2.5}$ increments can complement the continuation of PM_{10} increment determinations without any discontinuities or unwanted degradation concerns."

Another one of these commenters stated, "the basis for dismissing the annual PM_{10} NAAQS by the substitution of fine particle NAAQS to address certain health and welfare effects does not provide a basis for dismissing a PSD increment which is meant to stop significant degradation of air quality." The commenter noted, "as refinements are made to estimation of fine particle emissions or in instances where these are deemed not to be a major component of particulate emissions, the PM_{10} annual increment could prevent long term deterioration of air quality associated with the coarse component."

One State/local agency commenter noted, "EPA also proposes to replace the PM_{10} annual increment with the corresponding $PM_{2.5}$ increment under the Section 166(f) options 2A and 2B as well, but does not provide a substantive basis for such an action." The commenter does "not see the tension noted by EPA between Sections 166(a) and (f) with respect to reaching a holistic solution if EPA views $PM_{2.5}$ as a new indicator of PM, as we believe it can." The commenter explained, "under this approach, if EPA determines that coarse particle levels are necessary to protect the public from certain exposures not addressed by $PM_{2.5}$, then it will be appropriate for EPA to define complementary increments for coarse particulates as another indicator of PM." The commenter also asserted that the 24-hour increments for $PM_{2.5}$ must be based on section 166(f) authority, but believes that the $PM_{2.5}$ increment need not replace the PM_{10} increment for this averaging period.

One commenter requested that EPA "keep the PM_{10} PSD program (especially the increments) in place until the full $PM_{2.5}$ program is adopted and in place."

One commenter "does not support revoking the annual PM_{10} increments," because the commenter feels that "there are too many uncertainties regarding $PM_{2.5}$." The commenter provided the following example: "The program has been dragging for years, analytical methods are not formulated, the NSR part of the implementation rule has not issued, condensables are not yet included, and the impact of precursors has not been definitively explored." The commenter explained that "under these conditions, nothing concerning PM_{10} should be revoked until the reasons for doing so are clearly understood and the overall impact on ensuring clean air and the public health and welfare have been fully explored." The commenter suggested, "PM_{10} increments and NAAQS should remain in effect until these issues have been resolved to the satisfaction of the Administrator." This commenter believed that Options 2A and 2B must be based entirely on section 166(f) of the Act, but that the presence of increments for both PM_{10} and $PM_{2.5}$ can be supported under this section because the two sets of increments complement each other. The commenter indicated that the problem will be resolved when sufficient data are available to revoke the PM_{10} NAAQS and increments and/or PM_{10} is replaced by $PM_{10-2.5}$.

One State/local agency association commenter recommended that "EPA can and should continue both the 24-hour and annual average PM_{10} PSD increment program until $PM_{10-2.5}$ standards are promulgated." The commenter explained that "EPA has the discretion to accomplish this under CAA § 166(f)" and "at a minimum, the agency should continue the 24-hour PM_{10} increments in conjunction with the continuation of the 24-hour PM_{10} NAAQS."

As stated previously, in this rule we are taking no final action on our proposal to revoke the annual PM_{10} increments even though the annual PM_{10} NAAQS has been revoked. Based on comments and our own legal analysis of the PM_{10} increments, we have concluded that there is a strong legal basis for not revoking the annual increments at this time. The PM_{10} increments were promulgated on June 3, 1993 (58 FR 31622) as replacement increments for the then existing statutory increments for PM measured as TSP. The fact that EPA promulgated the PM_{10} increments as "equivalent" replacements for the TSP increments under the authority of section 166(f) of the Act is important in that EPA does not have authority to simply remove the TSP increments that were explicitly defined within the PSD program requirements in the Act. Accordingly, we believe that the annual TSP increments would be restored by default should we decide to revoke the annual PM_{10} increments as proposed. However, even if the original annual TSP increments were not restored, there is no basis for automatically revoking the annual PM_{10} increments simply because we have revoked the annual PM_{10} NAAQS, because annual increments are not contingent upon the existence of annual NAAQS. This is clear from the court's decision in the earlier NO_2 increment litigation stating that increments for a particular pollutant do not necessarily need to match the averaging periods that have been established for NAAQS for the same pollutant. *EDF* v. *EPA,* at 189–190 ("* * * the 'goals and purposes' of the PSD program, set forth in § 160, are not identical to the criteria on which the ambient standards are based.").

I. Other Comments on Increments

Ten commenters (including State/local agencies and industry commenters) supported section 166(f) of the Act as the basis for $PM_{2.5}$ increments. These commenters typically

voiced the belief that when Congress enacted section 166(f), it authorized EPA to update PM increments when another indicator was defined, and that section 166(f) allows EPA to continue do so as long as these increments are of equal stringency to the prior increments. Some of these commenters believe that section 166(f) is the only legitimate approach under the Act, while others indicated simply that it is preferable to section 166(a). Some of the commenters believe that section 166(f) authority can be used to add $PM_{2.5}$ increments to the existing PM_{10} increments. Others believe that $PM_{2.5}$ increments finalized under section 166(f) must fully replace the existing PM_{10} increments, and recommended doing so.

For the reasons discussed previously in this preamble, EPA has decided to finalize the $PM_{2.5}$ increments under the authority of section 166(a) of the Act. With respect to the potential creation of $PM_{2.5}$ increments under section 166(f) (as discussed in the 2007 NPRM at 72 FR 54120–54121), we have not reached any final conclusion as to whether that approach is authorized by the statute, but believe that such an approach raises significant legal issues. Because the Agency is not relying on section 166(f) in this rulemaking, we do not address these issues in this preamble, though some additional discussion is included in the Response to Comments document for this rule.

One industry association that supported the Option 1 approach based on section 166(a) authority also acknowledged that EPA is authorized to use the Option 2 approach based on section 166(f) authority. An industry commenter indicated that 2007 NPRM's arguments regarding the alternative legal authorities under section 166(a) and (f) were not compelling; the commenter recommended setting the $PM_{2.5}$ increments at the levels proposed as Option 2B because they would have the lowest economic impact.

As noted previously, we have decided to finalize Option 1 based on section 166(a) authority because we believe that provision provides the clearest statutory authority for purposes of developing increments based on $PM_{2.5}$. We would point out, however, that any conclusion as to which option would yield increments that "have the lowest economic impact" must include a consideration of not only the levels of the increments but also the associated baseline dates that define when emissions changes must be considered to affect the amount of increment consumed. Under Options 2 and 3, the $PM_{2.5}$ increments would be regarded as replacement increments for the PM_{10} increments and, as such, would include amounts of increment (based upon the $PM_{2.5}$ component) already consumed under the existing PM_{10} increment system. Thus, portions of the substitute $PM_{2.5}$ increments could have already been consumed by previous PSD sources that emit PM. If, in fact, a portion of the $PM_{2.5}$ increments had already been consumed by the prior PM_{10} increment consumption process, than there would be a basis to conclude that less additional economic growth would be allowed under a set of replacement $PM_{2.5}$ increments as compared to $PM_{2.5}$ increments based on separate, independent baseline dates.

One industry commenter suggested that EPA develop geographic area-specific increments (and SILs and SMCs) that take local conditions into account. The commenter pointed out that $PM_{2.5}$ levels in PSD areas proximate to international borders may be elevated by sources outside the legal and practical control of the United States and State authorities. The commenter also noted that $PM_{2.5}$ levels may be elevated by natural conditions, such as drought, fires, geologic formations (sandy or fine-grained surface features), high winds, etc., leading to excessively dusty ambient conditions over which the local area has no control. The commenter indicated that local area baselines must reflect these PM emissions, though they are not reflected in the local area's emissions inventory. The commenter urged EPA not to penalize such PSD areas by imposing uniform national PSD increments (or SILs or SMCs) where the conditions of concern are not capable of control.

As previously discussed, this final rule establishes an area classification system with prescribed, uniform $PM_{2.5}$ increments for each class. We do not believe that it is necessary to develop different increments (or SILs or SMC) for different areas of the country. Emissions from natural conditions such as those described by the commenter would not consume increment due to their natural and temporary nature. In addition, if a State wishes to disregard new emissions from sources outside the United States, the State's PSD program may provide that such emissions do not consume increment (*see* 40 CFR 51.166(f)(1)(iv)).

VI. Final Action on $PM_{2.5}$ SILs

A. EPA's Determination on SILs for $PM_{2.5}$

It is EPA's longstanding policy to allow the use of the SILs as *de minimis* thresholds under the NSR programs at 40 CFR 51.165(b) and part 51, Appendix S, to determine whether the predicted ambient impact resulting from the emissions increase at a proposed major new stationary source or modification is considered to cause or contribute to a violation of the NAAQS. We have also allowed the SILs under the PSD program to determine: (1) When a proposed source's ambient impacts warrant a comprehensive (cumulative) source impact analysis; (2) the size of the impact area within which the air quality analysis is completed, and (3) whether the emissions increase from a proposed new major stationary source or major modification is considered to cause or contribute to a violation of any NAAQS.

We proposed three separate options for setting SILs for $PM_{2.5}$. The first option relied upon the same approach we proposed for PM_{10} in the 1996 NSR Reform proposal. This set included Class I SILs set at 4 percent of the Class I $PM_{2.5}$ increments. For class II and III areas, we proposed to codify the SIL values that already existed for PM_{10}, *i.e.,* 1.0 μg/m³ (annual) and 5.0 μg/m³ (24-hour). Options 2 and 3 relied on scaling the PM_{10} SILs, as codified in 40 CFR 51.165(b), by a particular ratio. Specifically, for Option 2, the multiplier was the emissions ratio of $PM_{2.5}$ to PM_{10} for point sources in the 1999 NEI; for Option 3 the multiplier was the ratio of the $PM_{2.5}$ NAAQS to the PM_{10} NAAQS. The resulting SILs were proposed as follows:

Option	Proposed SILs (μg/m³)					
	Class I		Class II		Class III	
	Annual	24-hr	Annual	24-hr	Annual	24-hr
1	0.04	0.08	1.0	5.0	1.0	5.0
2	0.16	0.24	0.8	4.0	0.8	4.0
3	0.06	0.07	0.3	1.2	0.3	1.2

We have decided to finalize the $PM_{2.5}$ SILs proposed under Option 3. As explained earlier, these values will be used in the Federal PSD preconstruction review process consistent with our proposal. *See* 72 FR 54138–41 and 54143.

States are not required to adopt SILs in their NSR or PSD programs; the analyses for $PM_{2.5}$ required by each applicable regulation can be carried out without using a SIL.[21] Therefore, we do not intend for any specific deadlines to apply under the regulations at 40 CFR 51.165(b), 51.166, or part 51, Appendix S for states to submit SILs for $PM_{2.5}$, should they choose to do so, as part of their revisions to incorporate the final rules for $PM_{2.5}$ into SIPs. Nonetheless, we believe that the availability of SILs as a screening tool greatly improves PSD program implementation by streamlining the permit process and reducing labor hours necessary to submit and review a complete permit application where the projected impact of the proposed source is *de minimis* in the relevant area. For these reasons, we are including the $PM_{2.5}$ SILs in the Federal PSD regulations at 40 CFR 52.21 to screen proposed projects concerning the need for a cumulative source impact analysis for $PM_{2.5}$.

B. Response to Comments Concerning the SILs

The primary purpose of the SILs is to identify a level of ambient impact that is sufficiently low relative to the NAAQS or increments that such impact can be considered trivial or *de minimis.* Hence, the EPA considers a source whose individual impact falls below a SIL to have a *de minimis* impact on air quality concentrations that already exist. Accordingly, a source that demonstrates that the projected ambient impact of its proposed emissions increase does not exceed the SIL for that pollutant at a location where a NAAQS or increment violation occurs is not considered to cause or contribute to that violation. In the same way, a source with a proposed emissions increase of a particular pollutant that will have a significant impact at some locations is not required to model at distances beyond the point where the impact of its proposed emissions is below the SILs for that pollutant. When a proposed source's impact by itself is not considered to be "significant," EPA has long maintained that any further effort on the part of the applicant to complete a cumulative source impact analysis involving other source impacts would only yield information of trivial or no value with respect to the required evaluation of the proposed source or modification.

While some commenters opposed all of the proposed options for $PM_{2.5}$ SILs, most commenters generally supported the use of a SIL as a screening tool for $PM_{2.5}$ air quality analyses. Commenters who supported one of the proposed options for the SILs were divided as to their support of a particular approach for selecting the SIL value, with each option receiving some support. Commenters also tended to agree that the SILs should not be used for determining significant impacts on AQRVs in Class I areas.

Those commenters supporting the concept of the SILs, yet opposing all proposed options, believed that all options yielded SILs that were too low. Another commenter, an environmental group, presented extensive legal and policy arguments against the SILs concept in general. Some of the significant comments and our responses to them are addressed herein, while others are covered in the Response to Comments document which we have placed in the docket for this rulemaking.

1. Legal Basis for SILs

One commenter opposed all three proposed options on both legal and policy grounds claiming that EPA has no legal authority to promulgate SILs and that the *de minimis* doctrine endorsed by the court does not apply to increment analyses, where Congress has expressly directed that the letter of the law applies in all circumstances, as it has in this case. (The commenter's policy concerns about SILs are discussed later in this section of this preamble.) The commenter stated that "Congress codified increments in section 163 of the Act, directing that SIPs contain measures assuring that the increments shall not be exceeded." According to the commenter, "The Act plainly provides that no major source may be constructed unless it meets this requirement, and may not contribute to an exceedance 'for any pollutant in any area.' " The commenter further stated that "the *de minimis* doctrine is inapplicable because it applies only where the regulations will yield a gain that is demonstrably trivial or zero."

We disagree with this commenter's claim that there is no legal basis for SILs. As stated in the 2007 NPRM, the concept of a SIL is grounded on the *de minimis* principles described by the court in *Alabama Power* at 323, 360. In this case reviewing EPA's 1978 PSD regulations, the court recognized that "there is likely a basis for an implication of *de minimis* authority to provide exemption when the burdens of regulation yield a gain of trivial or no value." *Alabama Power* at 360. *See* the 2007 NPRM for more on how we have applied the *de minimis* principle in the past. See also, *Sur Contra La Contaminacion* v. *EPA,* 202 F.3d 443, 448–49 (1st Cir. 2000) (upholding EPA's use of SILs to allow permit applicant to avoid full impact analysis.)

2. Levels of the SILs

Several commenters opposed all three proposed options on the grounds that all yielded levels of SILs that are too low. One of these commenters argued that the proposed SILs "imply a level of monitoring and modeling sophistication that is currently absent in our regulatory scheme." This commenter recommended that EPA "rethink the level of the proposed SILs and select concentrations less likely to be within the level of error inherent in current monitoring and modeling methods."

We disagree with these commenters' concerns about all the proposed SILs being too low. While we did not select the Option 1 levels, the Class II and III SILs for $PM_{2.5}$ under that option were the same ambient concentration levels that are used for the SILs for the other criteria pollutants under 40 CFR 51.165(b), and those existing SILs values are associated with NAAQS that are considerably higher than the NAAQS for $PM_{2.5}$. Clearly, it would have been inappropriate to select Class II and III SILs for $PM_{2.5}$ that represent relatively higher values than the existing SIL values for other pollutants in light of the more stringent NAAQS levels that exist for $PM_{2.5}$. We also disagree that the SILs should be consistent with current monitoring capabilities for $PM_{2.5}$. The SILs are a screening tool used in comparison with modeled predictions—not monitored concentrations—of $PM_{2.5}$. Monitoring accuracy is not a relevant concern in predicting with air quality dispersion models the concentrations of a pollutant that a source will cause if its construction and operation are allowed to occur.

Two commenters expressed concern about national *de minimis* values. One stated that "the idea that a single national number can define 'trivial' is flawed, given that even very small impact can be of great significance in an area that is close to an increment or NAAQS." The other commenter

[21] We note that, under the 2007 NPRM, we proposed that the SILs for $PM_{2.5}$ would not be treated as a minimum program element for State PSD programs; however, the proposed regulatory language at 40 CFR 51.166(k)(2) incorrectly stated the "the plan shall provide that," which would indicate that the use of the SILs for $PM_{2.5}$ was required in the State plan. This final rule corrects this error.

recommended that EPA "develop geographic area-specific * * * levels that take local conditions into account." This commenter reasoned that some PSD areas "should not be 'penalized' by a single, national PSD increment, significant impact levels and significant monitoring level, where the conditions of concern are not capable of control."

With regard to the first of these commenters, our longstanding policy has been that when a source has a *de minimis* impact on an existing air quality problem, that source should not necessarily be required to bear the burden of addressing its small contribution to a problem caused primarily by other sources. However, notwithstanding the existence of a SIL, permitting authorities should determine when it may be appropriate to conclude that even a *de minimis* impact will "cause or contribute" to an air quality problem and to seek remedial action from the proposed new source or modification.

We do not agree with the second of these comments concerning the development of regional SILs based on a concern that some amounts of $PM_{2.5}$ in a particular area are "not capable of control." The $PM_{2.5}$ SILs define a threshold level for determining whether a predicted ambient impact by a proposed major stationary source or major modification of $PM_{2.5}$ needs to undergo a more thorough analysis of the $PM_{2.5}$ NAAQS or increments. This value is not directly affected by the total amounts of $PM_{2.5}$ that may exist in an area or by what causes the existing $PM_{2.5}$ concentrations, rather by the impact of a single source relative to the levels of the NAAQS and increments that must be protected. Therefore, we do not see why the SILs should be influenced by the geographic area of concern, or how different levels of SILs for the same pollutant and averaging period would be necessary.

With regard to the commenters that supported at least one of the proposed SILs options, they generally did not prefer the entire suite of SILs (Class I, II, and III SILs) from a single option, but instead supported parts of different options, primarily divided by drawing a distinction between the Class I SILs and the SILs for Class II and III areas. Consistent with the way that commenters addressed the Class I, II, and III SILs, we will address the comments separately herein as well.

a. Class I SILs

Support and opposition for the proposed $PM_{2.5}$ SILs for Class I areas was fairly evenly divided. The $PM_{2.5}$ SILs for Class I areas proposed under Option 2 received the support of some commenters, but also received an equal amount of opposition. Option 1, which yielded the lowest (most restrictive) values for the Class I area SILs for $PM_{2.5}$ (annual and 24-hour averages), was supported by some commenters, including a Federal agency that serves as a FLM for Federal Class I areas under the PSD program, but was equally opposed. Finally, comments supporting the Class I SILs proposed under Option 3 (from which we derived the values included in the final rules) were matched by comments that opposed the Class I SILs under Option 3.

One commenter opposing the Option 3 SILs for Class I areas said that the values "appear to be unrealistically low and, if selected, would point to the need for EPA to conduct an economic impact analysis." We disagree that adopting the Option 3 SILs for Class I areas (and Class II and III areas) will result in economic impacts significant enough to warrant an economic impact analysis. Under the Paperwork Reduction Act, EPA is required to analyze, and receive approval from the Office of Management and Budget (OMB) for, the recordkeeping and reporting burden imposed by its regulations (referred to as the "Information Collection Request" or "ICR" for the regulation). For the PSD program, this includes the burden associated with the entire permitting process, including any required modeling analyses. In our analysis for this rulemaking, we have concluded that the number of PSD permits issued annually will be unchanged (at an estimated 274 per year), while the total burden across all PSD permit applicants of adding $PM_{2.5}$ analyses will increase by a total of approximately 29,000 hours per year at a cost of approximately $2.8 million per year. This total annual impact on industry is a small fraction of the threshold ($100 million per year) that is considered "significant" under Executive Order 12866 (Regulatory Planning and Review) and the Unfunded Mandates Reform Act. See sections X.B and X.D of this preamble for more on the Paperwork Reduction Act and the Unfunded Mandates Reform Act, respectively. Our analysis of the recordkeeping and reporting burden of this rulemaking can be found in the docket for this ICR.[22]

Another commenter stated that the use of a NAAQS-based ratio under Option 3 for the proposed SILs does not "translate back to the emissions point level when comparing PM_{10} and $PM_{2.5}$." This commenter continued, "this is an invalid method of proceeding because EPA has not shown that there is a correlation between the NAAQS and direct $PM_{2.5}$ since there is no accounting for precursors and EPA does not have a quantifiable sense of the portion of $PM_{2.5}$ that is condensable for various industries."

We disagree with the commenter's concern that the use of NAAQS-based ratios is an invalid method for developing the $PM_{2.5}$ SILs. The purpose of using the NAAQS ratio with the PM_{10} SILs to develop $PM_{2.5}$ SILs is to establish values that have a comparable relationship between ambient concentrations of PM_{10} and $PM_{2.5}$ and their respective NAAQS levels. Whether a particular ambient concentration of $PM_{2.5}$ results from direct $PM_{2.5}$ emissions or from precursor emissions is not relevant to this particular approach. The $PM_{2.5}$ SILs in this final rule are intended to be compared to the ambient concentrations of $PM_{2.5}$ that are predicted by modeling the emissions of a proposed new project. Ambient concentrations of $PM_{2.5}$ can be the result of direct $PM_{2.5}$ emissions, which may include condensable particulate matter, as well as precursor emissions, *e.g.,* SO_2 and NO_X.

We note that the 2007 NPRM included proposed regulatory language providing that demonstrations of whether the air quality impact of a major new source or modification would be less than the $PM_{2.5}$ SILs be based on direct $PM_{2.5}$ emissions from the proposed project. The intent of this was to recognize the technical limitations associated with modeling precursor emissions to predict ambient $PM_{2.5}$ impacts. However, in this final rule we have removed that limitation by removing the reference to "direct" $PM_{2.5}$ emissions.

One commenter, who did not support any of the proposed SILs options, was especially critical of the Class I SILs for $PM_{2.5}$ under Option 1, stating that multiplying the proposed $PM_{2.5}$ increment by 4 percent is without legal or practical merit. The commenter stated that just because "4 percent may have been a reasonable multiplier to use in establishing a significant emission rate threshold does not mean that the multiplier should be used for a completely different regulatory purpose." The commenter added that if the $PM_{2.5}$ SILs for Class I areas under Option 1 were codified, emissions from even the most well-controlled coal-fired electric generating station located as far away as 300 km from a Class I area could well exceed the threshold.

[22] *See* "Information Collection Request (ICR) for the Prevention of Significant Deterioration for $PM_{2.5}$-Increments, Significant Impact Levels and Significant Monitoring Concentration," Docket No. EPA–HQ–OAR–2007–0628.

In contrast, the Federal agency commenter supporting the $PM_{2.5}$ SILs for Class I areas under Option 1 explained that they analyzed the effectiveness of the three sets of proposed SILs by modeling four different coal-fired power plant scenarios using an EPA-approved long-range transport model. The modeled plants included a large 1,500 megawatt (MW) facility, a moderate-sized 500 MW facility, and two medium 800 MW facilities. Based on this modeling analysis, the commenter concluded that the proposed levels of the Class I 24-hour SILs based on Option 1 and Option 3 are "more appropriately protective of the proposed Class I $PM_{2.5}$ increment and impacts to visibility than the level obtained under Option 2." This commenter supported the consistency of using 4 percent of the Class I increments that was used by EPA in proposing Class I SILs for SO_2, NO_X, and PM_{10} in 1996.

We chose the Class I SILs under Option 3 because we believe that this option yields the most appropriate combination of SILs for all area classifications. Whether a particular source will have a significant impact on an area is determined to some extent by the amount of its emissions, but also by other factors such as the height of release, pollutant transport distance, terrain features, and meteorological factors. Thus, we did not select SILs values to address a certain size source or the degree of control of that source, but the ambient impact of that source relative to the NAAQS and increments that will result from the source's emissions. While the annual Class I SIL under Option 3 represents a level that is somewhat greater than 4 percent of the $PM_{2.5}$ annual increment for Class I areas, it is sufficiently close (as derived from a ratio of the $PM_{2.5}$ NAAQS to the PM_{10} NAAQS) so as to provide a reasonable threshold for defining *de minimis* for purposes of conducting a Class I increment analysis. We had proposed the use of 4 percent of the existing Class I increments to develop SILs for pollutants in the 1996 NSR Reform proposal; however, that particular component of the proposal was never finalized. *See* 61 FR 38250 beginning at 38291. We will further discuss our rationale for selecting the SILs under Option 3 in the discussion which follows for the Class II and III SILs.

b. Class II and III SILs

While many commenters tended to favor Option 2 with regard to the proposed Class I increments, they tended clearly to support Option 1 for defining Class II and III SILs for $PM_{2.5}$. These particular SILs for $PM_{2.5}$ were proposed so as to be equal to the existing Class II and III SILs for the existing pollutants. In all, six commenters supported Option 1. One of these commenters stated that Option 1 SILs for Class II and III areas are "sufficiently stringent and fully consistent with the *de minimis* justification for SILs." The commenter added that "when conducting an air quality impact analysis * * * most applicants assume all coarse PM_{10} to be $PM_{2.5}$." The commenter claimed that this assumption is conservative and "overestimates the amount of fine particles being emitted and renders the effective SIL thresholds for $PM_{2.5}$ lower than those written into the regulations."

We strongly disagree that the SILs proposed under Option 1 as applied to $PM_{2.5}$ are sufficiently stringent. The application of such values as SILs for $PM_{2.5}$ would result in ambient concentrations of $PM_{2.5}$ that consume a much larger portion of both the $PM_{2.5}$ NAAQS and increments than either of the other two options proposed for $PM_{2.5}$ in light of the correspondingly more stringent levels of the $PM_{2.5}$ NAAQS and increments than those for the other pollutants. We believe that of the 3 options proposed, the $PM_{2.5}$ SILs based on Option 3 represent values that are more closely aligned percentage-wise with the SILs that have been or are being used for other forms of PM when compared to their respective NAAQS and increments.

We also disagree with the commenter's suggestion that the development of the SILs for $PM_{2.5}$, or any other pollutant, should in any way be influenced by the possibility that some sources may use conservative techniques for estimating a source's emissions rate. Such conservative techniques may be needed to the extent that technical issues associated with the determination of $PM_{2.5}$ emissions are identified, and can certainly be used at any time as a simplified methodology for estimating $PM_{2.5}$ emissions. But when such an overly conservative approach fails to yield *de minimis* results, the source may find it necessary to rely upon more accurate techniques for determining the amount of $PM_{2.5}$ that the source will emit.

Finally, one commenter, objecting to all of the proposed SILs, stated that EPA must assure that SILs are truly *de minimis* and must also include limitations on the use of SILs as necessary to prevent air quality from significantly deteriorating. We acknowledge that we did not conduct any new modeling or other types of analyses of the proposed SILs in order to explicitly show that the final $PM_{2.5}$ SILs values in this final rule are *de minimis.* Instead, we have relied on past actions regarding the setting of *de minimis* levels to illustrate that the $PM_{2.5}$ values selected via Option 3 represent values that are as stringent as the previous levels that have been established to define *de minimis* for PM_{10} and TSP. See 45 FR 52706–708 (using modeling and representative data).

Using the 24-hour and annual NAAQS ratios of $PM_{2.5}$ to PM_{10}, and multiplying them by the corresponding existing PM_{10} SILs, we conclude that the $PM_{2.5}$ SILs define *de minimis* for the $PM_{2.5}$ NAAQS in the same way as the PM_{10} SILs do for PM_{10} NAAQS. Using the increments as a basis for comparison provides further support for our conclusion. The annual and 24-hour $PM_{2.5}$ SILs represent about 7.5 and 13 percent of the annual and 24-hour $PM_{2.5}$ increments, respectively. By comparison, the annual and 24-hour PM_{10} SILs represent about 5 and 17 percent of the annual and 24-hour PM_{10} increments, respectively. We believe the $PM_{2.5}$ SILs fall into a comparable relative range with the PM_{10} SILs and can be considered *de minimis.*

In EPA's 1980 final rule for PSD, EPA adopted SERs for the pollutants then subject to regulation under the PSD requirements. The SER adopted for PM (then measured as TSP) was 25 tpy, which represented an emissions rate for which EPA modeled impacts that represented about 4 percent of the TSP 24-hour NAAQS and about 28 percent of the 24-hour TSP increment. Thus, EPA considered it acceptable under the *de minimis* assessment for PM that a source of particulate matter capable of consuming around 28 percent of the applicable 24-hour TSP increment could be exempted from the requirements to complete a comprehensive source impact analysis for the PM NAAQS and increments. 45 FR 52708.

In looking at the amount of increment that could be consumed by a source that is ultimately exempted from having to complete a comprehensive modeling analysis, it should be pointed out that the maximum modeled concentration typically occurs in a relatively limited area, as compared to the entire modeling domain. In particular, for the short-term averaging periods, such as the 24-hour averaging period, modeled concentrations across the modeled area generally show that ground level impacts are reduced significantly from the peak value as the pollutant travels a relatively short distance from the source, so that the peak modeled

concentrations represent the source's impact at only a relatively few receptors within the modeled area. In addition, it is important to note that the temporal and spatial conditions which lead to a maximum impact by one source are seldom the same for other sources, such that maximum impacts of individual sources do not typically occur at the same location or at the same time.

Thus, in an area where several sources can demonstrate that their modeled impacts are *de minimis,* it generally should not be assumed that their individual maximum (albeit *de minimis*) impacts on the increment are additive. For example, four sources with *de minimis* $PM_{2.5}$ impacts, each consuming 12 percent of the 24-hour $PM_{2.5}$ increment, would not necessarily consume 48% of the 24-hour increment. Increment consumption is determined by the cumulative impact of source emissions on each individual receptor or modeling point in the area of impact within the baseline area defined for the affected PSD sources.

The preamble for the 1980 final rule for PSD included a description of a modeling analysis that EPA conducted to illustrate that a number of major sources each making a *de minimis* emissions increase for SO_2 could locate in an area (in that case, the Dayton area) and not cause a violation of either the applicable SO_2 increment or NAAQS. In that particular case, the modeling indicated that the maximum aggregate increment consumption for 37 sources emitting 40 tpy of SO_2 (the *de minimis* emissions rate for SO_2) would have a cumulative impact at any location of less than 1.5 μg/m³ on a 24-hour basis—well below the NAAQS and increments for SO_2. 45 FR 52708.

With regard to the commenter's recommendation that we place limitations on the use of SILs, we earlier provided an example of when it might be appropriate to require a modified source to mitigate its contribution to a violation of a NAAQS or increment even when the predicted ambient impact of the proposed emissions increase would result in what is normally considered to be *de minimis.* In addition, we have historically cautioned states that the use of a SIL may not be appropriate when a substantial portion of any NAAQS or increment is known to be consumed. We have indicated elsewhere in this preamble that states are not required to adopt the SILs for $PM_{2.5}$ in this final rule. At their discretion they may choose not to rely on SILs to screen applicants or they may establish more stringent values.

Finally, it should be noted that while a source having only *de minimis* impacts may not be required to complete a comprehensive source impact analysis, the emissions from such sources are still considered to consume increment and would be counted as part of the next increment analysis required to be completed by a PSD applicant in that same area, or by the State under a periodic increment review.

3. Relationship Between SILs and AQRVs

While commenters generally supported EPA's position that the SILs should not be used in any way to determine effects of emissions increases on the AQRVs in a Class I area, two commenters urged that the *de minimis* concentration be used for analyzing Class I area impacts under certain circumstances. That is, they believed that the SILs should be used to determine the need for a Class I area air quality analysis when an FLM has not identified a specific AQRV related to the pollutant under evaluation or obtained ambient monitoring data to confirm that predicted concentrations from air dispersion models are representative of actual AQRV impacts in the Class I area. The commenters claimed that without this flexibility, applicants would be required to conduct complex and extensive Class I air dispersion modeling without any clear objective, and regulatory agencies would have to review the modeling with limited information to determine if the emissions could cause an "adverse" impact or if potentially costly controls should be required.

These commenters appear to be suggesting that an FLM may needlessly call for an analysis of a particular Class I area, involving "complex and extensive Class I area dispersion modeling" despite the fact that no AQRV has been identified for that Class I area. We agree that a Class I analysis in the absence of any known AQRVs would be unnecessary because any demonstration of an adverse impact must be made with respect to a pollutant adversely affecting an AQRV. We believe, however, that such analyses would be avoided under the procedures set forth in section 165(d)(2)(C) of the Act which require that a notice be filed alleging that a proposed source may cause or contribute to adverse effects, and identifying the adverse impact. Insofar as the FLM must also demonstrate "to the satisfaction of the State that emissions from such facility will have an adverse impact on the air quality related values," it would be difficult to require the source to undertake any kind of detailed analysis in the absence of an AQRV on which such adverse impacts must be demonstrated. Thus, we have concluded that it is not necessary to use the SILs as a safeguard against unnecessary Class I area analyses. Instead, we believe that the need for a Class I analysis, other than the required analysis of the NAAQS and Class I increments (for both of which the SILs are intended to be used), should be based on the potential for adverse effects on an AQRV that the FLM has identified and believes could be affected by a pollutant that would be emitted by the proposed project.

4. Form of the SILs

One commenter stated that "the Proposal does not indicate how the proposed $PM_{2.5}$ SILs are to be interpreted." This commenter believed that "the form of the SILs should be consistent with the form of the $PM_{2.5}$ NAAQS" adding that "the current $PM_{2.5}$ NAAQS requires that compliance with the 24-hour and annual standards be determined using 3-year averaging." Specifically, "The annual standard is calculated based upon the 3-year average of annual mean $PM_{2.5}$ concentrations, and the 24-hour standard is based on the 3-year average of the 98th percentile (or highest-8th high value) of 24-hour concentrations."

In a March 23, 2010 EPA memorandum titled "Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS," we provided guidance for using the SILs in conjunction with the 24-hour and annual $PM_{2.5}$ NAAQS, which takes into account the statistical form of the NAAQS. Following promulgation of the $PM_{2.5}$ increments in this final rule, we intend to provide guidance for interpreting the SILs for their use with the 24-hour and annual $PM_{2.5}$ increments as well.

5. SILs for Other Pollutants

In proposing Option 1, we noted that many who commented on the 1996 NSR Reform proposal supported this approach and believed that the proposed PM_{10} SIL values would serve as appropriate *de minimis* values. In fact, we are aware that many states have been using these proposed SILs for PM_{10} as screening tools since 1996 or earlier.

Regarding the proposed Class I SILs under Option 1, we expressed our belief that where a proposed source consumes less than 4 percent of the Class I increment, the source's impact is sufficiently low so as not to warrant requiring the source to carry out a detailed analysis of the combined effects of the proposed source and all other increment-consuming emissions in the

area. 72 FR 54140. We previously used a similar rationale to establish the SERs for PSD applicability purposes, concluding in part that emissions rates that resulted in ambient impacts less than 4 percent of the 24-hour standards for PM and SO_2 were sufficiently small so as to be considered *de minimis.* 45 FR 52707–8.

The original SIL values of 1.0 and 5.0 μg/m³ for TSP and PM_{10} were interpreted by EPA as representing the minimum amount of ambient impact that is significant. This formed the basis for the proposed Option 1 $PM_{2.5}$ SIL values of 1.0 and 5.0 μg/m³ for the annual and 24-hour averaging periods for Class II and III areas.

The SILs currently appear in EPA's regulations at 40 CFR 51.165(b). That particular NSR regulation provides that states must include a preconstruction review permit program for any new major stationary source or major modification that proposes to locate in an attainment or unclassifiable area and would cause or contribute to a violation of the NAAQS. These values, added to 40 CFR 51.165(b) on July 1, 1987, have previously been referred to as "significant ambient impact concentrations" and are used to enable a source to determine whether its emissions would cause or contribute to a NAAQS violation at "any locality that does not or would not meet the applicable national standard." 52 FR 24672, April 2, 1985, at 24688.

In 1985, when EPA proposed to add "significant ambient impact levels" for PM_{10}, we also indicated that for PSD purposes the requirements under section 51.165(b) [23] "would be applied to all applicable PSD requirements." The EPA has since applied these values in other analogous circumstances under the PSD program. Based on EPA interpretations and guidance, SILs have also been widely used in the PSD program as a screening tool for determining when a new major source or major modification that wishes to locate in an attainment or unclassifiable area must conduct a more extensive air quality analysis to demonstrate that it will not cause or contribute to a violation of the NAAQS or PSD increment in the attainment or unclassifiable area. The SILs are also used to define the extent of the Significant Impact Area where, using air dispersion models and ambient monitoring data, a cumulative source impact analysis accounting for emissions changes from affected sources is performed.[24] *See* the 2007 NPRM for additional information on the history of EPA's guidance related to SILs (72 FR 54138–39).

In the 1996 NSR Reform proposal, we proposed to add the SILs for PM_{10} and other pollutants already contained in 40 CFR 51.165(b)(2) directly into the PSD regulations at 40 CFR 51.166 and 52.21. Because the SILs in 40 CFR 51.165(b) did not include thresholds for Class I areas, we proposed to set Class I SILs at the level of 4 percent of the respective Class I increments. Thus, for PM_{10}, the proposed Class I SILs were 0.2 μg/m³ (annual) and 0.3 μg/m³ (24-hour), and the proposed Class II and III SILs were 1.0 μg/m³ (annual) and 5.0 μg/m³ (24-hour). The EPA has not yet taken final action on the 1996 proposal on SILs for pollutants other than $PM_{2.5}$; therefore, we rely upon our longstanding policy to use those values, as codified in 40 CFR 51.165(b)(2), for PSD permitting.

VII. Final Action on the $PM_{2.5}$ SMC

A. EPA's Determination on the $PM_{2.5}$ SMC

As with the increments and SILs for $PM_{2.5}$, we proposed three different options for establishing an SMC for $PM_{2.5}$. The first option, referred to as the "lowest detectable concentration" approach, relied on the method we used in 1980 to develop the SMCs for the pollutants then subject to PSD. This particular method focused on development of the SMC value based on the current capability of providing a meaningful measure of the pollutants. *See* relevant discussion later in this section and at 45 FR 52710. Options 2 and 3, called the "$PM_{2.5}$ to PM_{10} emissions ratio" and the "$PM_{2.5}$ to PM_{10} NAAQS ratio," respectively, used the SMC for PM_{10} as the base for multiplying the emissions and NAAQS ratios to derive an SMC for $PM_{2.5}$. *See* 72 FR 54141. The three proposed options yielded the following numerical levels for the SMC:

- Option 1: 10 μg/m³, (24-hour average);
- Option 2: 8.0 μg/m³ (24-hour average); and
- Option 3: 2.3 μg/m³ (24-hour average).

We are taking final action on the SMC for $PM_{2.5}$ using the "lowest detectable concentration" approach (Option 1). However, we have determined that the SMC value that is calculated under this methodology is lower than the proposed value of 10 μg/m³ to reflect "current capability" with respect to the measurement and collection of ambient $PM_{2.5}$ concentrations. The result of such revised calculation is that the SMC value in this final rule is different from (more stringent than) the proposed level. The revised value is 4 μg/m³ (24-hour average). Our basis for the revised calculation and the resulting lower value is described in greater detail later in this section.

The EPA and its delegated reviewing authorities will use the $PM_{2.5}$ SMC to determine when it may be appropriate to exempt a proposed new major stationary source or major modification from the ambient monitoring data requirements under the PSD rules. Similarly, states with EPA-approved PSD programs that adopt the SMC for $PM_{2.5}$ may use the SMC, once it is part of an approved SIP, to determine when it may be appropriate to exempt a particular major stationary source or major modification from the monitoring requirements under their State PSD programs (*see* 40 CFR 51.166(i)(5)).

B. Response to Comments Concerning the SMC

1. Legal Issues

Under the Act and EPA regulations, an applicant for a PSD permit is required to gather preconstruction monitoring data in certain circumstances. Section 165(a)(7) of the Act calls for "such monitoring as may be necessary to determine the effect which emissions from any such facility may have, or is having, on air quality in any areas which may be affected by emissions from such source." In addition, section 165(e) of the Act requires an analysis of the air quality in areas affected by a proposed major facility or major modification and calls for gathering 1 year of monitoring data unless the reviewing authority determines that a complete and adequate analysis may be accomplished in a shorter period. These requirements are codified in EPA's PSD regulations at 40 CFR 51.166(m) and 52.21(m).

In 1980, EPA adopted regulations that included pollutant-specific SMCs as a screening tool for sources to determine whether they should conduct site-specific preconstruction ambient monitoring.[25] We explained our

[23] In 1985, the requirements now contained in 40 CFR 51.165(b) were contained in 40 CFR 51.18(k), which was later part of a major restructuring of the part 51 SIP requirements.

[24] In the case of a NAAQS compliance analysis, all sources in the area are considered to contribute to the air quality levels; for increments, however, "all" refers only to those sources whose emissions, in whole or in part, consume PSD increment for a particular pollutant.

[25] The provision for the monitoring exemption was originally promulgated at 40 CFR 51.24(i)(8) and 52.21(i)(8); it should be noted, however, that this provision is now found at 40 CFR 51.166(i)(5) and 52.21(i)(5).

position that it was appropriate to exempt sources from preconstruction monitoring requirements for a pollutant if the source could demonstrate that its ambient air impact was less than a value known as the Significant Monitoring Concentration or SMC. At the time the SMCs were adopted, EPA described them as "air quality concentration *de minimis* level[s] for each pollutant [that were available] for the purpose of providing a possible exemption from monitoring requirements." 45 FR 52676, 52707 (August 7, 1980). The EPA explained that it believed there was "little to be gained from preconstruction monitoring" where a source could show that its projected impact of a pollutant within the affected area was below the *de minimis* concentration for that pollutant. 45 FR at 52710.

One commenter opposed our proposed establishment of any SMC for $PM_{2.5}$, claiming that SMCs in general are contrary to the Act. The commenter stated that "in Section 165(e) Congress mandated a full year of continuous air quality monitoring for each major source subject to the PSD program." With this in mind, the commenter indicated that there are no exceptions, other than the limited statutory provisions, discussed above, which allow for less than a year's worth of monitoring based on a determination that a complete and adequate analysis of such purposes may be accomplished in a shorter period. The commenter then argued that "the allowance for a 'shorter period' hardly amounts to authority to waive monitoring entirely, which is what EPA's SMC proposal would do."

As with the SMCs adopted by EPA in 1980, the SMCs that we proposed for $PM_{2.5}$ are supported by the *de minimis* doctrine set forth in the *Alabama Power* opinion. Like the other pollutants for which EPA has promulgated SMCs, EPA believes there is little to be gained from preconstruction monitoring of $PM_{2.5}$ concentrations that cannot be accurately measured.

Therefore, in developing the three proposed options for an SMC, EPA sought to use methods that would identify levels representing a *de minimis* or insignificant impact on $PM_{2.5}$ ambient air quality that makes the collection of additional monitoring data extraneous.

2. Level of the SMC

As indicated earlier, the SMC for $PM_{2.5}$ in this final rule is 4 $\mu g/m^3$, 24-hour average. This value may be used by permitting authorities to determine when they may exempt a proposed major stationary source or major modification for $PM_{2.5}$ from the air quality monitoring requirements for $PM_{2.5}$ under 40 CFR 51.166. The EPA and its delegated State/local programs will also use this new value under the Federal PSD program at 40 CFR 52.21.

We proposed three options for developing the SMC for $PM_{2.5}$; each option yielded a different concentration value. In choosing between the three options, EPA proposed to select the option that reflected the degree of ambient impact on $PM_{2.5}$ concentrations that could be considered truly *de minimis* and used to justify exempting a source from the requirement to gather 1 year of ambient monitoring data for $PM_{2.5}$. Ultimately, we have selected the "lowest detectable concentration" approach (Option 1) that relies directly upon ambient monitoring measurement sensitivity and precision. That is, if either the predicted source impact or estimated existing air quality in an area is below a concentration that can be accurately measured, then it would not be reasonable to require a source to attempt to collect such ambient data.

In 1980, EPA determined the SMCs based on the then current capability of providing a meaningful measure of ambient pollutant concentrations. The EPA promulgated values that represented five times the lowest detectable concentration in ambient air that could be measured by the instruments available for monitoring the pollutants. 45 FR 52710. The factor of "five" took into account the measurement errors associated with the monitoring of these low pollutant levels or small incremental changes in concentration. These measurement errors were said to arise from various sources, such as sample collection, analytical measurement, calibration, and interferences. *See* May 20, 1980 EPA memorandum from Rehme, K. A., to Warren Peters, contained in the docket for this rulemaking. Accordingly, in the 2007 NPRM for $PM_{2.5}$, we voiced our belief that this was a reasonable approach, since it was also used for PM_{10} and TSP. 72 FR 54141.

Eight commenters expressed support for the SMC based on Option 1, albeit at the higher level as originally proposed. In some cases, it is not clear whether these commenters supported the particular approach (*i.e.,* an SMC linked to the lowest detectable level) or the fact that the calculated value was simply the highest value of the values proposed under the three options. Clearly, some of the commenters indicated their support for the approach because it is consistent with the approach used for setting the original SMCs in 1980. Two commenters opposed Option 1 because it resulted in an SMC value that was too high. These latter commenters noted that the SMC derived via Option 1 (10 $\mu g/m^3$, 24-hour average) was greater than the proposed 24-hour $PM_{2.5}$ increment for Class II areas and argued that such an outcome is inappropriate. We believe that this important concern is adequately addressed by the level of the SMC for $PM_{2.5}$ that is established in this rulemaking.

Several commenters supported the levels derived from either Option 2 or Option 3, but were concerned that the justification for choosing either of these values would need to be further explained. Some of these commenters were specifically concerned about the use of a 0.8 $PM_{2.5}$-to-PM_{10} emissions ratio which, they argued, relied on inventory data that did not adequately address all sources that would likely affect ambient concentrations of $PM_{2.5}$ in an area.

We conclude that Option 1 is the appropriate option for defining the SMC for $PM_{2.5}$. The ability to accurately measure ambient $PM_{2.5}$ concentrations is not related to a ratio of $PM_{2.5}$ to PM_{10} either directly in terms of emissions or as expressed by the respective NAAQS, which were used to define the SMC for $PM_{2.5}$ under Options 2 and 3, respectively. Our original concern was that, while Option 1 linked the SMC directly to the concept of a minimum detectable concentration (in order to identify *de minimis* monitoring circumstances), the value originally derived from that approach in the 2007 NPRM was high in relationship to the concentrations of $PM_{2.5}$ defined by the existing NAAQS and increments for $PM_{2.5}$.

In considering the use of Option 1 for developing the SMC in the final rules, however, we recognized after publication of the proposed rule that it was necessary to re-examine the assumptions that we relied upon in 1980 to develop the numerical values for the original SMCs so that we could most accurately reflect current monitoring techniques for $PM_{2.5}$. Our re-examination for this final rule utilized the most current information concerning the physical capabilities of the $PM_{2.5}$ Federal Reference Method Samplers, and addresses uncertainties introduced to the measurement of $PM_{2.5}$ due to variability in the mechanical performance of the $PM_{2.5}$ samplers and the micro-gravimetric analytical balances that weigh filter samples.

The minimum detection limit (MDL) of 2 $\mu g/m^3$, originally used in 1980 for the SMC for PM and promulgated for $PM_{2.5}$ in 1997 (*see* 40 CFR part 50, Appendix L, section 3.1), has been

reaffirmed by 9 years of field blank data collected by EPA through the $PM_{2.5}$ Performance Evaluation Program. However, we found that new data exist to "indicate a conservative estimate of the aggregate uncertainty factor is no greater that '2' at the concentration equal to the MDL of 2 μg/m³." [26] Accordingly, the lowering of the uncertainty factor from "five" to "two" under Option 1 yields an SMC of 4 μg/m³ $PM_{2.5}$, 24-hour average, rather than the proposed concentration of 10 μg/m³.

We conclude that the modified level of 4 μg/m³ $PM_{2.5}$, 24-hour average, for the SMC under Option 1, based upon a more current understanding of monitoring precision for PM, especially fine PM, addresses commenter support for the use of a method that is consistent with the way other SMCs were developed and most directly reflects monitoring capability for the pollutant of concern, while at the same time responding to the concern of other commenters that a value in the lower range of proposed SMC values is most reasonable considering the levels of the NAAQS and increments for $PM_{2.5}$.

C. Correction of Cross Reference in PSD Ambient Monitoring Requirements

In the 2007 NPRM, we proposed to take final action to correct a cross reference contained in paragraph (i) of the part 51 and 52 PSD regulations. Specifically, at the time of the proposal, paragraphs (ii) and (iii) in 40 CFR 51.166(i)(5), and paragraph (ii) in 40 CFR 52.21(i)(5), each referred to concentrations listed in paragraph (i)(8)(i) of both regulations. However, there is no paragraph (i)(8)(i) in existing 40 CFR 51.166, and no concentration values are contained in existing section (i)(8)(i) of 40 CFR 52.21. The cross reference in these provisions was intended to reference the SMCs in paragraph (i)(5)(i) of the two PSD regulations, but EPA failed to make this change when the paragraphs were renumbered in an earlier rulemaking. We did not receive any comments concerning this proposed corrective action. We made the necessary correction as part of the May 16, 2008 final $PM_{2.5}$ NSR Implementation Rule (*see* 73 FR 28348 and 28349); therefore it is not necessary to take any further action in this final rule with regard to the proposed correction.

[26] This information is contained in a March 12, 2009 internal EPA memorandum from Dennis Crumpler to Raj Rao, titled "PSD Monitoring De Minimis Concentration for $PM_{2.5}$," which has been placed in the docket for this rulemaking.

VIII. Dates Associated With Implementation of the Final Rule

This section describes the key dates that we have established for implementing the final rule. In the 2007 NPRM, we indicated that different dates appeared to be appropriate for implementing the $PM_{2.5}$ increments, each date depending on the legal authority that we relied upon to promulgate it. We described and took comment on some alternative effective dates for increments, as well. In addition, we discussed and took comment on potential implementation dates for the SILs and SMC components of the proposed rule, which we indicated were not subject to the same statutory considerations as the increments.

We received a number of comments on the different proposed dates. We carefully considered these comments in selecting the dates described below for the final rule. Some of the significant comments and our responses to those comments are provided below. The remaining comments and our responses are contained in the Response to Comments document included in the docket for this rulemaking.

A. Effective Date of the Final Rule

In the 2007 NPRM, we took comment on the effective date of the final rule by presenting the different options available for implementing the $PM_{2.5}$ increments. Under Option 1 for developing the increments, we stated that section 166(b) of the Act specifies that increments promulgated pursuant to section 166(a) are to become effective 1 year following their promulgation. In contrast, there is no such 1-year delay or any other date prescribed for increments promulgated in accordance with section 166(f) of the Act, upon which we based Options 2 and 3 for the annual $PM_{2.5}$ increments. Thus, increments promulgated under Option 1, which relies on the procedural provisions of section 166(b) of the Act, would normally be subject to a 1-year delay in implementation, while increments promulgated under either Option 2 or 3, relying on section 166(f) of the Act, could follow a 30- or 60-day effective date, typical of the effective date for most new rules in general. In either case, our consideration of the effective date for the $PM_{2.5}$ increments assumed that the selected date would also be the effective date of the final rule.

In the 2007 NPRM, we took comment on some alternative approaches to establishing the effective date for $PM_{2.5}$ increments. Specifically, while proposing a 1-year effective date under Option 1, we requested comment on whether we could promulgate these increments under section 166(a) of the Act with an effective date of only 60 days. *See* 72 FR 54142.

Nine commenters supported our proposal to establish the effective date of the part 51 and 52 PSD regulations for $PM_{2.5}$ as 1 year from the date of publication. Alternatively, two commenters encouraged us to apply the 60-day effective date, while three other commenters supported other effective dates, as described in this section.

Seven industry and industry association commenters supported our proposal to make the final rule for $PM_{2.5}$ increments effective 1 year after promulgation. Most of these commenters cited the additional time necessary to develop the needed $PM_{2.5}$ inventories needed for implementation of the $PM_{2.5}$ PSD program. Two of the commenters urged EPA to allow State programs sufficient time to adopt increments, particularly if condensable particulate matter is included in the increment and its analysis. These commenters stated that the Federal rule should not be effective for 1 year. (They also stated that states should have 3 years for the associated SIP revisions.) These same commenters added that this delay would provide time for sources that have permits in the pipeline or are just about to submit an application to be able to complete the permitting process without undue delay. One of the commenters specifically voiced support for Option 1 for the effective date of the final rule (1 year) and Option 2B for the period granted for SIP revisions (3 years). This commenter also explained that this additional time may give the Agency time to promulgate better measurement methods for sources of condensable particulate matter.

Another of these commenters noted that, at the time of the proposal, the NSR portion of the CAFPIR had not yet been promulgated, and that states would need time to incorporate that rule as well as the requirements of the proposal into their SIPs. This commenter added that making the $PM_{2.5}$ increments effective before states and sources have had a reasonable opportunity to begin, let alone complete, the SIP process for the two related rulemakings would unnecessarily complicate an already-complex regulatory process.

In contrast, the two commenters supporting the shorter effective date encouraged us to apply the 60-day period for the effective date under whatever option is finalized. One of these commenters urged us to take measures to expedite the

implementation of the $PM_{2.5}$ final rule and suggested that we choose the shortest of the proposed effective dates which are allowed under any of the applicable regulations. This commenter indicated that in light of the excessive delay in the implementation of the $PM_{2.5}$ PSD program since the NAAQS were promulgated, the 60-day effective date should be applied under EPA's preferred option.

In light of our decision to promulgate $PM_{2.5}$ increments under the authority of section 166(a) of the Act (proposed Option 1), we are faced with the decision as to how to most effectively implement the long-awaited $PM_{2.5}$ increments, recognizing that the Act provides for a 1-year implementation delay. We have concluded that it is most appropriate to follow the plain language of the Act which calls for a 1-year effective date for implementing increments developed under section 166(a) of the Act. We agree with the commenters who suggested that a shortened implementation delay was desirable because of the substantial delay in the promulgation of measures to prevent significant air quality deterioration with respect to $PM_{2.5}$. Nevertheless, we believe it would be inappropriate in this action to disregard the statutory language which plainly calls for a 1-year delay. Accordingly, we are setting the effective date of the $PM_{2.5}$ increments at 1 year from the date of promulgation of this final rule, consistent with the 1-year delay required under section 166(b) of the Act. We are doing this by setting the "trigger date" for $PM_{2.5}$ as October 20, 2011. *See* new 40 CFR 51.166(b)(14)(i)(*c*) and (ii)(*c*), and new 40 CFR 52.21(b)(14)(i)(*c*) and (ii)(*c*). At the same time, we are establishing an effective date for the other provisions, *i.e.,* the SILs and SMC for $PM_{2.5}$, in this final rule as December 20, 2010. This will enable the implementation of these key elements of this rule under the Federal PSD program as soon as possible.

1. State PSD Programs

In this final rule, we are establishing the final $PM_{2.5}$ increments as minimum program elements for all State PSD programs. Accordingly, states must submit for EPA's approval revised SIPs that incorporate the final $PM_{2.5}$ increments or alternative measures that can be demonstrated to EPA's satisfaction to provide an equivalent level of protection as the $PM_{2.5}$ increments. In accordance with section 166(b) of the Act, we are requiring states to submit revised implementation plans to EPA for approval within 21 months of promulgation, that is, by July 20, 2012. Section 166(b) also specifies that we must approve or disapprove these revisions within 25 months of promulgation (4 months from the statutory deadline for SIP submittal). We regard these statutory deadlines as maximum allowed timeframes for action. Moreover, we do not believe that the Act restricts our ability to approve SIP revisions requested by a State at any time before these deadlines. In this final rule, we are amending the regulatory provisions at 40 CFR 51.166(a)(6)(i) to articulate the deadline set forth by the statute for the SIP submittals involving the $PM_{2.5}$ increments pursuant to section 166(a) of the Act.

It is very unlikely that states will be able to revise their SIPs and submit them to EPA for approval prior to the applicability date of the $PM_{2.5}$ increments in this final rule, which is October 20, 2011. Therefore, there is likely to be a period of time after October 20, 2010 when State laws will not require PSD applicants otherwise subject to PSD for $PM_{2.5}$ to complete an increment analysis for the $PM_{2.5}$ increments, even though the $PM_{2.5}$ increments, major source baseline date, and trigger date have been established as a result of this final rule. Similarly, it is not clear whether states will have the authority to consider such applicants as having triggered the minor source baseline date during this interim period before their revised PSD rules containing the $PM_{2.5}$ increments and relevant baseline dates become effective.

The EPA does not intend to prescribe the implementation timeline for State programs; rather, each State will need to determine how increment consumption and the setting of the minor source baseline date for $PM_{2.5}$ will occur under its own PSD program. Nevertheless, regardless of when a State begins to require $PM_{2.5}$ increment analyses and how it chooses to set the $PM_{2.5}$ minor source baseline date, the emissions from sources subject to PSD for $PM_{2.5}$ on which construction commenced after October 20, 2010 (the major source baseline date) will consume $PM_{2.5}$ increment and must be included in increment analyses occurring after the minor source baseline date is established for an area under the State's revised PSD program.

2. Federal PSD Program

The Federal PSD regulations under 40 CFR 52.21 apply where states do not have approved PSD programs and in Indian lands. In such cases, either EPA implements the PSD program or the State will implement it under authority granted by EPA through a delegation agreement.

We proposed to begin implementing the Federal PSD program for $PM_{2.5}$ on the effective date of the final rule, *i.e.,* either 1 year from the date of publication in the **Federal Register** or 60 days from date of publication, if we developed the $PM_{2.5}$ increments pursuant to proposed Option 1. Alternatively, we requested comment on whether we should delay implementation of the Federal PSD program until 25 months after promulgation, which is the latest date by which EPA is required to approve State SIP revisions. This is the same approach we took in 1988 to implement the then new NO_2 increments. *See* 53 FR 40658. We did not propose the 24-month delay for the $PM_{2.5}$ increments because of the significant delay that has already occurred between the time we promulgated the $PM_{2.5}$ NAAQS and the time the $PM_{2.5}$ increment rulemaking would be finalized. However, we sought comment on this alternative approach because we recognized that it might not be equitable to begin implementation of the new program requirements in those few areas where the Federal program applies before the majority of states are required to implement the program.

Two commenters urged EPA to hold off implementation of State programs administered under the Federal PSD program in order to provide a uniform and consistent national approach. One State agency supported implementing the Federal PSD program with a delayed effective date of 1 year after the effective date of the final rule instead of 60 days.

We have decided to begin implementing the revised Federal PSD program as set out previously in our introductory discussion of this issue in section VIII.A. That is, the revised regulations at 40 CFR 52.21 will become effective in 60 days, on December 20, 2010. This will allow EPA or the delegated State agency to begin using the SILs and SMC for $PM_{2.5}$ on that date, as described in section VIII.C of this preamble. However, the date established in the regulations for the trigger date will ensure that the $PM_{2.5}$ increments do not become effective for 1 year, consistent with section 166(b) of the Act, and that the minor source baseline date cannot be established until the $PM_{2.5}$ increments become effective. However, PSD sources subject to $PM_{2.5}$ that receive their PSD permit after the date of publication of this final rule will be considered to consume $PM_{2.5}$ increments by virtue of the fact that they will commence construction after the major source baseline date for $PM_{2.5}$, which is the date of publication of this final rule.

Thus, sources in an area subject to the Federal PSD program for $PM_{2.5}$ will be able to use the SILs and SMC as screening tools for the required $PM_{2.5}$ NAAQS compliance demonstration, but in most cases will not be required to submit a $PM_{2.5}$ increment analysis as part of a complete PSD permit application for a Federal PSD permit unless the application is submitted on or after October 20, 2011. On or after that date, when an applicant submits a complete PSD permit application that is required to address $PM_{2.5}$ under the Federal PSD program, that first application will establish the minor source baseline date for $PM_{2.5}$ in the applicable attainment or unclassifiable area.

As with the State PSD program requirements, prior to the establishment of the minor source baseline date in an area, emissions increases from minor sources in the area will be counted toward the baseline concentration, rather than to the $PM_{2.5}$ increment. As described earlier, the emissions from major stationary sources that commence construction after the major source baseline date, regardless of the date on which their PSD application is submitted, must be counted toward consumption of the $PM_{2.5}$ increments. While these sources will not be required to submit an increment analysis for $PM_{2.5}$ as part of their complete application as long as they receive their PSD permit before the trigger date for $PM_{2.5}$ (*see* discussion that follows in section VIII.B), the emissions increases resulting from the permitting of these sources ultimately must be counted toward the $PM_{2.5}$ increments when the first PSD permit application submitted after the trigger date establishes the minor source baseline date for the area of concern, and in all subsequent $PM_{2.5}$ increment analyses for that area.

B. Transition Period

In the 2007 NPRM, we proposed a transition period to clarify when PSD permit applications must contain an increment analysis demonstrating compliance with the $PM_{2.5}$ increments following the date the $PM_{2.5}$ increments become effective in any State or Federal PSD program. Specifically, we proposed to establish a grandfathering provision to allow complete applications submitted before the increment effective date, but for which the permit had not yet been issued by the effective date, to continue being processed using the PM_{10} Surrogate Policy to satisfy the requirement to demonstrate compliance with the new $PM_{2.5}$ requirements. The grandfathering provision for $PM_{2.5}$ was originally proposed in the 2007 NPRM at 40 CFR 51.166(i)(10) and 40 CFR 52.21(i)(11) for State and Federal PSD programs, respectively. *See* 72 FR 54149 and 54154.

Three commenters supported the proposed grandfathering provision for sources that submitted a complete application before the effective date of the applicable PSD rules. Another commenter felt that it was reasonable to allow states a choice between using PM_{10} or $PM_{2.5}$ increments during a transition period including SIP approval, where applicable.

During the time since the proposal of this rule in 2007, we have reconsidered the need for the proposed transition period in the Federal PSD program to effectively implement the $PM_{2.5}$ increments. In light of the importance of preventing significant deterioration of $PM_{2.5}$ air quality and the amount of time that has passed since the initial promulgation of the $PM_{2.5}$ NAAQS, we do not believe that further delay is warranted. We expect that most permits issued after October 20, 2011 will be from sources that submitted their PSD applications after the major source baseline date for $PM_{2.5}$, which is defined as the date of publication of this final rule, so that they will be increment-consuming sources. Therefore, when these sources apply for their PSD permits, they will have had significant advance notice of when the $PM_{2.5}$ increments will become effective, *i.e.,* 1 year from the date of publication of this final rule. The review and permitting of permit applications submitted prior to the publication date of this final rule should generally be completed prior to the effective date of $PM_{2.5}$ increments and thus effectively have a transition period of 1 year to complete processing.

Thus, we are requiring each source that receives its PSD permit after the effective date of the $PM_{2.5}$ increments, regardless of when the application was submitted, to provide a demonstration that the source's proposed emissions increase, along with other increment-consuming emissions, will not cause or contribute to a violation of the $PM_{2.5}$ increments.

Under this final rule, sources applying for a PSD permit under the Federal PSD program after the major source baseline date for $PM_{2.5}$ (*i.e.,* after the date of publication of this final rule), but before the $PM_{2.5}$ increments become effective (*i.e.,* the date 1 year after publication of this final rule), will be considered to consume $PM_{2.5}$ increment. While EPA will not require any such source to include a $PM_{2.5}$ increment analysis as part of its initial PSD application, an increment analysis ultimately will be required before the permit may be issued if the date of issuance will occur after the trigger date, when the $PM_{2.5}$ increments become effective under the Federal PSD program.

Finally, for the same reasons that we are not adopting the proposed transition period that would have exempted PSD applicants with pending permit applications from demonstrating compliance with the $PM_{2.5}$ increment requirements under the Federal PSD program, we have decided not to provide an option for states to apply a transition period under 40 CFR 51.166. We believe it is appropriate for all increment-consuming sources subject to $PM_{2.5}$ to demonstrate compliance with the $PM_{2.5}$ increments when the required permit is issued after the $PM_{2.5}$ increments become effective in the State's PSD regulations.

C. SILs and SMC for $PM_{2.5}$

In the 2007 NPRM, we explained our position that SILs and SMCs are not minimum required elements of an approvable SIP. While these *de minimis* values are widely considered to be useful components for implementing the PSD program, they are not absolutely necessary for the states to implement their PSD programs. That is, states can satisfy the statutory requirements for a PSD program by requiring each PSD applicant to submit air quality monitoring data and to conduct a comprehensive air quality impacts analysis for $PM_{2.5}$ without using *de minimis* thresholds to exempt certain sources from such requirements. Because the *de minimis* values for $PM_{2.5}$ (and other pollutants) are not mandatory elements, we proposed not to establish specific deadlines for submitting revisions to incorporate the specific values for $PM_{2.5}$ into SIPs.

One State/local commenter agreed that the SILs and SMCs should not be a required element of the PSD SIP. Another State/local commenter agreed with our proposal, but stated that EPA has the authority to include SILs and SMCs as minimum program requirements per the opinion set forth in *Alabama Power.* This commenter added that the EPA Environmental Appeals Board has affirmed EPA's interpretation of the Act to allow EPA to evaluate the significance of a source's impact when determining whether the source's emissions would "cause or contribute" to a NAAQS or increments violation under section 165(a)(3) of the Act.

Two commenters disagreed with our proposed position and argued that SILs and SMCs should be mandatory elements of a State PSD program. One

of these commenters argued that the requirement to model without the use of screening models with SILs and SMCs is so unreasonable that EPA must require that states adopt the SILs and SMCs to meet the Purpose clause of the Act, which requires a balancing of environmental and economic considerations. The other opposing commenter stated that the increments, SILs, and SMCs need to be adopted as a single regulatory approach because the SILs and SMCs define when additional work is needed to ensure that PSD requirements, such as maintaining adequate increment, are met. This commenter added that there is no reason for sources to be placed in the position of conducting expensive modeling that can delay a project when it is unnecessary from an air quality perspective.

We agree that the SILs and SMCs used as *de minimis* thresholds for the various pollutants are useful tools that enable permitting authorities and PSD applicants to screen out "insignificant" activities; however, the fact remains that these values are not required by the Act as part of an approvable SIP program. We believe that most states are likely to adopt the SILs and SMCs because of the useful purpose they serve regardless of our position that the values are not mandatory. Alternatively, states may develop more stringent values if they desire to do so. In any case, states are not under any SIP-related deadline for revising their PSD programs to add these screening tools.

Using the SILs for $PM_{2.5}$, when a proposed major new source or major modification of $PM_{2.5}$ predicts (via air quality modeling) an impact less than the $PM_{2.5}$ *de minimis* value, the proposed source or modification is not considered to have a significant air quality impact and would not need to complete a cumulative impact analysis involving an analysis of other sources in the area. Also, a source with a *de minimis* ambient impact would not be considered to cause or contribute to a violation of either the $PM_{2.5}$ NAAQS or increments.

The $PM_{2.5}$ SILs will become effective under the Federal PSD program on the effective date of this final rule, that is, on December 20, 2010, when either EPA, or a State acting under a delegation of EPA's authority, implements the revised PSD permitting requirements for $PM_{2.5}$ pursuant to 40 CFR 52.21. The SILs will be for use initially with the compliance demonstration for the $PM_{2.5}$ NAAQS, and later for the $PM_{2.5}$ increment analysis, under the Federal PSD program. We emphasize, however, that the $PM_{2.5}$ SILs are not intended to be used as part of the determination of adverse impacts on AQRVs for $PM_{2.5}$ in Class I areas.

Similarly, we intend to use the $PM_{2.5}$ SMC (4 $\mu g/m^3$, 24-hour average) as a screening tool in the Federal PSD permit program beginning on December 20, 2010. Accordingly, when either the modeled $PM_{2.5}$ impact of, or the existing ambient air quality within the area of, the proposed new major source or major modification is less than the $PM_{2.5}$ SMC, the reviewing authority may exempt the source or modification from the monitoring data requirements for $PM_{2.5}$ under 40 CFR 52.21(m).

IX. Other Regulatory Changes

The Act provides that the PSD regulations apply to areas designated as "attainment" or "unclassifiable" as defined by the Act. When the original regulations were written, the Act provisions for designating areas as either "attainment" or "unclassifiable" were contained in sections 107(d)(1)(D) and (E), respectively. In 1990, Congress revised section 107 and changed the relevant paragraphs defining "attainment" and "unclassifiable" areas to sections 107(d)(1)(A)(ii) and (iii), respectively. In accordance with these statutory changes, we are correcting the references to the statutory classifications contained in the existing PSD rules to match the revised paragraphs in the Act. *See* revised 40 CFR 51.166(b)(14)(iii)(*a*) and (15)(i) and (ii), and 40 CFR 52.21(b)(14)(iii)(*a*) and (15)(i) and (ii).

In adding the SILs for $PM_{2.5}$ in this final rule, we restructured paragraph (k) ("Source impact analysis") in the existing PSD regulations at 40 CFR 51.166 and 52.21. Under the restructuring of paragraph (k), old paragraph (k)(2) is now paragraph (k)(1)(ii). To accommodate this restructuring change, we are also revising grandfathering provisions that are contained in existing paragraphs (i)(8) and (i)(9) at 40 CFR 51.166, and paragraphs (i)(9) and (i)(10) at 40 CFR 52.21, which contained references to requirements contained in paragraph (k)(2). As revised, the grandfathering provisions now reference new paragraph (k)(1)(ii).

X. Statutory and Executive Order Reviews

A. Executive Order 12866—Regulatory Planning and Review

Under Executive Order 12866 (58 FR 51735, October 4, 1993), this action is a "significant regulatory action" because it raises novel legal or policy issues arising out of legal mandates, the President's priorities, or the principle set forth in the Executive Order. Accordingly, EPA submitted this action to OMB for review under Executive Order 12866 and any changes made in response to OMB recommendations have been documented in the docket for this action.

B. Paperwork Reduction Act

The information collection requirements in this rule have been submitted for approval to the OMB under the *Paperwork Reduction Act,* 44 U.S.C. 3501 *et seq.* The information collection requirements are not enforceable until OMB approves them.

Pursuant to title I, part C, of the Act, the PSD program requires the owner or operator to obtain a permit prior to either constructing a new major stationary source of air pollutants or making a major modification to an existing major stationary source. The information collection for sources under PSD results from the requirement for owners or operators to submit applications for NSR permits. In some cases, sources must conduct preconstruction monitoring to determine the existing ambient air quality. For reviewing authorities, the information collection results from the requirement to process permit applications and issue permits, and to transmit associated information to EPA. The EPA oversees the PSD program, and the information collected by sources and reviewing authorities is used to ensure that the program is properly implemented.

The final rule will increase the PSD permitting burden for owners and operators of major stationary sources of $PM_{2.5}$ emissions by adding $PM_{2.5}$ increments to the list of existing increments for which air quality impact analyses must be carried out to track the amount of increment consumed by the proposed source and other sources in the area. Over the 3-year period covered by the ICR, we estimate an average annual burden totaling about 29,000 hours and $2.8 million for all industry entities that will be affected by the final rule. For the same reasons, we also expect the final rule (when fully implemented) to increase burden for the State and local authorities reviewing PSD permit applications. In addition, there will be additional burden for State and local agencies to revise their SIPs to incorporate the proposed changes. Over the 3-year period covered by the ICR, we estimate that the average annual burden for all State and local reviewing authorities will total about 7,500 hours and $581,000. Burden is defined at 5 CFR 1320.3(b).

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations in 40 CFR are listed in 40 CFR part 9. When this ICR is approved by OMB, the Agency will publish a technical amendment to 40 CFR part 9 in the **Federal Register** to display the OMB control number for the approved information collection requirements contained in this final rule.

C. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the Agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

For purposes of assessing the impacts of this rule on small entities, "small entity" is defined as: (1) A small business as defined by the Small Business Administration's regulations at 13 CFR 121.201; (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of this final rule on small entities, I certify that this action will not have a significant economic impact on a substantial number of small entities. This final rule will not impose any requirements on small entities because small entities are not subject to the requirements of this rule.

D. Unfunded Mandates Reform Act

This action contains no Federal mandates under the provisions of Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), 2 U.S.C. 1531–1538 for State, local, or tribal governments or the private sector. The action imposes no enforceable duty on any State, local or tribal governments or the private sector. The final rules adds only a relatively small number of new requirements to the existing permit requirements already in place under the PSD program, since states are currently implementing a PM_{10} surrogate program pursuant to EPA guidance. Thus, this action is not subject to the requirements of sections 202 or 205 of UMRA.

This rule is also not subject to the requirements of section 203 of UMRA because it contains no regulatory requirements that might significantly or uniquely affect small governments. The final rule applies only to new major stationary sources and to major modifications at existing major stationary sources.

E. Executive Order 13132—Federalism

This final rule does not have federalism implications. It will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. The final rule makes relatively minor changes to the established PSD program, simply making it possible for states to implement PSD for $PM_{2.5}$ instead of relying on PM_{10} as a surrogate. Thus, Executive Order 13132 does not apply to this rule. In the spirit of Executive Order 13132, and consistent with EPA policy to promote communications between EPA and State and local governments, EPA specifically solicited comment on the proposed rule from State and local officials.

F. Executive Order 13175—Consultation and Coordination With Indian Tribal Governments

This action does not have tribal implications, as specified in Executive Order 13175 (65 FR 67249, November 9, 2000). The final rule provides the elements to implement a $PM_{2.5}$ PSD program in attainment areas. The Act provides for states to develop plans to regulate emissions of air pollutants within their jurisdictions. The Tribal Air Rule (TAR) under the Act gives tribes the opportunity to develop and implement Act programs to attain and maintain the $PM_{2.5}$ NAAQS, but leaves to the discretion of the tribes the decision of whether to develop these programs and which programs, or appropriate elements of a program, they will adopt. Thus, Executive Order 13175 does not apply to this action.

The EPA did reach out to national tribal organizations in 2006 to provide a forum for tribal professionals to provide input to the rulemaking. However, not much participation or input was received.

G. Executive Order 13045—Protection of Children From Environmental Health and Safety Risks

This action is not subject to Executive Order 13045 (62 FR 19885, April 23, 1997) because it is not economically significant as defined in Executive Order 12866, and because the Agency does not believe the environmental health or safety risks addressed by this action present a disproportionate risk to children. One of the basic requirements of the PSD program is that new and modified major sources must demonstrate that any new emissions do not cause or contribute to air quality in violation of the NAAQS.

H. Executive Order 13211—Actions That Significantly Affect Energy Supply, Distribution, or Use

This action is not a "significant energy action" as defined in Executive Order 13211 (66 FR 28355, May 22, 2001) because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. Further, we have concluded that this rule is not likely to have any adverse energy effects.

I. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA), Public Law 104–113, 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (*e.g.,* materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

This action does not involve technical standards. Therefore, EPA did not consider the use of any voluntary consensus standards.

J. Executive Order 12898—Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

Executive Order 12898 (59 FR 7629, Feb. 16, 1994) establishes Federal executive policy on environmental justice. Its main provision directs Federal agencies, to the greatest extent practicable and permitted by law, to make environmental justice part of their mission by identifying and addressing,

as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations in the United States.

The EPA has determined that this final rule will not have disproportionately high and adverse human health or environmental effects on minority or low-income populations because it does not affect the level of protection provided to human health or the environment. This final rule will provide regulatory certainty for implementing the preconstruction NSR permitting program for $PM_{2.5}$. However, the requirements are similar to the existing requirements of the PM_{10} program and hence do not impact the human health or environmental effects.

K. Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 *et seq.,* as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. The EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This action is not a "major rule" as defined by 5 U.S.C. 804(2). Nevertheless, this rule needs to be reviewed for the $PM_{2.5}$ increments being promulgated herein so that they can be scrutinized by Congress as intended under section 166(b) of the Act. Even though the $PM_{2.5}$ increments will not become applicable for 1 year, the final rule will become effective 60 days from the date of publication, that is, on December 20, 2010, for the screening tools (SILs and SMC) being established in this rule.

XI. Judicial Review

Under section 307(b)(1) of the Act, petitions for judicial review of this action must be filed in the United States Court of Appeals for the District of Columbia Circuit by December 20, 2010. Any such judicial review is limited to only those objections that are raised with reasonable specificity in timely comments. Filing a petition for reconsideration by the Administrator of this final rule does not affect the finality of this rule for the purposes of judicial review nor does it extend the time within which a petition for judicial review may be filed, and shall not postpone the effectiveness of such rule or action. Under section 307(b)(2) of the Act, the requirements of this final action may not be challenged later in civil or criminal proceedings brought by us to enforce these requirements.

XII. Statutory Authority

The statutory authority for this final action is provided by sections 101, 160, 163, 165, 166, 301, and 307(d) of the Act as amended (42 U.S.C. 7401, 7470, 7473, 7475, 7476, 7601, and 7607(d)).

List of Subjects

40 CFR Part 51

Administrative practices and procedures, Air pollution control, Environmental protection, Intergovernmental relations.

40 CFR Part 52

Administrative practices and procedures, Air pollution control, Environmental protection, Intergovernmental relations.

Dated: September 30, 2010.

Lisa P. Jackson,

Administrator.

■ For the reasons set out in the preamble, title 40, chapter I of the Code of Federal Regulations is amended as follows:

PART 51—[AMENDED]

■ 1. The authority citation for part 51 continues to read as follows:

Authority: 23 U.S.C. 101; 42 U.S.C. 7401–7671q.

Subpart I—[Amended]

■ 2. Section 51.165 is amended by revising the table in paragraph (b)(2) to read as follows:

§ 51.165 Permit requirements.

* * * * *

(b) * * *

(2) * * *

Pollutant	Annual	Averaging time (hours)			
		24	8	3	1
SO_2	1.0 μg/m³	5 μg/m³		25 μg/m³	
PM_{10}	1.0 μg/m³	5 μg/m³			
$PM_{2.5}$	0.3 μg/m³	1.2 μg/m³			
NO_2	1.0 μg/m³				
CO			0.5 mg/m³		2 mg/m³

* * * * *

■ 3. Section 51.166 is amended as follows:

■ a. By revising paragraph (a)(6)(i);

■ b. By revising paragraph (b)(14)(i)(*a*);

■ c. By removing the period at the end of paragraph (b)(14)(i)(*b*) and adding "; and" in its place;

■ d. By adding paragraph (b)(14)(i)(*c*);

■ e. By revising paragraph (b)(14)(ii)(*a*);

■ f. By removing the period at the end of paragraph (b)(14)(ii)(*b*) and adding "; and" in its place;

■ g. By adding paragraph (b)(14)(ii)(*c*);

■ h. By revising paragraph (b)(14)(iii)(*a*);

■ i. By revising paragraph (b)(15)(i) and paragraph (b)(15)(ii) introductory text;

■ j. By revising the table in paragraph (c)(1);

■ k. By revising paragraph (c)(2);

■ l. By revising paragraph (i)(5)(i)(*c*);

■ m. By redesignating existing paragraphs (i)(5)(i)(*d*) through (*j*) as paragraphs (i)(5)(i)(*e*) through (*k*);

■ n. By adding new paragraph (i)(5)(i)(*d*);

■ o. By removing "(k)(2)" from paragraph (i)(8) and adding "(k)(1)(ii)" in its place;

■ p. By removing in two places "(k)(2)" from paragraph (i)(9) and adding "(k)(1)(ii)" in those places;

■ q. By revising paragraph (k);

■ r. By removing the words "particulate matter" in the last sentence of paragraph (p)(4) introductory text and adding in their place "$PM_{2.5}$, PM_{10}"; and

■ s. By revising the table in paragraph (p)(4).

§ 51.166 Prevention of significant deterioration of air quality.

(a) * * *

(6) * * *

(i) Any State required to revise its implementation plan by reason of an amendment to this section, with the exception of amendments to add new maximum allowable increases or other measures pursuant to section 166(a) of the Act, shall adopt and submit such plan revision to the Administrator for approval no later than 3 years after such amendment is published in the **Federal Register**. With regard to a revision to an implementation plan by reason of an amendment to paragraph (c) of this section to add maximum allowable increases or other measures, the State shall submit such plan revision to the Administrator for approval within 21 months after such amendment is published in the **Federal Register**.

* * * * *

(b) * * *

(14)(i) * * *

(*a*) In the case of PM_{10} and sulfur dioxide, January 6, 1975;

* * * * *

(*c*) In the case of $PM_{2.5}$, October 20, 2010.

(ii) * * *

(*a*) In the case of PM_{10} and sulfur dioxide, August 7, 1977;

* * * * *

(*c*) In the case of $PM_{2.5}$, October 20, 2011.

(iii) * * *

(*a*) The area in which the proposed source or modification would construct is designated as attainment or unclassifiable under section 107(d)(1)(A)(ii) or (iii) of the Act for the pollutant on the date of its complete application under 40 CFR 52.21 or under regulations approved pursuant to 40 CFR 51.166; and

* * * * *

(15)(i) *Baseline area* means any intrastate area (and every part thereof) designated as attainment or unclassifiable under section 107(d)(1)(A)(ii) or (iii) of the Act in which the major source or major modification establishing the minor source baseline date would construct or would have an air quality impact for the pollutant for which the baseline date is established, as follows: Equal to or greater than 1 μg/m³ (annual average) for SO_2, NO_2, or PM_{10}; or equal or greater than 0.3 μg/m³ (annual average) for $PM_{2.5}$.

(ii) Area redesignations under section 107(d)(1)(A)(ii) or (iii) of the Act cannot intersect or be smaller than the area of impact of any major stationary source or major modification which:

* * * * *

(c) * * *

(1) * * *

Pollutant	Maximum allowable increase (micrograms per cubic meter)
Class I Area	
$PM_{2.5}$:	
Annual arithmetic mean	1
24-hr maximum	2
PM_{10}:	
Annual arithmetic mean	4
24-hr maximum	8
Sulfur dioxide:	
Annual arithmetic mean	2
24-hr maximum	5
3-hr maximum	25
Nitrogen dioxide:	
Annual arithmetic mean	2.5
Class II Area	
$PM_{2.5}$:	
Annual arithmetic mean	4
24-hr maximum	9
PM_{10}:	
Annual arithmetic mean	17
24-hr maximum	30
Sulfur dioxide:	
Annual arithmetic mean	20
24-hr maximum	91
3-hr maximum	512
Nitrogen dioxide:	
Annual arithmetic mean	25
Class III Area	
$PM_{2.5}$:	
Annual arithmetic mean	8
24-hr maximum	18
PM_{10}:	
Annual arithmetic mean	34
24-hr maximum	60
Sulfur dioxide:	
Annual arithmetic mean	40
24-hr maximum	182
3-hr maximum	700
Nitrogen dioxide:	

Pollutant	Maximum allowable increase (micrograms per cubic meter)
Annual arithmetic mean	50

* * * * *

(2) Where the State can demonstrate that it has alternative measures in its plan other than maximum allowable increases as defined under paragraph (c)(1) of this section, that satisfy the requirements in sections 166(c) and 166(d) of the Clean Air Act for a regulated NSR pollutant for which the Administrator has established maximum allowable increases pursuant to section 166(a) of the Act, the requirements for maximum allowable increases for that pollutant under paragraph (c)(1) of this section shall not apply upon approval of the plan by the Administrator. The following regulated NSR pollutants are eligible for such treatment:

(i) Nitrogen dioxide.

(ii) $PM_{2.5}$.

* * * * *

(i) * * *

(5) * * *

(i) * * *

(*c*) $PM_{2.5}$–4 μg/m³, 24-hour average;

(*d*) PM_{10}–10 μg/m³, 24-hour average;

* * * * *

(k) *Source impact analysis*—(1) *Required demonstration.* The plan shall provide that the owner or operator of the proposed source or modification shall demonstrate that allowable emission increases from the proposed source or modification, in conjunction with all other applicable emissions increases or reduction (including secondary emissions), would not cause or contribute to air pollution in violation of:

(i) Any national ambient air quality standard in any air quality control region; or

(ii) Any applicable maximum allowable increase over the baseline concentration in any area.

(2) *Significant impact levels.* The plan may provide that, for purposes of $PM_{2.5}$, the demonstration required in paragraph (k)(1) of this section is deemed to have been made if the emissions increase from the new stationary source alone or from the modification alone would cause, in all areas, air quality impacts less than the following amounts:

Pollutant	Averaging time	Class I area	Class II area	Class III area
$PM_{2.5}$	Annual	0.06 μg/m³	0.3 μg/m³	0.3 μg/m³
	24-hour	0.07 μg/m³	1.2 μg/m³	1.2 μg/m³

* * * * *

(p) * * *

(4) * * *

Pollutant	Maximum allowable increase (micrograms per cubic meter)
$PM_{2.5}$:	
Annual arithmetic mean	4
24-hr maximum	9
PM_{10}:	
Annual arithmetic mean	17
24-hr maximum	30
Sulfur dioxide:	
Annual arithmetic mean	20
24-hr maximum	91
3-hr maximum	325
Nitrogen dioxide:	
Annual arithmetic mean	25

* * * * *

■ 4. Appendix S to part 51 is amended by revising the table in section III.A to read as follows:

Appendix S to Part 51—Emission Offset Interpretative Ruling

* * * * *

III. * * *

A. * * *

Pollutant	Annual	Averaging time (hours)			
		24	8	3	1
SO_2	1.0 μg/m³	5 μg/m³		25 μg/m³	
PM_{10}	1.0 μg/m³	5 μg/m³			

Pollutant	Annual	Averaging time (hours)			
		24	8	3	1
$PM_{2.5}$	0.3 μg/m³	1.2 μg/m³			
NO_2	1.0 μg/m³				
CO			0.5 mg/m³		2 mg/m³

* * * * *

PART 52—[AMENDED]

■ 1. The authority citation for part 52 continues to read as follows:

Authority: 42 U.S.C. 7401, *et seq.*

Subpart A—[Amended]

■ 2. Section 52.21 is amended as follows:
■ a. By revising paragraph (b)(14)(i)(*a*);
■ b. By removing the period at the end of paragraph (b)(14)(i)(*b*) and adding "; and" in its place;
■ c. By adding paragraph (b)(14)(i)(*c*);
■ d. By revising paragraph (b)(14)(ii)(*a*);
■ e. By removing the period at the end of paragraph (b)(14)(ii)(*b*) and adding "; and" in its place;
■ f. By adding paragraph (b)(14)(ii)(*c*);
■ g. By revising paragraph (b)(14)(iii)(*a*);
■ h. By revising paragraph (b)(15)(i) and paragraph (b)(15)(ii) introductory text;
■ i. By revising the table in paragraph (c);
■ j. By revising paragraph (i)(5)(i);
■ k. By removing "(k)(2)" from paragraph (i)(9) and adding "(k)(1)(ii)" in its place;
■ l. By removing in two places "(k)(2)" from paragraph (i)(10) and adding "(k)(1)(ii)" in those places;
■ m. By revising paragraph (k);
■ n. By removing the words "particulate matter" in the last sentence of paragraph (p)(5) introductory text and adding in their place "$PM_{2.5}$, PM_{10}"; and
■ o. By revising the table in paragraph (p)(5).

§ 52.21 Prevention of significant deterioration of air quality.

* * * * *

(b) * * *

(14)(i) * * *

(*a*) In the case of PM_{10} and sulfur dioxide, January 6, 1975;

* * * * *

(*c*) In the case of $PM_{2.5}$, October 20, 2010.

(ii) * * *

(*a*) In the case of PM_{10} and sulfur dioxide, August 7, 1977;

* * * * *

(*c*) In the case of $PM_{2.5}$, October 20, 2011.

(iii) * * *

(*a*) The area in which the proposed source or modification would construct is designated as attainment or unclassifiable under section 107(d)(1)(A)(ii) or (iii) of the Act for the pollutant on the date of its complete application under 40 CFR 52.21 or under regulations approved pursuant to 40 CFR 51.166; and

* * * * *

(15)(i) *Baseline area* means any intrastate area (and every part thereof) designated as attainment or unclassifiable under section 107(d)(1)(A)(ii) or (iii) of the Act in which the major source or major modification establishing the minor source baseline date would construct or would have an air quality impact for the pollutant for which the baseline date is established, as follows: equal to or greater than 1 μg/m³ (annual average) for SO_2, NO_2, or PM_{10}; or equal or greater than 0.3 μg/m³ (annual average) for $PM_{2.5}$.

(ii) Area redesignations under section 107(d)(1)(A)(ii) or (iii) of the Act cannot intersect or be smaller than the area of impact of any major stationary source or major modification which:

* * * * *

(c) * * *

Pollutant	Maximum allowable increase (micrograms per cubic meter)
Class I Area	
$PM_{2.5}$:	
Annual arithmetic mean	1
24-hr maximum	2
PM_{10}:	
Annual arithmetic mean	4
24-hr maximum	8
Sulfur dioxide:	
Annual arithmetic mean	2
24-hr maximum	5
3-hr maximum	25
Nitrogen dioxide:	
Annual arithmetic mean	2.5
Class II Area	
$PM_{2.5}$:	
Annual arithmetic mean	4
24-hr maximum	9
PM_{10}:	
Annual arithmetic mean	17
24-hr maximum	30
Sulfur dioxide:	
Annual arithmetic mean	20

Pollutant	Maximum allowable increase (micrograms per cubic meter)
24-hr maximum	91
3-hr maximum	512
Nitrogen dioxide:	
Annual arithmetic mean	25
Class III Area	
$PM_{2.5}$:	
Annual arithmetic mean	8
24-hr maximum	18
PM_{10}:	
Annual arithmetic mean	34
24-hr maximum	60
Sulfur dioxide:	
Annual arithmetic mean	40
24-hr maximum	182
3-hr maximum	700
Nitrogen dioxide:	
Annual arithmetic mean	50

* * * * *

(i) * * *

(5) * * *

(i) The emissions increase of the pollutant from the new source or the net emissions increase of the pollutant from the modification would cause, in any area, air quality impacts less than the following amounts:

(*a*) Carbon monoxide—575 μg/m³, 8-hour average;

(*b*) Nitrogen dioxide—14 μg/m³, annual average;

(*c*) $PM_{2.5}$—4 μg/m³, 24-hour average;

(*d*) PM_{10}—10 μg/m³, 24-hour average;

(*e*) Sulfur dioxide—13 μg/m³, 24-hour average;

(*f*) Ozone;

(*g*) Lead—0.1 μg/m³, 3-month average;

(*h*) Fluorides—0.25 μg/m³, 24-hour average;

(*i*) Total reduced sulfur—10 μg/m³, 1-hour average;

(*j*) Hydrogen sulfide—0.2 μg/m³, 1-hour average;

(*k*) Reduced sulfur compounds—10 μg/m³, 1-hour average; or

Note to paragraph (c)(50)(i)(*f*): No *de minimis* air quality level is provided for ozone. However, any net emissions increase of 100 tons per year or more of volatile organic compounds or nitrogen oxides subject to PSD would be required to perform an ambient impact analysis, including the gathering of ambient air quality data.

* * * * *

(k) *Source impact analysis*—(1) *Required demonstration.* The owner or operator of the proposed source or modification shall demonstrate that allowable emission increases from the proposed source or modification, in conjunction with all other applicable emissions increases or reductions (including secondary emissions), would not cause or contribute to air pollution in violation of:

(i) Any national ambient air quality standard in any air quality control region; or

(ii) Any applicable maximum allowable increase over the baseline concentration in any area.

(2) *Significant impact levels.* For purposes of $PM_{2.5}$, the demonstration required in paragraph (k)(1) of this section is deemed to have been made if the emissions increase from the new stationary source alone or from the modification alone would cause, in all areas, air quality impacts less than the following amounts:

Pollutant	Averaging time	Class I area	Class II area	Class III area
$PM_{2.5}$	Annual	0.06 μg/m³	0.3 μg/m³	0.3 μg/m³
	24-hour	0.07 μg/m³	1.2 μg/m³	1.2 μg/m³

* * * * *

(p) * * *

(5) * * *

Pollutant	Maximum allowable increase (micrograms per cubic meter)
$PM_{2.5}$:	
Annual arithmetic mean	4
24-hr maximum	9
PM_{10}:	
Annual arithmetic mean	17
24-hr maximum	30
Sulfur dioxide:	
Annual arithmetic mean	20
24-hr maximum	91
3-hr maximum	325
Nitrogen dioxide:	
Annual arithmetic mean	25

* * * * *

[FR Doc. 2010–25132 Filed 10–19–10; 8:45 am]

BILLING CODE 6560–50–P

Stephanie Salter

From: Mindy Bowman [mbowman@kdheks.gov]
Sent: Wednesday, May 25, 2011 10:42 AM
To: Stephanie Salter
Subject: FW:
Attachments: EPA Modeling Proceedures PM2 5_Page-memo_3-13-10.pdf

See also page 9, other caveats #1. We've talked about this document before.

_____

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From: Rick Bolfing
Sent: Monday, May 16, 2011 3:45 PM
To: Mindy Bowman; Sergio Guerra
Subject:

See Other Caveats #1

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

MAR 23 2010

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS

FROM: Stephen D. Page, Director
Office of Air Quality Planning and Standards

TO: See Addressees

This memorandum addresses the need for recommendations regarding appropriate dispersion modeling procedures which can be used to demonstrate compliance with $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS). The need for these recommendations arises from several recent regulatory actions and proposals which increase the likelihood that applicants for permits under the new source review (NSR) and prevention of significant deterioration (PSD) programs may be required to demonstrate compliance with $PM_{2.5}$ NAAQS rather than relying upon the PM_{10} surrogate policy established in 1997. These recommendations are intended to facilitate appropriate and consistent implementation of current guidance regarding $PM_{2.5}$ dispersion modeling contained in the *Guideline on Air Quality Models*, Appendix W to 50 CFR Part 51, while acknowledging that such guidance is somewhat limited in detail due to technical issues associated with $PM_{2.5}$ modeling.

This memorandum provides recommendations on two aspects of the modeling procedures for demonstrating compliance with the $PM_{2.5}$ NAAQS. First, this memorandum discusses some of the technical issues that must be addressed by any applicant or permitting authority that is seeking to rely on the PM_{10} surrogate policy. Second, this memorandum provides additional information on modeling procedures to demonstrate compliance with $PM_{2.5}$ NAAQS without relying upon the PM_{10} surrogate policy.

BACKGROUND

On July 18, 1997, EPA revised the NAAQS for particulate matter to add new annual and 24-hour standards for fine particles using $PM_{2.5}$ as the indicator. EPA revised the 24-hour NAAQS for $PM_{2.5}$ on September 21, 2006, reducing the standard from 65 $\mu g/m^3$ to 35 $\mu g/m^3$. EPA also retained the previous 1997 annual standard for $PM_{2.5}$ and the 24-hour standard for PM_{10}, while revoking the previous annual standard for PM_{10}. For attainment of the new 24-hour $PM_{2.5}$ NAAQS based on ambient monitoring, the average of the 98th percentile 24-hour values

over three years of monitoring must not exceed 35 $\mu g/m^3$. The annual $PM_{2.5}$ NAAQS is set at 15 $\mu g/m^3$ based on the average of the annual mean $PM_{2.5}$ concentrations over three years.

Citing significant technical difficulties with respect to $PM_{2.5}$ monitoring, emissions estimation, and modeling, EPA established a policy, known as the PM_{10} surrogate policy, on October 23, 1997. This policy allowed permit applicants to use compliance with the applicable PM_{10} requirements as a surrogate approach for meeting $PM_{2.5}$ NSR requirements until the technical difficulties were resolved. On May 16, 2008, EPA promulgated final rules governing the implementation of the NSR program for $PM_{2.5}$, which included a "grandfathering provision" allowing applicants for federal PSD permits covered by 40 CFR § 52.21, with complete permit applications submitted as of July 15, 2008, to continue relying on the PM_{10} surrogate policy. In response to a petition challenging the continued use of the PM_{10} surrogate policy for issuing PSD permits, on June 1, 2009, EPA issued a 3-month administrative stay of the grandfathering provision for $PM_{2.5}$ affecting federal PSD permits to give EPA time to propose repealing the challenged grandfathering provision. On September 16, 2009, the original 3-month stay was extended to June 22, 2010, to allow additional time for EPA to formally propose repeal of the grandfathering provision from the $PM_{2.5}$ NSR implementation rule for federal PSD permits issues under 40 CFR § 52.21. On February 11, 2010, EPA published its proposal to repeal the grandfathering provision in the *Federal Register* at 75 FR 6827. These actions cite the fact that the technical difficulties which necessitated the PM_{10} surrogate policy have been largely, although not entirely, resolved.

As part of the proposed rulemaking to repeal the grandfathering provision contained in the federal PSD program, EPA has also proposed to end the use of the PM_{10} surrogate policy for state PSD programs that EPA has approved as part of the state implementation plan (SIP) under 40 CFR § 51.166. Under the PSD programs for $PM_{2.5}$ currently in effect for SIP-approved states, states would be allowed to continue using the PM_{10} surrogate policy until May 2011, or until EPA approves the revised SIP for $PM_{2.5}$, whichever occurs first. While we continue to allow states to use the PM_{10} surrogate policy during their transition to the new $PM_{2.5}$ requirements, we have also made it clear that the policy needs to be implemented by taking into account court decisions that address the surrogacy concept. Accordingly, an applicant seeking a PSD permit under a SIP-approved PSD program may still rely upon the PM_{10} surrogate policy as long as (1) the appropriateness of the PM_{10}-based assessment for determining $PM_{2.5}$ compliance has been adequately demonstrated based on the specifics of the project; and (2) the applicant can show that a $PM_{2.5}$ analysis is not technically feasible. Absent such demonstrations, applicants would be required to submit a $PM_{2.5}$-based assessment to demonstrate compliance with the $PM_{2.5}$ standards, in addition to meeting the other requirements under the NSR/PSD programs.

PM_{10} SURROGACY DEMONSTRATIONS

Given the need for applicants that continue to rely on the PM_{10} surrogate policy to demonstrate the appropriateness of the policy based on the specifics of the project, we feel that it is appropriate and timely to address some of the technical issues associated with a surrogacy demonstration. EPA's August 12, 2009, Administrative Order in response to petitions regarding the Title V permit for Louisville Gas and Electric Company (LG&E), Trimble Generating Station, provides a brief summary of the case law history that bears on the PM_{10} surrogacy issue

which suggests that an appropriateness demonstration "would need to address the differences between PM_{10} and $PM_{2.5}$."[1] The LG&E order cites two examples in this regard: 1) "emission controls used to capture coarse particles may be less effective in controlling $PM_{2.5}$"; and 2) "particles that make up $PM_{2.5}$ may be transported over long distances while coarse particles normally only travel short distances." These examples serve to highlight the two main aspects of PSD permitting for which the appropriateness of the surrogate policy should be demonstrated: 1) the Best Available Control Technology (BACT) emission control technology assessment; and 2) the ambient air quality impact assessment to demonstrate compliance with the applicable NAAQS.

While acknowledging "an evolving understanding of the technical and legal issues associated with the use of the PM_{10} Surrogate Policy," the LG&E order offers two steps as possible approaches for making an appropriateness demonstration, without suggesting that the "two steps are necessary or sufficient to demonstrate that PM_{10} is a reasonable surrogate for $PM_{2.5}$" and clearly stating that "these two steps are not intended to be the exclusive list of possible demonstrations" regarding surrogacy. The two steps offered in the LG&E order are primarily relevant to the appropriateness demonstration regarding emission controls under BACT, while the discussion here will be focused on the appropriateness demonstration in relation to ambient air impacts.

Given the range of application-specific factors that may need to be addressed for an appropriateness demonstration in relation to ambient air impacts, it is not practical to provide detailed guidance regarding how to conduct such demonstrations. However, the following list identifies some of the "differences between PM_{10} and $PM_{2.5}$" in relation to ambient air impacts that should be addressed in the development of a surrogacy demonstration:

1. While EPA revoked in 2006 the annual PM_{10} standard that was in effect when the surrogate policy, the surrogacy demonstration would still need to address the appropriateness of the PM_{10} surrogate policy in relation to the annual $PM_{2.5}$ standard, and would likely require a modeling analysis of annual PM_{10} impacts.
2. The current 24-hour NAAQS of 35 $\mu g/m^3$ is well below the previous level of 65 $\mu g/m^3$ that was in effect when the PM_{10} surrogate policy was established. The background monitored levels of $PM_{2.5}$ are, therefore, likely to account for a more significant fraction of the cumulative impacts from a modeling analysis relative to the current 24-hour $PM_{2.5}$ NAAQS than for PM_{10}.
3. Secondary formation of $PM_{2.5}$ from emissions of NO_x, SO_x and other compounds from sources across a large domain will often contribute significantly to the total ambient levels of $PM_{2.5}$, and may be the dominant source of ambient $PM_{2.5}$ in some cases. In contrast, secondarily formed particles are less likely to be significant portion of PM_{10}, which may result in significant differences in the spatial and temporal patterns of ambient impacts between $PM_{2.5}$ and PM_{10}.

---

[1] A discussion of the case law that bears on the PM_{10} surrogacy issue also appears in the February 11, 2010, proposed rule at 75 FR 6831-6832.

4. The probabilistic form of the $PM_{2.5}$ NAAQS, based on the multiyear average of the 98th percentile for the daily standard, differs from the expected exceedance form of the PM_{10} NAAQS, which allows the standard to be exceeded once per year on average using the high-sixth-high (H6H) value over 5 years. These differences affect the temporal and spatial characteristics of the ambient air impacts of PM_{10} and $PM_{2.5}$. Differences in the form of the NAAQS also complicate the process of combining modeled impacts with monitored background levels to estimate cumulative impacts under the NSR/PSD permitting programs, as well as the determination of whether modeled impacts from the facility will cause a significant contribution to any modeled violations of the NAAQS that may occur.

These factors complicate the viability of demonstrating the appropriateness of the PM_{10} surrogate policy to comply with the requirement for a $PM_{2.5}$ ambient air quality impact assessment. In light of these complications, applicants may elect to use $PM_{2.5}$ dispersion modeling to explicitly meet the requirement of an ambient air quality impact assessment under the PSD permitting program, provided that the technical difficulties with respect to $PM_{2.5}$ monitoring, emissions estimation, and modeling have been sufficiently resolved in relation to the specific application.

For surrogacy demonstrations, it is assumed that as an initial step the applicant will have conducted an appropriate dispersion modeling analysis which demonstrates compliance with the PM_{10} NAAQS, including an analysis of annual PM_{10} impacts to address item 1. A simple example illustrating when a PM_{10} modeling analysis might serve as a surrogate for $PM_{2.5}$ modeling would be if a clearly conservative assumption is made that all PM_{10} emissions are $PM_{2.5}$, and the modeled PM_{10} impacts are taken as a direct surrogate for $PM_{2.5}$ impacts and compared to the $PM_{2.5}$ NAAQS. If an adequate accounting for contributions from background $PM_{2.5}$ concentrations to the cumulative impact assessment can be made, and a reasonable demonstration that the modeled PM_{10} emission inventory adequately accounted for potential nearby sources of $PM_{2.5}$, then the appropriateness of surrogacy could be reasonably found in this example. An analysis of source-specific $PM_{2.5}$/ PM_{10} emission factor ratios may also support the assumption of a more realistic, yet still conservative approach for taking a ratio of modeled PM_{10} ambient impacts to provide conservative estimates of $PM_{2.5}$ impacts.

While additional modeling analyses, short of explicit $PM_{2.5}$ modeling, may also be used to the support the surrogacy demonstration in some cases, it is important to make a clear distinction between modeling analyses for purposes of surrogacy demonstrations and modeling analyses that are intended to explicitly demonstrate compliance with the $PM_{2.5}$ standards. The distinction between these two types of modeling analyses may not always be clear, but one important distinction is whether or not a $PM_{2.5}$ emission inventory has been developed as the basis for the modeling. The distinction between these types of modeling is important because modeling procedures that may be considered appropriate for one type of analysis may not be appropriate for the other. The following section elaborates further on this point.

$PM_{2.5}$ MODELING ANALYSES

The differences between PM_{10} and $PM_{2.5}$ described above in relation to surrogacy demonstrations, especially items 2 through 4, also have implications on how best to conduct an explicit $PM_{2.5}$ NAAQS compliance demonstration through dispersion modeling. Due to the potentially significant contribution from secondary formation of $PM_{2.5}$, and the more prominent role of monitored background concentrations of $PM_{2.5}$ in the cumulative analysis, certain aspects of standard modeling practices used for PM_{10} and other criteria pollutants may not be appropriate for $PM_{2.5}$. Our recommendations for addressing these issues in terms of explicit $PM_{2.5}$ modeling analyses are described in more detail below.

Given the issues listed above, and especially the important contribution from secondary formation of $PM_{2.5}$, which is not explicitly accounted for by the dispersion model, PSD modeling of $PM_{2.5}$ should currently be viewed as screening-level analyses, analogous to the screening nature of the guidance in Section 5.2.4 of Appendix W regarding dispersion modeling for NO_2 impacts given the importance of chemistry in the conversion of NO emissions to ambient NO_2. The screening recommendations presented below for demonstrating compliance with the $PM_{2.5}$ NAAQS through dispersion modeling have been developed with the factors listed above in mind. As with any modeling analysis conducted under Appendix W, alternative models and methods may be considered on a case-by-case basis, subject to approval by the Regional Office in accordance with the recommendations in Section 3.2 on "Use of Alternative Models."

The following sections describe the recommended modeling methods for the two main stages in a typical PSD ambient air quality analysis: 1) preliminary significant impact analysis; and 2) cumulative impact assessment. The rationale for the recommendations is also provided.

Preliminary Significant Impact Analysis

The initial step in air quality impact assessments under NSR/PSD is typically a significant impact level analysis to determine whether the proposed emissions increase from the proposed new or modified source (i.e., project emissions) would have a "significant" ambient impact. Thus, the first step of the ambient impact analysis is to determine whether those emissions would result in ambient air concentrations that exceed a de minimis level, referred to as the Significant Impact Level (SIL). If modeled impacts from the facility do not exceed the SIL, then the permitting authority may be able to conclude, based on this preliminary analysis, that the project would not cause or contribute to a violation of the NAAQS. Under these circumstances, EPA would not consider it necessary for the facility to conduct a more comprehensive cumulative impact assessment that would involve modeling the facility's total emissions along with emissions from other nearby background sources, and combining impacts from the modeled emission inventory with representative ambient monitored background concentrations to estimate the cumulative impact levels for comparison to the NAAQS. The SIL is also used to establish the significant impact area of the facility for purposes of determining the geographic range of the background source emission inventory that would be appropriate should a cumulative impact assessment be necessary.

EPA's 2007 proposed rule to establish PSD increments, SILs, and a Significant Monitoring Concentration (SMC) for $PM_{2.5}$ included three options for the $PM_{2.5}$ SILs for both the 24-hour and annual NAAQS. Until the $PM_{2.5}$ SILs are finalized, the proposed SILs may not be presumed to be appropriate de minimis impact levels. However, EPA does not preclude states from adopting interim de minimis impact levels for $PM_{2.5}$ to determine whether a cumulative impact analysis will be necessary, provided that states prepare an appropriate record to support the value used. Such de minimis levels do not necessarily have to match any of the SILs that have been proposed for $PM_{2.5}$, but the levels proposed by EPA and the record supporting EPA's proposed rule could be considered in the state's determination.

The modeling methods used in this initial significant impact assessment phase of the $PM_{2.5}$ analysis, based on either a state's interim de minimis levels or EPA-finalized SILs, are similar to the methods used for other pollutants, including the use of maximum allowable emissions. However, due to the probabilistic form of the NAAQS, we recommend that the highest average of the modeled annual averages across 5 years for National Weather Service (NWS) meteorological data or the highest modeled annual average for one year of site-specific meteorological data be compared to the annual screening level (SIL). Similarly, the highest average of the maximum 24-hour averages across 5 years for NWS meteorological data or the highest modeled 24-hour average for one year of site-specific meteorological data should be compared to the 24-hour screening level (SIL).

Using the average of the highest values across the years modeled preserves one aspect of the form of the NAAQS, while using the average of the <u>first</u> highest 24-hour averages rather than the 98th percentile (8th highest) values from the distribution is consistent with the screening-level nature of the analysis. In addition, since the $PM_{2.5}$ NAAQS is based on air quality levels averaged over time, it is appropriate to use an average modeled impact for comparison to the SIL since that will more accurately characterize the modeled contribution from the facility in relation to the NAAQS than use of the highest modeled impacts from individual years. At the present time, the dispersion modeling recommendations presented here are based on modeling only the primary or direct $PM_{2.5}$ emissions from the facility.

<u>Cumulative Impact Assessment</u>

Unless modeled ambient air concentrations of $PM_{2.5}$ from the project emissions are shown to fall below the state's de minimis level or EPA's promulgated SIL (when finalized), then a cumulative impact assessment would be necessary to account for the combined impact of facility emissions, emissions from other nearby sources, and representative background levels of $PM_{2.5}$ within the modeling domain. The cumulative impacts are then compared to the NAAQS to determine whether the facility emissions will cause or contribute to a violation of the NAAQS. Several aspects of the cumulative impact assessment for $PM_{2.5}$ will be comparable to assessments conducted for other criteria pollutants, while other aspects will differ due to the issues identified above.

Modeling Inventory

The current guidance on modeling emission inventories contained in Section 8.1 of Appendix W will generally be applicable for the $PM_{2.5}$ modeling inventory, recognizing that these recommendations only address modeling of primary $PM_{2.5}$ emissions. The guidance in Appendix W addresses the appropriate emission level to be modeled, which in most cases is the maximum allowable emission rate under the proposed permit. Nearby sources that are expected to cause a significant concentration gradient in the vicinity of the facility should generally be included in the modeled inventory. Since modeling of $PM_{2.5}$ emissions has not been a routine requirement to date, the availability of an adequate $PM_{2.5}$ emission inventory for background sources may not exist in all cases. Recommendations for developing $PM_{2.5}$ emission inventories for use in PSD applications will be addressed separately, but existing PM_{10} inventories may provide a useful starting point for this effort.

Monitored Background

The determination of representative background monitored concentrations of $PM_{2.5}$ to include in the $PM_{2.5}$ cumulative impact assessment will entail different considerations from those for other criteria pollutants. An important aspect of the monitored background concentration for $PM_{2.5}$ is that the monitored data should account for the contribution of secondary $PM_{2.5}$ formation representative of the modeling domain. As with other criteria pollutants, consideration should also be given to the potential for some double-counting of the impacts from modeled emissions that may be reflected in the background monitoring, but this should generally be of less importance for $PM_{2.5}$ than the representativeness of the monitor for secondary contributions. Also, due to the important role of secondary $PM_{2.5}$, background monitored concentrations of $PM_{2.5}$ are likely to be more homogeneous across the modeling domain in most cases, compared to other pollutants. We plan to address separately more detailed guidance on the determination of representative background concentrations for $PM_{2.5}$.

Comparison to NAAQS

Combining the modeled and monitored concentrations of $PM_{2.5}$ for comparison to the $PM_{2.5}$ NAAQS also entails considerations that differ from those for other criteria pollutants, due to the issues identified above. Given the importance of secondary contributions for $PM_{2.5}$ and the typically high background levels relative to the NAAQS for $PM_{2.5}$, greater emphasis is placed on the monitored background contribution relative to the modeled inventory. Also, given the probabilistic form of the $PM_{2.5}$ NAAQS, careful consideration must be given to how the monitored and modeled concentrations are combined to estimate the cumulative impact levels.

The representative monitored $PM_{2.5}$ design value, rather than the overall maximum monitored background concentration, should be used as a component of the cumulative analysis. The $PM_{2.5}$ design value for the annual averaging period is based on the 3-year average of the annual average $PM_{2.5}$ concentrations; for the 24-hour averaging period, the design value is based on the 3-year average of the 98th percentile 24-hour average $PM_{2.5}$ concentrations for the daily standard. Details regarding the determination of the 98th percentile monitored 24-hour value

based on the number of days sampled during the year are provided in the ambient monitoring regulations, Appendix N to 40 CFR Part 50.

The modeled annual concentrations of (primary) $PM_{2.5}$ to be added to the monitored annual design value should be computed using the same procedure used for the initial significant impact analysis based on the highest average of the modeled annual averages across 5 years for NWS meteorological data or the highest modeled annual average for one year of site-specific meteorological data. The resulting cumulative annual concentration would then be compared to the annual $PM_{2.5}$ NAAQS of 15 $\mu g/m^3$.

For the 24-hour NAAQS analysis, the modeled concentrations to be added to the monitored 24-hour design value should be computed using the same procedure used for the preliminary analysis based on the highest average of the maximum modeled 24-hour averages across 5 years for NWS meteorological data or the maximum modeled 24-hour average for one year of site-specific meteorological data. As noted above, use of the average modeled concentration across the appropriate time period more accurately characterizes the modeled contribution from the facility in relation to the NAAQS than use of the highest modeled impact from individual years, while using the average of the first highest 24-hour averages rather than the 98th percentile (8th highest) values is consistent with the screening nature of $PM_{2.5}$ dispersion modeling. Furthermore, combining the 98th percentile monitored with the 98th percentile modeled concentrations for a cumulative impact assessment could result in a value that is below the 98th percentile of the combined cumulative distribution and would, therefore, not be protective of the NAAQS.

The recommendations provided above constitute a First Tier modeling analysis for $PM_{2.5}$ compliance demonstrations. For applications where impacts from primary $PM_{2.5}$ emissions are not temporally correlated with background $PM_{2.5}$ levels, combining the modeled and monitored contributions as described above may be overly conservative. In these cases, a Second Tier modeling analysis may be considered that would involve combining the monitored and modeled $PM_{2.5}$ concentrations on a seasonal or quarterly basis, and re-sorting the total impacts across the year to determine the cumulative design value. We plan to provide separately additional details regarding this Second Tier, including a discussion of circumstances where this approach may be appropriate.

Determining Significant Contributions to Modeled Violations

If the cumulative impact assessment following these screening recommendations results in modeled violations of the $PM_{2.5}$ NAAQS, then the applicant will need to determine whether the facility emissions are causing a significant contribution to those modeled violations. A "significant contribution" determination is based on a comparison of the modeled impacts from the project emissions associated with the modeled violation to the appropriate SIL. The significant contribution determination should be made following the same procedures used during the initial significant impact analysis, based on a comparison of the average of the modeled concentrations at the receptor location showing the violation, across 5 years for NWS meteorological data and the highest modeled concentration for one year of site-specific meteorological data. For a violation of the annual NAAQS, the average of the annual values at

the affected receptor(s) is compared to the SIL, while the average of the highest 24-hour average concentrations at the affected receptor(s) should be used for the 24-hour NAAQS. Use of the average modeled concentration is appropriate in this context since it is consistent with the actual contribution of the facility to the cumulative impacts at the receptor(s) showing violations and accounts for the fact that modeled violations of the 24-hour NAAQS represent average impacts across the modeling period.

Synopsis

Significant Impact Analysis: Compare the average of the highest modeled individual year's annual averages and the average of the first highest individual year's 24-hour average concentrations from project emissions to their respective screening levels, which may be based on the state's de minimis levels or EPA-finalized SILs. If modeled impacts exceed the screening levels, a cumulative impact assessment would need to be performed.

Cumulative Impact Assessment: Develop an emission inventory of background sources to be included in the modeling analysis using traditional guidance. That would include using the significant impact area established in the initial significant impact analysis, plus a 50-km annular ring to determine the geographic extent of the background emission inventory. From data obtained within this combined area, compare the average of the highest modeled individual year's annual averages and the average of the first highest individual year's 24-hour averages, plus representative background monitored concentrations, to their respective NAAQS. Monitored background concentrations are based on the 3-year average of the annual $PM_{2.5}$ concentrations, and the 3-year average of the 98th percentile 24-hour averages. To determine whether the proposed project's emissions cause a significant contribution to any modeled violations of the NAAQS, the proposed project's impacts at the affected receptor(s) are determined based on the average of the highest modeled individual years' annual averages and average of the first highest individual years' 24-hour averages from the proposed project's emissions, and are compared to the state's de minimis levels or EPA-finalized SILs.

Additional Caveats

A few additional caveats should be considered while implementing these recommendations:

1. The current preferred dispersion model for near-field $PM_{2.5}$ modeling, AERMOD, does not account for secondary formation of $PM_{2.5}$. Therefore, any secondary contribution of the facility's or other modeled source's emissions is not explicitly accounted for. While representative background monitoring data for $PM_{2.5}$ should adequately account for secondary contribution from background sources in most cases, if the facility emits significant quantities of $PM_{2.5}$ precursors, some assessment of their potential contribution to cumulative impacts as secondary $PM_{2.5}$ may be necessary. In determining whether such contributions may be important, keep in mind that peak impacts due to facility primary and secondary $PM_{2.5}$ are not likely to be well-correlated in space or time, and these relationships may vary for different precursors. We plan to issue separately additional guidance regarding this issue.

2. While dry and/or wet deposition may be important processes when estimating ambient concentrations of particulate matter (PM) in general, these factors are expected to be minor for $PM_{2.5}$ due to the small particle size. In addition, there may be additional uncertainty associated with deposition modeling for $PM_{2.5}$ due to the variable makeup of the constituent elements for $PM_{2.5}$ and the fact that deposition properties may vary depending on the constituent elements of $PM_{2.5}$. Therefore, use of deposition algorithms to account for depletion in estimating ambient $PM_{2.5}$ concentrations should be done with caution and only when clear documentation and justification of the deposition parameters is provided.
3. While EPA has proposed PSD increments for $PM_{2.5}$, the increments have not been finalized yet. Until the increments are finalized, no increment analysis is required for $PM_{2.5}$. However, it should be noted that some of the recommendations presented here in relation to NAAQS modeling analyses may need to be modified for $PM_{2.5}$ increment analyses due to the differences between the forms of the NAAQS and increments. We plan to provide further clarification of these differences separately, once the increments are finalized.

This memorandum presents EPA's views on these issues concerning modeling procedures for demonstrating compliance with the $PM_{2.5}$ NAAQS. The statements in this memorandum do not bind State and local governments and the public as a matter of law. If you have any questions concerning this memorandum, please contact Tyler Fox, Leader, Air Quality Modeling Group at (919) 541-5562.

Addressees:

Bill Harnett, C504-01
Richard Wayland, C304-02
Scott Mathias, C504-01
Tyler Fox, C439-01
Raj Rao, C504-01
Roger Brode, C439-01
Bret Anderson, C439-01
Dan deRoeck, C504-01
EPA Regional Modeling Contacts

Stephanie Salter

From: Sergio Guerra [SGuerra@kdheks.gov]
Sent: Wednesday, June 01, 2011 10:17 AM
To: Stephanie Salter
Cc: Mindy Bowman; Marian Massoth; Rick Brunetti; Daye.Richard@epamail.epa.gov; Robert.Wildgen@bioenergy.abengoa.com; Joseph.Birschbach@bioenergy.abengoa.com
Subject: RE: Modeling Update

Stephanie,

KDHE approves the use of the receptor grid sent earlier for all pollutants and averaging periods.

Based on the recommendations from the 1-hour NO2 memo from Tyler Fox (March 1, 2011) you may "limit the cumulative impact analysis to only those receptors that have shown to have significant impacts from the proposed new source based on the SIL analysis."

Also, please provide the correct location for the fenceline. There are two options to address the wrong coordinates from the fenceline:

1- You may perform all runs with the corrected fenceline or;
2- You may include additional runs with the fenceline receptors next to the north road. This would result in individual runs of about 50 reeceptors.

Please let us know if you have questions.

Sergio

Sergio Guerra
Email : sguerra@kdheks.gov
Work #: 785-296-0365

From: Stephanie Salter [mailto:stephanie.salter@wla-consulting.com]
Sent: Tuesday, May 31, 2011 11:57 PM
To: Sergio Guerra
Cc: Mindy Bowman
Subject: RE: Modeling Update

It appears that the fenceline is off due to the use of a wrong coordinate when relocating the sources at the facility. Your email indicates that the reduced receptor grid may only be used for the 1-hour SO2 and 1-hour NO2 cumulative; however, there will still be about 18,000 receptors out to 50 km unless I may use the reduced receptor grid for the SIL runs and then include in the cumulative only those receptors above the SIL. This methodology was allowed by Andy Hawkins of the EPA for the modeling that was completed previously.

Also, the reduced receptor grid will be necessary for both the SIL and cumulative runs for PM; therefore, can you please provide formal approval that the reduced receptor grid is acceptable for all pollutants and averaging periods and that only those receptors above the SIL are required to be included in the cumulative runs. The inclusion of only those receptors over the SIL is consistent with 40 CFR Part 51 which allows for a permit to be issued when dispersion modeling predicts a violation of the NAAQS or increment but the proposed source will not have a significant impact (i.e. will not be above the de minimis levels) at the point and time of the modeled violation. This rule can be inferred to allow for receptors below the SIL to be excluded from the cumulative modeling analysis because they are insignificant. Because of the high number of nearby sources, the reduction in receptors will allow for the modeling runs to complete faster.

Stephanie Salter

From: Sergio Guerra [mailto:SGuerra@kdheks.gov]
Sent: Tuesday, May 31, 2011 3:00 PM
To: Stephanie Salter
Cc: Mindy Bowman; Marian Massoth; Rick Brunetti; Daye.Richard@epamail.epa.gov
Subject: RE: Modeling Update

Stephanie,

You may use the following receptor spacing for the 1-hour SO2 and 1-hour NO2 cumulative runs. Please let me know if you have questions,

Sergio

Receptor Spacing for Significant Impact Modeling

Receptor Grid Type	Distance from Facility	Receptor Spacing
Extra Fine	Fenceline to 200+ m	50 m
Fine	200 m to 2,000+ m	100 m
Medium	2,000m to 5,000+ m	250 m
Coarse	5,000 m to 10,000+ m	500 m
Extra Coarse	10,000 m to 50,000 m	1,000 m

Sergio Guerra
Email : sguerra@kdheks.gov
Work #: 785-296-0365

From: Stephanie Salter [mailto:stephanie.salter@wla-consulting.com]
Sent: Tuesday, May 31, 2011 11:54 AM
To: Sergio Guerra
Cc: Terry Tavener; Marian Massoth; Robert.Wildgen@bioenergy.abengoa.com; Carl.LaFoy@bioenergy.abengoa.com; Joseph.Birschbach@bioenergy.abengoa.com; Mindy Bowman
Subject: Modeling Update

Sergio,
Per our conversation this morning here is the beginning of the transmission of the input files for Abengoa. Attached to this email is the PTE updated to reflect the new scrubber parameters (corrected H2S concentration), the modeling parameter worksheet, and flare parameter calculations. Input files will follow in separate emails following this one.

Because of EPA's request, the run time has become extremely burdensome. The PM runs require over 200 hours to complete using the receptor grid EPA requires, and we have a total of 4 PM10 SIL runs and 4 PM25 SIL runs in order to evaluate the different haul road scenarios. I had an issue over the weekend with the PM runs due to an exceedance that had not been previously identified due to missing hours coupled with the highest impacts not occurring at the fenceline (I had been using the fenceline to screen for highest impacts to set the stack heights on some of the sources). So, I am now facing re-running the PM runs.

I have successfully reran the PM10/PM25 SIL runs with AERMOD 09292. I have all of the other pollutant SIL runs completed using 11103. With KDHE's approval, I would like to request to use AERMOD 09292 for the

completion of the cumulative runs (except 1-hour NO2 and 1-hour SO2). There is no difference in the results between AERMOD 09292 and 11103 except for the averaging of the 1-hour NO2 and 1-hour SO2 results; therefore the use of AERMOD 09292 should be acceptable. By using AERMOD 09292, I am able to utilize the BREEZE BRMS which expedites the results. For 1-hour NO2 and SO2, I would like to request a reduced receptor grid intensity and would like for you to provide the grid requirements that would be acceptable to KDHE.

Stephanie E. Salter, P.E.

_____

WLA Consulting, Inc.
1640 "L" Street, Suite D | Lincoln, NE 68508
phone (402) 475-8588 | fax (402) 477-1956 | cell (417) 860-7275
e-mail stephanie.salter@WLA-consulting.com

WaterLandAir *"Promises Kept, Solutions Delivered"*

Stephanie Salter

From: Daye.Richard@epamail.epa.gov
Sent: Wednesday, June 01, 2011 3:19 PM
To: Sergio Guerra
Cc: Mindy Bowman; Marian Massoth; Rick Brunetti; Stephanie Salter; Scott.PatriciaA@epa.gov
Subject: RE: Modeling Update

Hi Sergio
Our recommended and verifying analyses will use the extensive receptor, i.e, 50 m spacing to 1 km etc. PM output comparing output from AERMOD 09292 and 110103 with the fine grid should be submitted for review before allowing the continued use of 09292. If a parallel version is, comparison should be submitted for all modeled pollutants and all time periods.
Mick

Richard L. Daye
Regional Meteorologist
Environmental Protection Agency Region VII AWMD/APDB/ATPS
901 North 5th Street
Kansas City, KS 66101

Phone: 913-551-7619
FaX: 913-551-9619
daye.richard@epa.gov

From: Sergio Guerra <SGuerra@kdheks.gov>

To: Stephanie Salter <stephanie.salter@wla-consulting.com>

Cc: Mindy Bowman <mbowman@kdheks.gov>, Marian Massoth <MMassoth@kdheks.gov>, Rick Brunetti <rbrunetti@kdheks.gov>,
Richard Daye/R7/USEPA/US@EPA

Date: 05/31/2011 02:59 PM

Subject: RE: Modeling Update

Stephanie,

You may use the following receptor spacing for the 1-hour SO2 and 1-hour NO2 cumulative runs. Please let me know if you have questions,

Sergio

Receptor Spacing for Significant Impact Modeling

|----------+----------+----------|
| | Distance from | |
| Receptor Grid| Facility | Receptor |

Type	Boundary	Spacing
Extra Fine	Fenceline to 200+ m	50 m
Fine	200 m to 2,000+ m	100 m
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Sergio Guerra
Email : sguerra@kdheks.gov
Work #: 785-296-0365

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To: Sergio Guerra
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Stephanie E. Salter, P.E.

WLA Consulting, Inc.
1640 "L" Street, Suite D | Lincoln, NE 68508 phone (402) 475-8588 | fax (402) 477-1956 | cell (417) 860-7275 e-mail stephanie.salter@WLA-consulting.com

WaterLandAir "Promises Kept, Solutions Delivered"

Stephanie Salter

From: Daye.Richard@epamail.epa.gov
Sent: Wednesday, June 01, 2011 3:27 PM
To: Sergio Guerra
Cc: Hawkins.Andy@epamail.epa.gov; Mindy Bowman; Marian Massoth; Rick Brunetti; Stephanie Salter; Scott.PatriciaA@epa.gov
Subject: Re: FW: Modeling Update

Hi again Sergio
I am working my way though my emails. I think that I have answered the question of use of AERMOD 09292 for PM in reply to your earlier email. OK if documented and files provided. I have not looked at the attachments yet.
Mick

Richard L. Daye
Regional Meteorologist
Environmental Protection Agency Region VII AWMD/APDB/ATPS
901 North 5th Street
Kansas City, KS 66101

Phone: 913-551-7619
FaX: 913-551-9619
daye.richard@epa.gov

From: Sergio Guerra <SGuerra@kdheks.gov>

To: Richard Daye/R7/USEPA/US@EPA, Andy Hawkins/R7/USEPA/US@EPA

Cc: Mindy Bowman <mbowman@kdheks.gov>, Marian Massoth <MMassoth@kdheks.gov>, Rick Brunetti <rbrunetti@kdheks.gov>,
Stephanie Salter <stephanie.salter@wla-consulting.com>

Date: 05/31/2011 03:13 PM

Subject: FW: Modeling Update

Hi Mick,

Abengoa is proposing to use AERMOD version 09292 for those pollutants requiring a cumulative modeling except for the 1-hr NO2 and the 1-hr SO2 (version 11103 will be used for these two). I believe Abengoa will provide a sensitivity analysis to confirm that the results from using version 09292 are adequate. KDHE will also verify all runs with the latest version of AERMOD.

Please let us know if you approve the use of version 09292 as requested in the email below,

Thanks,

Sergio

Sergio Guerra
Email : sguerra@kdheks.gov

Work #: 785-296-0365

From: Stephanie Salter [mailto:stephanie.salter@wla-consulting.com]
Sent: Tuesday, May 31, 2011 11:54 AM
To: Sergio Guerra
Cc: Terry Tavener; Marian Massoth; Robert.Wildgen@bioenergy.abengoa.com;
Carl.LaFoy@bioenergy.abengoa.com;
Joseph.Birschbach@bioenergy.abengoa.com; Mindy Bowman
Subject: Modeling Update

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WaterLandAir "Promises Kept, Solutions Delivered"
[attachment "20110520_ABBK Stoker PTE_r1.xls" deleted by Richard Daye/R7/USEPA/US] [attachment "20110530_ABBK AERMOD Modeling Worksheets.xls" deleted by Richard Daye/R7/USEPA/US] [attachment "Mbal-S18185-1106Rev1.pdf" deleted by Richard Daye/R7/USEPA/US] [attachment "EP-09001 Flare.xls" deleted by Richard Daye/R7/USEPA/US]

Stephanie Salter

From: Sergio Guerra [SGuerra@kdheks.gov]
Sent: Wednesday, June 01, 2011 3:33 PM
To: 'Daye.Richard@epamail.epa.gov'
Cc: Mindy Bowman; Rick Brunetti; Stephanie Salter; 'Scott.PatriciaA@epa.gov'; Marian Massoth
Subject: RE: Modeling Update

Thanks Mick,

We are having major issues to get aermod to run with the over 50 000 receptors from the recommended grid. Thus, we have opted to go with the receptor grid mentioned in the email below. Have you been able to run aermod under similar conditions? In our case the computer crashes each time we try to run under so many receptors and sources.

At any rate, we can let Abengoa decide about submitting comparison analyses for the 2009 and 2011 versions of aermod.

Thanks again,

Sergio

Sergio Guerra
Email : sguerra@kdheks.gov
Work #: 785-296-0365

-----Original Message-----
From: Daye.Richard@epamail.epa.gov [mailto:Daye.Richard@epamail.epa.gov]
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To: Stephanie Salter <stephanie.salter@wla-consulting.com>

Cc: Mindy Bowman <mbowman@kdheks.gov>, Marian Massoth <MMassoth@kdheks.gov>, Rick Brunetti <rbrunetti@kdheks.gov>,
Richard Daye/R7/USEPA/US@EPA

Date: 05/31/2011 02:59 PM

Subject: RE: Modeling Update

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Sergio Guerra
Email : sguerra@kdheks.gov
Work #: 785-296-0365

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Cc: Terry Tavener; Marian Massoth; Robert.Wildgen@bioenergy.abengoa.com; Carl.LaFoy@bioenergy.abengoa.com; Joseph.Birschbach@bioenergy.abengoa.com; Mindy Bowman
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WaterLandAir "Promises Kept, Solutions Delivered"

Stephanie Salter

From: Daye.Richard@epamail.epa.gov
Sent: Wednesday, June 01, 2011 3:42 PM
To: Stephanie Salter
Cc: Carl.LaFoy@bioenergy.abengoa.com; Joseph.Birschbach@bioenergy.abengoa.com; Mindy Bowman; Marian Massoth; Robert.Wildgen@bioenergy.abengoa.com; Sergio Guerra; Terry Tavener; Scott.PatriciaA@epa.gov
Subject: Re: AERMOD 11103 VS AERMOD 09292

Greetings Stephanie
I believe that you should have received my emails to Sergio by now concerning the use of AERMOD 09292 for PM. All other pollutants should be modeled with 11103. It will be necessary to show that PM concentrations are the same for both versions. Additional verifications will be necessary if a parallel version is used.
Mick

Richard L. Daye
Regional Meteorologist
Environmental Protection Agency Region VII AWMD/APDB/ATPS
901 North 5th Street
Kansas City, KS 66101

Phone: 913-551-7619
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daye.richard@epa.gov

From: Stephanie Salter <stephanie.salter@wla-consulting.com>

To: Richard Daye/R7/USEPA/US@EPA

Cc: Sergio Guerra <SGuerra@kdheks.gov>, Mindy Bowman <mbowman@kdheks.gov>, Marian Massoth <MMassoth@kdheks.gov>, Terry Tavener <TTavener@kdheks.gov>, "Robert.Wildgen@bioenergy.abengoa.com" <Robert.Wildgen@bioenergy.abengoa.com>, "Carl.LaFoy@bioenergy.abengoa.com" <Carl.LaFoy@bioenergy.abengoa.com>, "Joseph.Birschbach@bioenergy.abengoa.com" <Joseph.Birschbach@bioenergy.abengoa.com>

Date: 05/31/2011 03:30 PM

Subject: AERMOD 11103 VS AERMOD 09292

Mick,
Per Sergio Guerra's request at KDHE, I am formally requesting EPA's approval to use AERMOD 09292 in place of AERMOD 11103 for all pollutants modeled for the Abengoa Bioenergy project in Hugoton, KS, except 1-hour NO2 and 1-hour SO2. I have completed the SIL runs (excluding PM10 & PM25, 1-hour NO2 and 1-hour SO2) using both model versions and can provide those runs as part of a sensitivity analysis in the final AQIA provided. The output files are too large to email due to the use of the extensive receptor grid you had previously recommended (files are larger than 400 MB)

The PM runs require over 200 hours to complete using the receptor grid EPA requires, and we have a total of 4 PM10 SIL runs and 4 PM25 SIL runs in order to evaluate the different haul road scenarios. I have successfully ran the PM10/PM25 SIL runs with AERMOD 09292. Based on results to date, there is no difference in the results between AERMOD
09292 and 11103; therefore the use of AERMOD 09292 should be acceptable.
I understand that the AERMOD 11103 averaging for PM25 will not be utilized, but we would instead use the high first high from AERMOD 09292, which is more conservative than the 1st high result using AERMOD 11103. By using AERMOD 09292, I am able to utilize the BREEZE BRMS which expedites the results.

Please let me know as soon as possible what your decision will be on this as we are trying to expedite this project and have had many hurdles due to the extensive receptor grid and AERMOD 11103 run times.

Thank you.

Stephanie E. Salter, P.E.

WLA Consulting, Inc.
1640 "L" Street, Suite D | Lincoln, NE 68508 phone (402) 475-8588 | fax (402) 477-1956 | cell (417) 860-7275 e-mail stephanie.salter@WLA-consulting.com

WaterLandAir "Promises Kept, Solutions Delivered"

Stephanie Salter

From: Daye.Richard@epamail.epa.gov
Sent: Friday, June 03, 2011 6:46 AM
To: Stephanie Salter
Cc: Mindy Bowman; Marian Massoth; Rick Brunetti; Robert.Wildgen@bioenergy.abengoa.com; Sergio Guerra
Subject: RE: Modeling Update

Hi Stephanie,
Parallel versions of AERMOD are still considered to "non-guideline models". Therefore, it must be demonstrated that the concentrations from a parallel version are the same as the concentrations predicted by the approved AERMOD model. a demonstration should be done before any extensive modeling. Does your runs have a non Abengoa group and an Abengoa group or just an "all" group? I will be out of the office until June 13.
Mick

Richard L. Daye
Regional Meteorologist
Environmental Protection Agency Region VII AWMD/APDB/ATPS
901 North 5th Street
Kansas City, KS 66101

Phone: 913-551-7619
FaX: 913-551-9619
daye.richard@epa.gov

From: Stephanie Salter <stephanie.salter@wla-consulting.com>

To: Richard Daye/R7/USEPA/US@EPA

Cc: Mindy Bowman <mbowman@kdheks.gov>, Sergio Guerra <SGuerra@kdheks.gov>, Marian Massoth <MMassoth@kdheks.gov>, Rick Brunetti <rbrunetti@kdheks.gov>, "Robert.Wildgen@bioenergy.abengoa.com" <Robert.Wildgen@bioenergy.abengoa.com>

Date: 06/01/2011 03:31 PM

Subject: RE: Modeling Update

Mick,
Can you please specify when you say that "if a parallel version is, comparison should be submitted for all modeled pollutants and all time periods" what you are looking for. The purpose of requesting the use of AERMOD 09292 was to reduce the run times, but if I am reading your email correctly, we will not be reducing the run times because you want a demonstration for all modeled pollutants and time periods, so effectively I would be running both AERMOD 11103 and AERMOD 09292.

_____
Stephanie Salter

-----Original Message-----
From: Daye.Richard@epamail.epa.gov [mailto:Daye.Richard@epamail.epa.gov]

Sent: Wednesday, June 01, 2011 3:19 PM
To: Sergio Guerra
Cc: Mindy Bowman; Marian Massoth; Rick Brunetti; Stephanie Salter; Scott.PatriciaA@epa.gov
Subject: RE: Modeling Update

Hi Sergio
Our recommended and verifying analyses will use the extensive receptor, i.e, 50 m spacing to 1 km etc. PM output comparing output from AERMOD 09292 and 110103 with the fine grid should be submitted for review before allowing the continued use of 09292. If a parallel version is, comparison should be submitted for all modeled pollutants and all time periods.
Mick

Richard L. Daye
Regional Meteorologist
Environmental Protection Agency Region VII AWMD/APDB/ATPS
901 North 5th Street
Kansas City, KS 66101

Phone: 913-551-7619
FaX: 913-551-9619
daye.richard@epa.gov

From: Sergio Guerra <SGuerra@kdheks.gov>

To: Stephanie Salter <stephanie.salter@wla-consulting.com>

Cc: Mindy Bowman <mbowman@kdheks.gov>, Marian Massoth <MMassoth@kdheks.gov>, Rick Brunetti <rbrunetti@kdheks.gov>, Richard Daye/R7/USEPA/US@EPA

Date: 05/31/2011 02:59 PM

Subject: RE: Modeling Update

Stephanie,

You may use the following receptor spacing for the 1-hour SO2 and 1-hour NO2 cumulative runs. Please let me know if you have questions,

Sergio

Receptor Spacing for Significant Impact Modeling

|----------+----------+----------|

Receptor Grid Type	Distance from Facility Boundary	Receptor Spacing
Extra Fine	Fenceline to 200+ m	50 m
Fine	200 m to 2,000+ m	100 m
Medium	2,000m to 5,000+ m	250 m
Coarse	5,000 m to 10,000+ m	500 m
Extra Coarse	10,000 m to 50,000 m	1,000 m

Sergio Guerra
Email : sguerra@kdheks.gov
Work #: 785-296-0365

From: Stephanie Salter [mailto:stephanie.salter@wla-consulting.com]
Sent: Tuesday, May 31, 2011 11:54 AM
To: Sergio Guerra
Cc: Terry Tavener; Marian Massoth; Robert.Wildgen@bioenergy.abengoa.com; Carl.LaFoy@bioenergy.abengoa.com; Joseph.Birschbach@bioenergy.abengoa.com; Mindy Bowman
Subject: Modeling Update

Sergio,

Per our conversation this morning here is the beginning of the transmission of the input files for Abengoa. Attached to this email is the PTE updated to reflect the new scrubber parameters (corrected H2S concentration), the modeling parameter worksheet, and flare parameter calculations. Input files will follow in separate emails following this one.

Because of EPA's request, the run time has become extremely burdensome.
The PM runs require over 200 hours to complete using the receptor grid EPA requires, and we have a total of 4 PM10 SIL runs and 4 PM25 SIL runs in order to evaluate the different haul road scenarios. I had an issue over the weekend with the PM runs due to an exceedance that had not been previously identified due to missing hours coupled with the highest impacts not occurring at the fenceline (I had been using the fenceline to screen for highest impacts to set the stack heights on some of the sources). So, I am now facing re-running the PM runs.

I have successfully reran the PM10/PM25 SIL runs with AERMOD 09292. I have all of the other pollutant SIL runs completed using 11103. With KDHE's approval, I would like to request to use AERMOD 09292 for the completion of the cumulative runs (except 1-hour NO2 and 1-hour SO2).
There is no difference in the results between AERMOD 09292 and 11103 except for the averaging of the 1-hour NO2 and 1-hour SO2 results; therefore the use of AERMOD 09292 should be acceptable. By using AERMOD 09292, I am able to utilize the BREEZE BRMS which expedites the results.
For 1-hour NO2 and SO2, I would like to request a reduced receptor grid intensity and would like for you to provide the grid requirements that would be acceptable to KDHE.

Stephanie E. Salter, P.E.

WLA Consulting, Inc.
1640 "L" Street, Suite D | Lincoln, NE 68508 phone (402) 475-8588 | fax (402) 477-1956 | cell (417) 860-7275 e-mail stephanie.salter@WLA-consulting.com

WaterLandAir "Promises Kept, Solutions Delivered"

Stephanie Salter

From: Hawkins.Andy@epamail.epa.gov
Sent: Monday, June 06, 2011 12:56 PM
To: Stephanie Salter
Cc: Mindy Bowman; Marian Massoth; Robert.Wildgen@bioenergy.abengoa.com; Sergio Guerra; Daye.Richard@epamail.epa.gov
Subject: Re: Outstanding Items Needing EPA Approval

Stephanie,

I went back and reviewed Mick's comments on the protocol...

#1... For PVMRM approval he indicated...
Page 24 & Appendix A: PVMRM AERMOD Version 11103 must be used. The ozone data from Cedar Bluff must have missing data filled with a missing flag (999) not zero's. Valid ozone readings of zero should be retained and not set to a background value. NO2/NOx in-stack ratios must be source specific and justified. An NO2EQUIL value of 0.9 must be used with PVMRM. There should be no omitted days in the meteorological data as this gives erroneous results when using the MAXDCONT option. Missing periods should have a missing flag.

Page 26: EPA requests a post construction stack test of the in-stack NO2/NOx ratio for the biomass fired boiler. In the prior analysis the company never answered how fuel variability with nitrogen content would impact the ratios as well as how control equipment could impact the ratios. The reference that the company is using is for wood firing only. Should the stack test show a higher ratio (i.e. a higher NO2 rate) they will have to demonstrate via modeling the NAAQS is protected.

I would say these conditions still apply... If you are meeting these conditions, EPA will approve the use of PVMRM. Mick will be reviewing the modeling including the ozone and in-stack ratios. If he finds an issue he can raise it then. I was also under the impression the boiler had changed since this protocol... which may change the in-stack ratio. In summary, please proceed with PVMRM with the understanding EPA will likely further review the in-stack ratios and ozone data used in the analysis.

#2 My recommendation is to exclude this for purposes of a compliance demonstration based on the March 1, 2011 OAQPS guidance. Permit limitations for these sources should reflect an intermittent source with infrequent use (i.e. testing shall be performed no more than 2-hours every week... or something similar). KDHE may ask to see the impacts from these units if they believe they are an issue.

#3 I will approve the grids as proposed as long as they contain the receptor with the highest modeled concentration. If they don't contain the receptor with the highest respective pollutant modeled concentration please add this receptor into the demonstration.

Thanks,
Andy
==========
Andy Hawkins
U.S. Environmental Protection Agency Region 7
Air and Waste Management Division
Air Planning and Development Branch
901 N. 5th Street
Kansas City, KS 66101

Phone: (913) 551-7179
Fax: (913) 551-9179
Email: hawkins.andy@epa.gov

==========

From: Stephanie Salter <stephanie.salter@wla-consulting.com>
To: Andy Hawkins/R7/USEPA/US@EPA
Cc: Mindy Bowman <mbowman@kdheks.gov>, Marian Massoth <MMassoth@kdheks.gov>, Sergio Guerra <SGuerra@kdheks.gov>, "Robert.Wildgen@bioenergy.abengoa.com" <Robert.Wildgen@bioenergy.abengoa.com>
Date: 06/06/2011 11:50 AM
Subject: Outstanding Items Needing EPA Approval

Andy,
Due to the large number of receptors and/or sources the runs times for Abengoa have significantly increase since the February modeling analysis was completed. The specific items that changed were 1) a more dense receptor grid; and 2) haul roads are now included in the model as adjacent volume sources per the EPA haul roads guidance. When receptors are extended out to 50 km for NO2 and SO2 runs, there are 18,826 receptors with the KDHE approved grid detailed below and the number of haul road sources are 772 volume sources.

Receptor Spacing for Significant Impact Modeling

Receptor Grid Type	Distance from Facility Boundary	Receptor Spacing
Extra Fine	Fenceline to 200+ m	50 m
Fine	200 m to 2,000+ m	100 m
Medium	2,000m to 5,000+ m	250 m
Coarse	5,000 m to 10,000+ m	500 m
Extra Coarse	10,000 m to 50,000 m	1,000 m

In working with Mick, I have been requesting EPA approval for the following items:
1) Use of PVMRM as proposed in the April AQIA modeling protocol (attached);
2) Exclusion of the firewater pump engine for the 1-hour NO2 and 1-hour SO2 modeling as this unit will run less than 100 hours per year during normal operations; and
3) Use of parallel AERMOD.
For the parallel AERMOD, we had originally requested to use the previous version 09292 to be able to utilize the BREEZE BRMS; however, I was not able to successfully come to an agreement with Mick about what specifically would meet his needs for the parallel demonstration that would actually reduce our run times. Since then, I have suce4ssfully used the Bee-Line parallel server which has incorporated the AERMOD 11103. Mick had indicated that he wanted to see the parallel demonstration include receptors at a 50 m spacing out to 1 km for every pollutant and every averaging period. Because KDHE has approved a less dense receptor grid, WLA formally requests to provide the following runs for the parallel demonstration in which the Bee-Line AERMOD 11103 parallel program will be used (the PM runs are proposed at a lower distance from the source due to the extreme run times and highest impacts near the fenceline):
- 1-Hour NO2: 50 m spacing out to 1 km
- 1-Hour SO2: 50 m spacing out to 1 km
- 24-Hour PM25: 50 m spacing to 200 m (one haul road scenario only)
- Annual PM25: 50 m spacing to 200 m (one haul road scenario only)
- 24-Hour PM10: 50 m spacing to 200 m (one haul road scenario only)
- Annual PM10: 50 m spacing to 200 m (one haul road scenario only)
- All other pollutants will be modeled with the EPA AERMOD 11103

A subsequent email with the 1-hour NO2 parallel demonstration will follow.

Stephanie E. Salter, P.E.

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1640 "L" Street, Suite D | Lincoln, NE 68508
phone (402) 475-8588 | fax (402) 477-1956 | cell (417) 860-7275
e-mail stephanie.salter@WLA-consulting.com

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[attachment "20110425_ABBK AQIA Protocol_r0.pdf" deleted by Andy Hawkins/R7/USEPA/US]

Stephanie Salter

From: Hawkins.Andy@epamail.epa.gov
Sent: Monday, June 06, 2011 12:57 PM
To: Stephanie Salter
Cc: Mindy Bowman; Marian Massoth; Daye.Richard@epamail.epa.gov; Robert.Wildgen@bioenergy.abengoa.com; Sergio Guerra
Subject: Re: NO2 Parallel Output Files

You will need to rename the .zip to .zp for the files to make it past our firewall.
==========
Andy Hawkins
U.S. Environmental Protection Agency Region 7
Air and Waste Management Division
Air Planning and Development Branch
901 N. 5th Street
Kansas City, KS 66101

Phone: (913) 551-7179
Fax: (913) 551-9179
Email: hawkins.andy@epa.gov
==========

From: Stephanie Salter <stephanie.salter@wla-consulting.com>
To: Andy Hawkins/R7/USEPA/US@EPA
Cc: Mindy Bowman <mbowman@kdheks.gov>, Marian Massoth <MMassoth@kdheks.gov>, Sergio Guerra <SGuerra@kdheks.gov>, "Robert.Wildgen@bioenergy.abengoa.com" <Robert.Wildgen@bioenergy.abengoa.com>, Richard Daye/R7/USEPA/US@EPA
Date: 06/06/2011 12:26 PM
Subject: NO2 Parallel Output Files

Follow-up email as indicated in the 1-Hour NO2 Parallel Demonstration email.

Stephanie E. Salter, P.E.

WLA Consulting, Inc.
1640 "L" Street, Suite D | Lincoln, NE 68508
phone (402) 475-8588 | fax (402) 477-1956 | cell (417) 860-7275
e-mail stephanie.salter@WLA-consulting.com

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********** ATTACHMENT NOT DELIVERED **********

This Email message contained an attachment named
NO2 Parallel Output Files.zip
which may be a computer program. This attached computer program could contain a computer virus which could cause harm to EPA's computers, network, and data. The attachment has been deleted.

This was done to limit the distribution of computer viruses introduced

into the EPA network. EPA is deleting all computer program attachments sent from the Internet into the agency via Email.

If the message sender is known and the attachment was legitimate, you should contact the sender and request that they rename the file name extension and resend the Email with the renamed attachment. After receiving the revised Email, containing the renamed attachment, you can rename the file extension to its correct name.

For further information, please contact the EPA Call Center at (866) 411-4EPA (4372). The TDD number is (866) 489-4900.

********** ATTACHMENT NOT DELIVERED **********

Stephanie Salter

From: Hawkins.Andy@epamail.epa.gov
Sent: Thursday, June 09, 2011 11:47 AM
To: Stephanie Salter
Cc: Daye.Richard@epamail.epa.gov
Subject: Re: Additional Items Needing EPA Approval

Can you please send me his response to you and your original summary he responded to. I'm hesitant to approve a request he has already determined was insufficient. Did he provide further direction on what was sufficient?

I'm curious, could you just output a post file from each run and do a difference on the post files between the two runs? Might save you time on the compare as these are just hour by hour results. Files will be large.

==========
Andy Hawkins
U.S. Environmental Protection Agency Region 7
Air and Waste Management Division
Air Planning and Development Branch
901 N. 5th Street
Kansas City, KS 66101

Phone: (913) 551-7179
Fax: (913) 551-9179
Email: hawkins.andy@epa.gov
==========

From: Stephanie Salter <stephanie.salter@wla-consulting.com>
To: Andy Hawkins/R7/USEPA/US@EPA
Cc: Mindy Bowman <mbowman@kdheks.gov>, Sergio Guerra <SGuerra@kdheks.gov>, "Robert.Wildgen@bioenergy.abengoa.com" <Robert.Wildgen@bioenergy.abengoa.com>, "Carl.LaFoy@bioenergy.abengoa.com" <Carl.LaFoy@bioenergy.abengoa.com>, "Joseph.Birschbach@bioenergy.abengoa.com" <Joseph.Birschbach@bioenergy.abengoa.com>, Marian Massoth <MMassoth@kdheks.gov>, Rick Brunetti <rbrunetti@kdheks.gov>, Richard Daye/R7/USEPA/US@EPA
Date: 06/09/2011 11:02 AM
Subject: Additional Items Needing EPA Approval

Andy,

We have been attempting to reduce the PM runs with the AERMOD Parallel Version 11103 by Bee-Line; however, when the runs do complete successfully (due to memory issues), the run times on our best computers and on the BEEST Xpress remote server system are approximately 100 hours for the annual runs and 200 hours for the 24-hour runs. There are 40 annual runs due to the need to evaluate different haul road scenarios and 8 24-hour runs (with the ultra fine grid at 50 m to 200 m), of which we are about 20% done.

I had previously requested to use the BREEZE BRMS AERMOD Parallel Version 09292 which will reduce the 200 hour runs to 4.5 hours with the ultra fine grid at 50 m to 1000 m. We never completely resolved what would be sufficient for a parallel demonstration to use the BREEZE BRMS AERMOD Parallel Version 09292. I had sent to Mick a parallel demonstration using all of the fenceline receptors and had summarized the top 10 impacts in that email. However, he responded that I had only used 6 receptors and that the demonstration was not sufficient.

Because we would like to complete the modeling as soon as possible, and because of the duration of the PM runs, we would like to again formally request the use of BREEZE BRMS AERMOD Parallel Version 09292. A parallel demonstration is proposed as previously proposed to you on Monday (50 m receptor grid spacing out to 200 m, including the max receptor). Knowing that the 11103 results average for 24-hour PM25 is different than 09292, in order to complete

a parallel demonstration for 11103, two 11103 runs will be performed: 1) the “pollutant ID” will be “other”, that way 11103 doesn’t average the results; and 2) the “pollutant ID” will be “PM25”. Once the maximum receptor is identified using 11103, that receptor’s results from 09292 will be identified from each year and averaged over the five years. 09292 will be ran with each year individually and the identified high receptor averaged over the five years.

Stephanie E. Salter, P.E.

_____

WLA Consulting, Inc.
1640 "L" Street, Suite D | Lincoln, NE 68508
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e-mail stephanie.salter@WLA-consulting.com

WaterLandAir *"Promises Kept, Solutions Delivered"*

Stephanie Salter

From: Hawkins.Andy@epamail.epa.gov
Sent: Thursday, June 09, 2011 12:49 PM
To: Stephanie Salter
Cc: Carl.LaFoy@bioenergy.abengoa.com; Joseph.Birschbach@bioenergy.abengoa.com; Mindy Bowman; Marian Massoth; Rick Brunetti; Daye.Richard@epamail.epa.gov; Robert.Wildgen@bioenergy.abengoa.com; Sergio Guerra
Subject: Re: Additional Items Needing EPA Approval

Stephanie,

I'm approving your proposal below using the smaller fine grid. Mick has stated a summary of top 10 receptors is insufficient. To address this issue that Mick has raised, please verify all receptors in the limited grid have identical modeled concentrations. I suggest you do this by verifying post files from the two runs are identical. As I stated before, please ensure the receptor with the highest modeled concentration is included in the parallel demonstration.

KDHE has also indicated to Mick (5/31 email from Sergio) they intend to verify your runs using the "latest version of AERMOD" see Sergio's email below. The combination of your demonstration on the limited grid proposed below and KDHE's commitment to verify your results for all runs should ensure a defensible modeling demonstration.

```
Hi Mick,

Abengoa is proposing to use AERMOD version 09292 for those pollutants
requiring a cumulative modeling except for the 1-hr NO2 and the 1-hr SO2
(version 11103 will be used for these two).  I believe Abengoa will
provide a sensitivity analysis to confirm that the results from using
version 09292 are adequate.  KDHE will also verify all runs with the
latest version of AERMOD.

Please let us know if you approve the use of version 09292 as requested
in the email below,

Thanks,

Sergio
```

==========
Andy Hawkins
U.S. Environmental Protection Agency Region 7
Air and Waste Management Division
Air Planning and Development Branch
901 N. 5th Street
Kansas City, KS 66101

Phone: (913) 551-7179
Fax: (913) 551-9179
Email: hawkins.andy@epa.gov
==========

From: Stephanie Salter <stephanie.salter@wla-consulting.com>
To: Andy Hawkins/R7/USEPA/US@EPA
Cc: Mindy Bowman <mbowman@kdheks.gov>, Sergio Guerra <SGuerra@kdheks.gov>, "Robert.Wildgen@bioenergy.abengoa.com" <Robert.Wildgen@bioenergy.abengoa.com>, "Carl.LaFoy@bioenergy.abengoa.com" <Carl.LaFoy@bioenergy.abengoa.com>, "Joseph.Birschbach@bioenergy.abengoa.com" <Joseph.Birschbach@bioenergy.abengoa.com>, Marian Massoth <MMassoth@kdheks.gov>, Rick Brunetti <rbrunetti@kdheks.gov>, Richard Daye/R7/USEPA/US@EPA
Date: 06/09/2011 11:02 AM
Subject: Additional Items Needing EPA Approval

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Because we would like to complete the modeling as soon as possible, and because of the duration of the PM runs, we would like to again formally request the use of BREEZE BRMS AERMOD Parallel Version 09292. A parallel demonstration is proposed as previously proposed to you on Monday (50 m receptor grid spacing out to 200 m, including the max receptor). Knowing that the 11103 results average for 24-hour PM25 is different than 09292, in order to complete a parallel demonstration for 11103, two 11103 runs will be performed: 1) the “pollutant ID” will be “other”, that way 11103 doesn’t average the results; and 2) the “pollutant ID” will be “PM25”. Once the maximum receptor is identified using 11103, that receptor’s results from 09292 will be identified from each year and averaged over the five years. 09292 will be ran with each year individually and the identified high receptor averaged over the five years.

Stephanie E. Salter, P.E.

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e-mail stephanie.salter@WLA-consulting.com

WaterLandAir *"Promises Kept, Solutions Delivered"*

Stephanie Salter

From: Hawkins.Andy@epamail.epa.gov
Sent: Thursday, June 09, 2011 12:50 PM
To: Stephanie Salter
Subject: RE: Additional Items Needing EPA Approval

A direct comparison of two post files from each run would address Mick's limited receptor summary concern and save you time in placing values in an excel file and averaging etc. I would do this in linux using the "diff" command personally. This would not save computer runtime just your time in creating excel comparisons.
==========
Andy Hawkins
U.S. Environmental Protection Agency Region 7
Air and Waste Management Division
Air Planning and Development Branch
901 N. 5th Street
Kansas City, KS 66101

Phone: (913) 551-7179
Fax: (913) 551-9179
Email: hawkins.andy@epa.gov
==========

From: Stephanie Salter <stephanie.salter@wla-consulting.com>
To: Andy Hawkins/R7/USEPA/US@EPA
Date: 06/09/2011 12:00 PM
Subject: RE: Additional Items Needing EPA Approval

These runs take so long to complete that it's hard to identify the best course to take with reviewing the data. I will try anything that you recommend.

_____
Stephanie Salter

From: Hawkins.Andy@epamail.epa.gov [mailto:Hawkins.Andy@epamail.epa.gov]
Sent: Thursday, June 09, 2011 11:47 AM
To: Stephanie Salter
Cc: Daye.Richard@epamail.epa.gov
Subject: Re: Additional Items Needing EPA Approval

Can you please send me his response to you and your original summary he responded to. I'm hesitant to approve a request he has already determined was insufficient. Did he provide further direction on what was sufficient?

I'm curious, could you just output a post file from each run and do a difference on the post files between the two runs? Might save you time on the compare as these are just hour by hour results. Files will be large.
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Andy Hawkins
U.S. Environmental Protection Agency Region 7
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901 N. 5th Street
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From: Stephanie Salter <stephanie.salter@wla-consulting.com>

To: Andy Hawkins/R7/USEPA/US@EPA

Cc: Mindy Bowman <mbowman@kdheks.gov>, Sergio Guerra <SGuerra@kdheks.gov>, "Robert.Wildgen@bioenergy.abengoa.com" <Robert.Wildgen@bioenergy.abengoa.com>, "Carl.LaFoy@bioenergy.abengoa.com" <Carl.LaFoy@bioenergy.abengoa.com>, "Joseph.Birschbach@bioenergy.abengoa.com" <Joseph.Birschbach@bioenergy.abengoa.com>, Marian Massoth <MMassoth@kdheks.gov>, Rick Brunetti <rbrunetti@kdheks.gov>, Richard Daye/R7/USEPA/US@EPA

Date: 06/09/2011 11:02 AM

Subject: Additional Items Needing EPA Approval

Andy,

We have been attempting to reduce the PM runs with the AERMOD Parallel Version 11103 by Bee-Line; however, when the runs do complete successfully (due to memory issues), the run times on our best computers and on the BEEST Xpress remote server system are approximately 100 hours for the annual runs and 200 hours for the 24-hour runs. There are 40 annual runs due to the need to evaluate different haul road scenarios and 8 24-hour runs (with the ultra fine grid at 50 m to 200 m), of which we are about 20% done.

I had previously requested to use the BREEZE BRMS AERMOD Parallel Version 09292 which will reduce the 200 hour runs to 4.5 hours with the ultra fine grid at 50 m to 1000 m. We never completely resolved what would be sufficient for a parallel demonstration to use the BREEZE BRMS AERMOD Parallel Version 09292. I had sent to Mick a parallel demonstration using all of the fenceline receptors and had summarized the top 10 impacts in that email. However, he responded that I had only used 6 receptors and that the demonstration was not sufficient.

Because we would like to complete the modeling as soon as possible, and because of the duration of the PM runs, we would like to again formally request the use of BREEZE BRMS AERMOD Parallel Version 09292. A parallel demonstration is proposed as previously proposed to you on Monday (50 m receptor grid spacing out to 200 m, including the max receptor). Knowing that the 11103 results average for 24-hour PM25 is different than 09292, in order to complete a parallel demonstration for 11103, two 11103 runs will be performed: 1) the “pollutant ID” will be “other”, that way 11103 doesn’t average the results; and 2) the “pollutant ID” will be “PM25”. Once the maximum receptor is identified using 11103, that receptor’s results from 09292 will be identified from each year and averaged over the five years. 09292 will be ran with each year individually and the identified high receptor averaged over the five years.

Stephanie E. Salter, P.E.

WLA Consulting, Inc.
1640 "L" Street, Suite D | Lincoln, NE 68508
phone (402) 475-8588 | fax (402) 477-1956 | cell (417) 860-7275
e-mail stephanie.salter@WLA-consulting.com

WaterLandAir *"Promises Kept, Solutions Delivered"*

Stephanie Salter

From: Hawkins.Andy@epamail.epa.gov
Sent: Thursday, June 09, 2011 1:51 PM
To: Stephanie Salter
Subject: RE: Additional Items Needing EPA Approval

That should work...
==========
Andy Hawkins
U.S. Environmental Protection Agency Region 7
Air and Waste Management Division
Air Planning and Development Branch
901 N. 5th Street
Kansas City, KS 66101

Phone: (913) 551-7179
Fax: (913) 551-9179
Email: hawkins.andy@epa.gov
==========

From: Stephanie Salter <stephanie.salter@wla-consulting.com>
To: Andy Hawkins/R7/USEPA/US@EPA
Date: 06/09/2011 01:27 PM
Subject: RE: Additional Items Needing EPA Approval

I have been using plot files for the comparisons. I can open the plot files with ultraedit and copy the data over easily to excel. The files are a lot smaller and deal with only the H1H. I am not familiar with linux, and as long as you agree that the plot file comparisons will yield the same answer, would prefer to use plot files in the comparison. Your thoughts?

_____
Stephanie Salter

From: Hawkins.Andy@epamail.epa.gov [mailto:Hawkins.Andy@epamail.epa.gov]
Sent: Thursday, June 09, 2011 12:50 PM
To: Stephanie Salter
Subject: RE: Additional Items Needing EPA Approval

A direct comparison of two post files from each run would address Mick's limited receptor summary concern and save you time in placing values in an excel file and averaging etc. I would do this in linux using the "diff" command personally. This would not save computer runtime just your time in creating excel comparisons.
==========
Andy Hawkins
U.S. Environmental Protection Agency Region 7
Air and Waste Management Division
Air Planning and Development Branch
901 N. 5th Street
Kansas City, KS 66101

Phone: (913) 551-7179
Fax: (913) 551-9179

Email: hawkins.andy@epa.gov
==========

From: Stephanie Salter <stephanie.salter@wla-consulting.com>
To: Andy Hawkins/R7/USEPA/US@EPA
Date: 06/09/2011 12:00 PM
Subject: RE: Additional Items Needing EPA Approval

These runs take so long to complete that it's hard to identify the best course to take with reviewing the data. I will try anything that you recommend.

_____
Stephanie Salter

From: Hawkins.Andy@epamail.epa.gov [mailto:Hawkins.Andy@epamail.epa.gov]
Sent: Thursday, June 09, 2011 11:47 AM
To: Stephanie Salter
Cc: Daye.Richard@epamail.epa.gov
Subject: Re: Additional Items Needing EPA Approval

Can you please send me his response to you and your original summary he responded to. I'm hesitant to approve a request he has already determined was insufficient. Did he provide further direction on what was sufficient?

I'm curious, could you just output a post file from each run and do a difference on the post files between the two runs? Might save you time on the compare as these are just hour by hour results. Files will be large.
==========
Andy Hawkins
U.S. Environmental Protection Agency Region 7
Air and Waste Management Division
Air Planning and Development Branch
901 N. 5th Street
Kansas City, KS 66101

Phone: (913) 551-7179
Fax: (913) 551-9179
Email: hawkins.andy@epa.gov
==========

From: Stephanie Salter <stephanie.salter@wla-consulting.com>
To: Andy Hawkins/R7/USEPA/US@EPA
Cc: Mindy Bowman <mbowman@kdheks.gov>, Sergio Guerra <SGuerra@kdheks.gov>, "Robert.Wildgen@bioenergy.abengoa.com" <Robert.Wildgen@bioenergy.abengoa.com>, "Carl.LaFoy@bioenergy.abengoa.com" <Carl.LaFoy@bioenergy.abengoa.com>, "Joseph.Birschbach@bioenergy.abengoa.com" <Joseph.Birschbach@bioenergy.abengoa.com>, Marian Massoth <MMassoth@kdheks.gov>, Rick Brunetti <rbrunetti@kdheks.gov>, Richard Daye/R7/USEPA/US@EPA
Date: 06/09/2011 11:02 AM
Subject: Additional Items Needing EPA Approval

Andy,

We have been attempting to reduce the PM runs with the AERMOD Parallel Version 11103 by Bee-Line; however, when the runs do complete successfully (due to memory issues), the run times on our best computers and on the BEEST Xpress remote server system are approximately 100 hours for the annual runs and 200 hours for the 24-hour runs. There are 40 annual runs due to the need to evaluate different haul road scenarios and 8 24-hour runs (with the ultra fine grid at 50 m to 200 m), of which we are about 20% done.

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Stephanie E. Salter, P.E.

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Stephanie Salter

From: William G. Stone [WStone@kdheks.gov]
Sent: Friday, June 10, 2011 1:46 PM
To: Stephanie Salter
Subject: RE: Nearby Summary

Zone 14 coordinate for Colorado Interstate Gas Source ID 1297127

4119348.8 m N
231028.4 m E

Will Stone

Bureau of Air

1000 SW Jackson, Suite 310

Topeka, KS 66612-1366

(785) 296-6427 (BUS)

(785) 291-3953 (FAX)

wstone@kdheks.gov

Note my email address has changed.

From: Stephanie Salter [mailto:stephanie.salter@wla-consulting.com]
Sent: Friday, June 10, 2011 12:57 PM
To: William G. Stone
Cc: William G. Stone
Subject: RE: Nearby Summary

Will,
I have attached a spreadsheet with several sources that I need additional information on in order to apply a NO2/NOx ratio. Please see the NOx-PSD tab of the spreadsheet and the sources are highlighted in red.

Thanks!

_____
Stephanie Salter

From: Sergio Guerra [mailto:SGuerra@kdheks.gov]
Sent: Friday, June 10, 2011 12:35 PM
To: Stephanie Salter; Mindy Bowman
Cc: William G. Stone
Subject: RE: Nearby Summary

Stephanie,

I left you a message about the items discussed in your email.

1- Colorado Interstate Gas Co, 1297127: Use this source, its coordinates are correct in spite of the difference in the distance value. That value was calculated with a formula that applies to zone 14 and the facility is on zone 13.
2- I am including below the information for the Sunflower project.
3- For the other highlighted cells please call Will stone to let him know if you need the source description or SCC code. Will direct line is :

(785) 296-6427

I am leaving the office now so have a great weekend.

Sergio

From Sunflowers submittals available:
http://www.kdheks.gov/bar/sunflower/Cover-Part-7.pdf

Model ID	X (m)	Y (m)	Load	Stack Height (ft)	Stack Diameter (ft)	Flue Gas Exhaust Temperature (°F)	Flue Gas Exit Velocity (ft/sec)	NO_X Emission Rate (lb/hr)	NO_2/NO_X Ratio
H2_100	326,798.44	4,199,760.4	100%	620	23	165	91.1	1740	0.05
H2_75	326,798.44	4,199,760.4	75%	620	23	165	68.3	1305	
H2_50	326,798.44	4,199,760.4	50%	620	23	165	45.5	870	
H2_25	326,798.44	4,199,760.4	25%	620	23	165	22.7	435	

H2 Auxiliary Boiler Stack Parameters

Model ID	X (m)	Y (m)	NO_X Emission Rate (lb/hr)	Stack Height (ft)	Stack Diameter (ft)	Flue Gas Exhaust Temperature (°F)	Flue Gas Exit Velocity (ft/sec)	NO_2/NO_X Ratio
H2AUX	326,805.6	4,199,740.8	7.2	30	6	299	43.29	0.05

Table 5
H2 Emergency Diesel Generator Stack Parameters

Model ID	X (m)	Y (m)	NO_X Emission Rate (lb/hr)	Stack Height (ft)	Stack Diameter (ft)	Flue Gas Exhaust Temperature (°F)	Flue Gas Exit Velocity (ft/sec)	NO_2/NO_X Ratio
H2GEN	326710.4	4199729.9	1.88	280	0.94	915	288	0.25

Table 6
H2 DFP Booster Pump Stack Parameters

Model ID	X (m)	Y (m)	NO_X Emission Rate (lb/hr)	Stack Height (ft)	Stack Diameter (ft)	Flue Gas Exhaust Temperature (°F)	Flue Gas Exit Velocity (ft/sec)	NO_2/NO_X Ratio
H2FIRE	326,541.5	4,199,760.2	2.31	40	0.94	1,083	45.79	0.32

Table 7
H1 Sources Stack Parameters

Emission Unit	Model ID	X (m)	Y (m)	NO_X Emission Rate (lb/hr)	Stack Height (ft)	Stack Diameter (ft)	Flue Gas Exhaust Temperature (°F)	Flue Gas Exit Velocity (ft/sec)	NO_2/NO_X Ratio
Steam Generator	H1	326,638	4,199,981	1,814.5	475	16.33	180	102.2	0.05
Auxiliary Boiler	H1AUX	326,603.6	4,199,777.7	8.09	67.5	4.5	425	13.6	0.05
Emergency Generator	H1GEN	326,660.5	4,199,753.8	19.2	245	0.83	490	174.2	0.20
New Fire Pump	H1FIRE	326,493.2	4,199,766.1	2.31	40	0.94	1,083	45.8	0.32

Sergio Guerra
Email : sguerra@kdheks.gov
Work #: 785-296-0365

From: Stephanie Salter [mailto:stephanie.salter@wla-consulting.com]
Sent: Friday, June 10, 2011 10:37 AM
To: Mindy Bowman
Cc: Sergio Guerra
Subject: Nearby Summary

I wanted to make sure you received this. If you can please help fill in the equipment description for the NOx sources so that we can apply a NO2/NOx ratio, I would really appreciate it.

Stephanie E. Salter, P.E.

WLA Consulting, Inc.
1640 "L" Street, Suite D | Lincoln, NE 68508
phone (402) 475-8588 | fax (402) 477-1956 | cell (417) 860-7275
e-mail stephanie.salter@WLA-consulting.com

WaterLandAir *"Promises Kept, Solutions Delivered"*

Stephanie Salter

From: Daye.Richard@epamail.epa.gov
Sent: Wednesday, June 15, 2011 6:53 PM
To: Stephanie Salter
Cc: Mindy Bowman; Sergio Guerra
Subject: Re: Modeling for PM2.5 Annual

Stephanie
As far as I know there is no current EPA preferred method for modeling PM2.5 annual. Tables 8-1 and 8-2 in Append W must be followed for the emissions modeled.
Mick

Richard L. Daye
Regional Meteorologist
Environmental Protection Agency Region VII AWMD/APDB/ATPS
901 North 5th Street
Kansas City, KS 66101

Phone: 913-551-7619
FaX: 913-551-9619
daye.richard@epa.gov

From: Stephanie Salter <stephanie.salter@wla-consulting.com>

To: Richard Daye/R7/USEPA/US@EPA

Cc: Mindy Bowman <mbowman@kdheks.gov>, Sergio Guerra <SGuerra@kdheks.gov>

Date: 06/14/2011 12:30 PM

Subject: Modeling for PM2.5 Annual

Mick,
Can you please tell me what the current EPA preferred method is for modeling PM2.5 annual? Should we model each year separate or use the combined 5 year met data for the PM2.5 modeling?

Thanks!

Stephanie E. Salter, P.E.

WLA Consulting, Inc.
1640 "L" Street, Suite D | Lincoln, NE 68508 phone (402) 475-8588 | fax (402) 477-1956 | cell (417) 860-7275 e-mail stephanie.salter@WLA-consulting.com

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Appendix B

Emission Source Parameters and Rates

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

Rev. 5

NAAQS & PSD Modeling Thresholds

Emission Point No.	Emission Unit(s)		PM_{10} (lb/hr)	PM_{10} (lb/day)	PM_{10} (tons/yr)	$PM_{2.5}$ (lb/hr)	$PM_{2.5}$ (lb/day)	$PM_{2.5}$ (tons/yr)	NOx (lb/hr)	NOx (tons/yr)	SO_2 (lb/hr)	SO_2 (tons/yr)	CO (lb/hr)	CO (tons/yr)	Notes
HAUL ROADS															
EP-01000FUG	Paved Plant Roads		0.80	9.55	1.50	0.20	2.34	0.37	--	--	--	--	--	--	Note 1
EP-01050FUG	Biomass Laydown Roads		0.34	4.11	0.73	0.03	0.41	0.07	--	--	--	--	--	--	Note 1
ENZYMATIC HYDROLYSIS PLANT															
EP-11120	Floor Sweep System DC		0.27	6.42	1.17	0.05	1.09	0.20	--	--	--	--	--	--	
EP-11110	Bale Grinder DC		4.93	118.41	21.61	0.84	20.13	3.67	--	--	--	--	--	--	
EP-11170	Classifier Cyclone # 1 DC		0.74	17.77	3.24	0.13	3.02	0.55	--	--	--	--	--	--	
EP-11270	Classifier Cyclone # 2 DC		0.74	17.77	3.24	0.13	3.02	0.55	--	--	--	--	--	--	
EP-11711	Boiler Feed System DC		0.74	17.77	3.24	0.13	3.02	0.55	--	--	--	--	--	--	
EP-11110FUG	Crops Receiving, Grinding and Conveying		0.03	0.82	0.07	0.01	0.12	0.01	--	--	--	--	--	--	
EP-18185	EH Fermentation CO2 Scrubber		0.10	2.40	0.44	0.10	2.40	0.44	0.07	0.29	--	--	--	--	
EP-19001FUG	Lignin-Rich Stillage Storage		--	--	--	--	--	--	--	--	--	--	--	--	
ETHANOL STORAGE AND PIPING															
EP-02000	Fugitive Leaks		--	--	--	--	--	--	--	--	--	--	--	--	
T-02107	EH Product Shift Tank #1		--	--	--	--	--	--	--	--	--	--	--	--	
T-02108	EH Product Shift Tank #2		--	--	--	--	--	--	--	--	--	--	--	--	
T-02102	EH Ethanol Product Storage Tank #1		--	--	--	--	--	--	--	--	--	--	--	--	
T-02112	EH Ethanol Product Storage Tank #2		--	--	--	--	--	--	--	--	--	--	--	--	
T-02105	EH Denaturant Storage Tank		--	--	--	--	--	--	--	--	--	--	--	--	
EP-02100	Vapor Recovery System		--	--	--	--	--	--	--	--	--	--	--	--	
EP-02100FUG	Loading Losses		--	--	--	--	--	--	--	--	--	--	--	--	
UTILITIES															
EP-02710	Bulk Fly Ash Load-Out Silo		0.96	23.12	4.22	0.48	11.56	2.11	--	--	--	--	--	--	
EP-02711	Bulk Fly Ash Load-Out Silo Spout		0.96	23.12	4.22	0.48	11.56	2.11	--	--	--	--	--	--	
EP-04001	Cooling Water Tower		0.12	2.85	0.52	0.07	1.71	0.31	--	--	--	--	--	--	
EP-20001	Biomass-Fired Stoker Boiler #1	30% Load	4.24	101.67	--	3.98	95.51	--	107.39	--	29.99	--	31.09	--	Note 2
		50% Load	7.06	169.45	--	6.63	159.18	--	98.44	--	49.99	--	51.81	--	Note 2
		75% Load	10.59	254.17	46.39	9.95	238.76	43.57	147.66	646.74	74.99	328.43	77.72	340.39	Note 2
		100% Load	14.12	338.89	61.85	13.26	318.35	58.10	196.88	862.33	99.98	437.91	103.62	453.86	Note 2
		120% Load	14.99	359.82	65.67	14.08	338.01	61.69	207.56	909.10	106.16	464.96	110.04	481.99	Note 2
EP-20512	Lime Handling DC #1		0.07	1.65	0.30	0.03	0.82	0.15	--	--	--	--	--	--	
EP-20514	Boiler Bottoms Ash Handling DC #1		0.96	23.12	4.22	0.48	11.56	2.11	--	--	--	--	--	--	
EP-20510	Boiler Fly Ash Handling DC #1		0.48	11.56	2.11	0.24	5.78	1.05	--	--	--	--	--	--	
EP-20520	Boiler Fly Ash Handling DC #2		0.48	11.56	2.11	0.24	5.78	1.05	--	--	--	--	--	--	
EP-09001	Flare	FWP Engine Operating (Pilot Only)	0.00	0.02	0.00	0.00	0.02	0.00	0.01	0.04	0.00	0.00	0.01	0.04	
EP-09001	Flare	No FWP Engine	0.00	0.02	0.00	0.00	0.02	0.00	3.48	6.92	9.31	18.43	18.92	37.47	Note 3
EP-06001 (EMG)	Firewater Pump Engine	Normal Operations	0.08	0.08	0.00	0.08	0.08	0.00	2.61	0.13	0.94	0.05	0.68	0.03	Note 4
EP-08000	High Voltage Circuit Breakers Fugitive Leaks		--	--	--	--	--	--	--	--	--	--	--	--	

Note 1. The daily haul road traffic and associated processes are based on the "typical scenario" for shipping and receiving, which assumes that all shipping and receiving will occur 6:00 AM to 6:00 PM only, or 12 hours per day. 24-hour PM_{10} and $PM_{2.5}$ emissions from haul roads were also modeled based on "alternate scenarios", which assumes various traffic configurations to ensure the modeling analysis has captured the highest impacts.

Note 2. Reduced load emissions were only evaluated for the maximum short-term emissions. Annual emissions were evaluated based on the normal operating loads (75%, 100% and 120% load).

Note 3. Flare permitted to operate up to 3,960 hours per year to support the boiler during shutdown or malfunction, or when the boiler is not operating at full capacity. For modeling purposes, the flare will be operated concurrent with boiler operations at all loads to ensure the worst case scenario is evaluated. The boiler emissions will not adjusted to account for the diverted biogas, process vent streams and loadout vapors to the flare; therefore, the biogas, process vent streams and loadout vapors emissions are being double-counted since it may be possible for only one vent stream to be diverted at any given time. The firewater pump engine will not be operated at any time that the flare is operating except in the event of a facility emergency. In the event of an emergency, operations at the facility will be shutdown at all of the major processes during the event, and an emergency event will not be modeled.

Note 4. Emergency equipment will operate a maximum of 1 hours per day for testing, no more than 100 hours per year, during normal facility operations. In the event of an emergency, operations at the facility will be shutdown at all of the major

Modeled Source Parameters

VOLUME SOURCE PARAMETERS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (ft)	Release Height [1] (ft)	Length of Side[2] (ft)	Initial Lateral Dim. [3] (ft)	Height of Truck When Unloading (ft)	Initial Vertical Dim. [4] (ft)
EP11110F	Crops Grinding and Handling	288262.5	4117797.5	3,132.38	5.0	10	2.33	25	11.63

Note 1. Release Height from Truck Unloading = Height from Truck Bed
Note 2. Length of Side = Truck Bed Width.
Note 3. Initial Lateral Dimensions of Single Volume Source = Length of Side / 4.3
Note 4. Initial Vertical Dimensions of Single Volume Source = Maximum Height of Tilt Bed / 2.15

POINT SOURCE PARAMETERS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (ft)	Stack Height (ft)	Stack Diameter (in)	Stack Temp. (°F)	Flow Rate (cfm)	Stack Velocity (ft/s)
ENZYMATIC HYDROLYSIS PLANT									
EP11120	Floor Sweep System DC	288214.5	4117821.0	3,134.02	17	24	Ambient	7,800	41.38
EP11110	Bale Grinder DC	288190.5	4117828.5	3,134.02	48	84	Ambient	143,900	62.32
EP11170	Classifier Cyclone # 1 DC	288236.5	4117773.5	3,134.02	103	36	Ambient	21,600	50.93
EP11270	Classifier Cyclone # 2 DC	288236.5	4117763.0	3,134.02	103	36	Ambient	21,600	50.93
EP11711	Boiler Feed System DC	288141.0	4117829.0	3,136.48	73	36	Ambient	21,600	50.93
EP18185	EH Fermentation CO_2 Scrubber	288242.0	4117662.0	3,132.38	67	16	67	4,100	48.94
UTILITIES									
EP02710	Bulk Fly Ash Load-Out Silo	288100.0	4117776.0	3,137.30	58	36	Ambient	28,100	66.26
EP02711	Bulk Fly Ash Load-Out Silo Spout	288084.5	4117781.5	3,137.30	31	36	Ambient	28,100	66.26
EP04001	Cooling Water Tower								
EP04001A	Cell 1	288157.5	4117806.5	3,134.84	44	396	72	1,258,000	24.51
EP04001B	Cell 2	288157.5	4117795.0	3,134.84	44	396	72	1,258,000	24.51
EP04001C	Cell 3	288157.5	4117783.5	3,134.84	44	396	72	1,258,000	24.51
EP20512	Lime Handling DC #1	288141.0	4117827.0	3,136.48	73	12	Ambient	2,000	42.44
EP20514	Boiler Bottoms Ash Handling DC #1	288136.0	4117847.5	3,136.48	73	36	Ambient	28,100	66.26
EP20510	Boiler Fly Ash Handling DC #1	288116.5	4117830.0	3,136.48	58	30	Ambient	14,050	47.70
EP20520	Boiler Fly Ash Handling DC #2	288097.5	4117831.0	3,136.48	58	30	Ambient	14,050	47.70
EP09001	Flare - Pilot Only	288344.0	4117704.5	3,131.56	34.5	15.1	1,832	--	65.62
EP09001	Flare	288344.0	4117704.5	3,131.56	47.1	61.6	1,832	--	65.62
EP06000	Firewater Pump Engine	288289.0	4117693.5	3,132.38	68	6	770	1,750	148.54

Note 1. The Iowa Department of Natural Resources (IDNR) has a flare tool spreadsheet (http://www.iowadnr.gov/air/prof/progdev/files/Flares.xls) that was utilized for estimating the effective stack height and diameter for the modified point source.

POINT SOURCE PARAMETERS

Source ID	Source Description	Percent Load (%)	UTM Easting (m)	UTM Northing (m)	Elevation (ft)	Stack Height (ft)	Stack Diameter (in)	Stack Temp. (°F)	Flow Rate (cfm)	Stack Velocity (ft/s)
UTILITIES										
EP20001	Biomass-Fired Boiler #1	30	288133.0	4117839.0	3,136.48	160	120	250	66,000	14.01
EP20001	Biomass-Fired Boiler #1	50	288133.0	4117839.0	3,136.48	160	120	280	110,000	23.34
EP20001	Biomass-Fired Boiler #1	75	288133.0	4117839.0	3,136.48	160	120	300	165,000	35.01
EP20001	Biomass-Fired Boiler #1	100	288133.0	4117839.0	3,136.48	160	120	300	220,000	46.69
EP20001	Biomass-Fired Boiler #1	120	288133.0	4117839.0	3,136.48	160	120	300	264,000	56.02

Modeled Source Parameters

BUILDING PARAMETERS — Rev 5/4/2011

AERMOD ID	Structure Name	Plan Label	Type	UTM Easting (m)	UTM Northing (m)	Elevation (ft)	Height (ft)	Length (X) (ft)	Width (Y) (ft)	Angle
RECTANGULAR BUILDINGS										
BLD1	Administration	1	Building	288231.5	4117876	3134.02	14	117	94	
BLD18	Mechanical Room	11	Building	288218.5	4117781	3134.02	14	100	30	
BLD19	Rail Unloading	12, 39	Building	288066.1	4117799.6	3137.30	28	140	70	
BLD2	Maintenance	2	Building	288210.5	4117876	3134.02	28	68	94	
BLD20	Dehydration & Evaporation	13, 33	Building	288111.5	4117686.5	3134.02	90	100	110	
BLD22	Water Treatment	15	Building	Partial Structure, Not Included			Various	115	90	
BLD3	Control	3	Building	288182	4117752.5	3134.84	14	83	94	
BLD38	Turbine	20	Building	288148.5	4117824.5	3135.66	20	75	75	
BLD39	Cogen / Electrical	21	Building	288171	4117883	3135.66	14	80	60	
BLD4	Guard House	4	Building	288318.5	4117928.5	3131.56	10	34	13	
BLD43	Cooling Tower	23	Building	288151.5	4117815.65	3134.84	28	125	40	
BLD45	Chemical Tote Storage	26	Building	288185	4117658	3134.84	14	64	25	
BLD47	Fire Pump House	28	Building	288282.5	4117683.5	3132.38	12	25	40	
BLD5A	Biomass Handling & Cleaning	6, 7	Building	288206.5	4117843.5	3134.02	14	127	52	
BLD5B	Biomass Hammermilling	6, 7	Building	288188	4117841	3134.84	28	80	40	
BLD54	Waste Water Treatment	32	Building	288311	4117778.5	3131.56	14	35	90	
BLD6	Biomass Boiler	8	Boiler	288117	4117833	3136.48	70	80	45	
BLD62	Foam	38	Building	288161.5	4117667	3135.66	14	20	20	
BLD63	Electrical Room #1	ECR	Building	288171	4117865	3135.66	14	80	60	
BLD64	Electrical Room #2	ECR	Building	288134.7	4117790.1	3136.48	14	15	15	
BLD65	Electrical Room #3	ECR	Building	288162	4117688.5	3135.66	14	25	25	
BLD66	Electrical Room #4	ECR	Building	288261.5	4117756	3133.20	14	15	15	
BLD8	Biomass Pretreatment	9	Building	288228	4117781	3134.02	100	105	75	

BUILDING PARAMETERS — Rev 5/4/2011

AERMOD ID	Structure Name	Plan Label	Type	UTM Easting (m)	UTM Northing (m)	Elevation (ft)	Height (ft)	Radius (ft)	Diameter (ft)
RECTANGULAR BUILDINGS									
BLD9	Liquefaction Tower	9	Tank	Under BLD8 (Biomass Pretreatment, Plan Label 9)			10.5	16.625	33.25
BLD10	Yeast Propagator	9	Tank				4.6	2.3	4.6
BLD11	Yeast Propagator	9	Tank				4.6	2.3	4.6
BLD12	Yeast Propagator	9	Tank				17	8.75	17.5
BLD13	Yeast Propagator	9	Tank				17	8.75	17.5
BLD14	Soak	9	Tank				8	3.5	7
BLD15	Fermentor	10	Tank	288255.5	4117734.0	3133.20	59.5	30	60
BLD16	Fermentor	10	Tank	288255.5	4117711.5	3133.20	59.5	30	60
BLD17	Fermentor	10	Tank	288255.5	4117685.5	3133.20	59.5	30	60
BLD21	Clarified (Thin) Stillage	14	Tank	288158.0	4117712.0	3135.66	35	12.5	25
BLD23	Filtered Water	15	Tank	288117.0	4117820.5	3136.48	64	15	30
BLD24	RO Water Storage	15	Tank	288133.5	4117804.0	3136.48	35	15	30
BLD25	Polished Water Storage	15	Tank	288116.0	4117786.5	3136.48	35	29	58
BLD26	Expansion	15	Tank	288098.0	4117800.0	3136.48	5	2	4
BLD27	HP Air	15	Tank	288095.5	4117807.5	3136.48	5.5	8	16
BLD28	HP Air	15	Tank	288101.0	4117807.5	3136.48	5.5	8	16
BLD29	LP Air	15	Tank	288095.5	4117802.5	3136.48	10	8.5	17
BLD30	LP Air	15	Tank	288101.0	4117802.5	3136.48	10	8.5	17
BLD31	Stillage Settling	17	Tank	288159.0	4117737.0	3135.66	42	29.5	59
BLD32	Stillage Flocculation	17	Tank	288147.5	4117730.0	3135.66	12	5.5	11
BLD33	Product Shift	18	Tank	288143.0	4117620.5	3133.20	20	10	20
BLD34	Product Shift	18	Tank	288143.0	4117628.5	3133.20	20	10	20
BLD35	Denaturant Storage	18	Tank	288143.0	4117636.5	3133.20	16.5	8.25	16.5
BLD36	Ethanol Product Storage	18	Tank	288127.0	4117629.5	3133.20	48.5	24.25	48.5
BLD37	Ethanol Product Storage	18	Tank	288127.0	4117609.5	3133.20	48.5	24.25	48.5
BLD40	Saccharification	22	Tank	288227.0	4117734.0	3133.20	59.5	30	60
BLD41	Saccharification	22	Tank	288227.0	4117711.5	3133.20	59.5	30	60
BLD42	Saccharification	22	Tank	288227.0	4117685.5	3133.20	59.5	30	60
BLD44	Beer Well	25	Tank	288255.5	4117662.0	3133.20	68	30	60
BLD46	Fire Water	27	Tank	288289.0	4117700.0	3132.38	65	17	34
BLD48	Cleaning in Place (CIP)	29	Tank	288192.0	4117722.0	3134.84	12	17.5	35
BLD49	Sulfuric Acid	30	Tank	288189.5	4117687.0	3134.84	13	13	26
BLD50	Nutrient	30	Tank	288201.0	4117675.5	3134.84	12	6	12
BLD51	Cellulase	30	Tank	288198.5	4117687.0	3134.84	21	10.5	21
BLD52	Media Liquid	30	Tank	288189.5	4117675.5	3134.84	15.5	11	22
BLD53	Acid	30	Tank	288196.0	4117675.5	3134.84	11	6.5	13
BLD55	Final Rinse	32	Tank	Location To Be Determined			16	15.5	31
BLD56	2% Caustic	32	Tank	Location To Be Determined			16	15.5	31
BLD57	Pre-Rinse	32	Tank	Location To Be Determined			16	15.5	31
BLD58	Waste Water Mix	32	Tank	Location To Be Determined			13.5	12	24
BLD59	Treated Waste Water Storage	32	Tank	288283.5	4117737.0	3132.38	56.5	23	46
BLD60	Evaporator Condensate	33	Tank	288283.5	4117758.0	3133.20	43	23	46
BLD61	Syrup	37	Tank	288144.0	4117741.0	3136.48	19.5	16.5	33
BLD67	Elevated Fly Ash Silo	Near 39	Tank	288127.5	4117869.5	3137.30	55	20	40
BLD7	Aqueous Ammonia	Near 8	Tank	288100.0	4117776.0	3136.48	10	7.5	15

Modeled Source Parameters

VOLUME SOURCE PARAMETERS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Release Height [1] (m)	Length of Side[2] (m)	Initial Lateral Dim. [3] (m)	Height of Truck When Unloading (m)	Initial Vertical Dim. [4] (m)
EP11110F	Crops Grinding and Handling	288262.5	4117797.5	954.75	1.52	3.05	0.71	7.62	3.54

Note 1. Release Height from Truck Unloading = Height from Truck Bed
Note 2. Length of Side = Truck Bed Width.
Note 3. Initial Lateral Dimensions of Single Volume Source = Length of Side / 4.3
Note 4. Initial Vertical Dimensions of Single Volume Source = Maximum Height of Tilt Bed / 2.15

POINT SOURCE PARAMETERS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Stack Height (m)	Stack Diameter (m)	Stack Temp. (°K)	Flow Rate (m^3/s)	Stack Velocity (m/s)
ENZYMATIC HYDROLYSIS PLANT									
EP11120	Floor Sweep System DC	288214.5	4117821.0	955.25	5.18	0.61	Ambient	3.68	12.61
EP11110	Bale Grinder DC	288190.5	4117828.5	955.25	14.63	2.13	Ambient	67.91	18.99
EP11170	Classifier Cyclone # 1 DC	288236.5	4117773.5	955.25	31.39	0.91	Ambient	10.19	15.52
EP11270	Classifier Cyclone # 2 DC	288236.5	4117763.0	955.25	31.39	0.91	Ambient	10.19	15.52
EP11711	Boiler Feed System DC	288141.0	4117829.0	956.00	22.25	0.91	Ambient	10.19	15.52
EP18185	EH Fermentation CO2 Scrubber	288242.0	4117662.0	954.75	20.42	0.41	292.44	1.93	14.92
UTILITIES									
EP02710	Bulk Fly Ash Load-Out Silo	288100.0	4117776.0	956.25	17.68	0.91	Ambient	13.26	20.19
EP02711	Bulk Fly Ash Load-Out Silo Spout	288084.5	4117781.5	956.25	9.45	0.91	Ambient	13.26	20.19
EP04001	Cooling Water Tower								
EP04001A	Cell 1	288157.5	4117806.5	955.50	13.41	10.06	295.22	593.71	7.47
EP04001B	Cell 2	288157.5	4117795.0	955.50	13.41	10.06	295.22	593.71	7.47
EP04001C	Cell 3	288157.5	4117783.5	955.50	13.41	10.06	295.22	593.71	7.47
EP20512	Lime Handling DC #1	288141.0	4117827.0	956.00	22.25	0.30	Ambient	0.94	12.94
EP20514	Boiler Bottoms Ash Handling DC #1	288136.0	4117847.5	956.00	22.25	0.91	Ambient	13.26	20.19
EP20510	Boiler Fly Ash Handling DC #1	288116.5	4117830.0	956.00	17.68	0.76	Ambient	6.63	14.54
EP20520	Boiler Fly Ash Handling DC #2	288097.5	4117831.0	956.00	17.68	0.76	Ambient	6.63	14.54
EP09001	Flare - Pilot Only	288344.0	4117704.5	954.50	10.52	0.38	1273.00	--	20.00
EP09001	Flare	288344.0	4117704.5	954.50	14.36	1.56	1273.00	--	20.00
EP06000	Firewater Pump Engine	288289.0	4117693.5	954.75	20.73	0.15	683.00	0.83	45.28

Note 1. The Iowa Department of Natural Resources (IDNR) has a flare tool spreadsheet (http://www.iowadnr.gov/air/prof/progdev/files/Flares.xls) that was utilized for estimating the effective stack height and diameter for the modified point source.

POINT SOURCE PARAMETERS

Source ID	Source Description	Percent Load (%)	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Stack Height (m)	Stack Diameter (m)	Stack Temp. (°K)	Flow Rate (m^3/s)	Stack Velocity (m/s)
UTILITIES										
EP20001	Biomass-Fired Boiler #1	30	288133.0	4117839.0	956.00	48.77	3.05	394.11	31.15	4.27
EP20001	Biomass-Fired Boiler #1	50	288133.0	4117839.0	956.00	48.77	3.05	410.78	51.91	7.11
EP20001	Biomass-Fired Boiler #1	75	288133.0	4117839.0	956.00	48.77	3.05	421.89	77.87	10.67
EP20001	Biomass-Fired Boiler #1	100	288133.0	4117839.0	956.00	48.77	3.05	421.89	103.83	14.23
EP20001	Biomass-Fired Boiler #1	120	288133.0	4117839.0	956.00	48.77	3.05	421.89	124.59	17.08

Modeled Source Parameters

BUILDING PARAMETERS										Rev 5/4/2011
ID	Description	Plan Label	Type	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Height (m)	Length (X) (m)	Width (Y) (m)	Angle
RECTANGULAR BUILDINGS										
BLD1	Administration	1	Building	288231.5	4117876.0	955.25	4.27	35.66	28.65	0
BLD18	Mechanical Room	11	Building	288218.5	4117781.0	955.25	4.27	30.48	9.14	0
BLD19	Rail Unloading	12, 39	Building	288066.1	4117799.6	956.25	8.53	42.67	21.34	0
BLD2	Maintenance	2	Building	288210.5	4117876.0	955.25	8.53	20.73	28.65	0
BLD20	Dehydration & Evaporation	13, 33	Building	288111.5	4117686.5	955.25	27.43	30.48	33.53	0
BLD22	Water Treatment	15	Building	Partial Structure, Not Included			Various	35.05	27.43	0
BLD3	Control	3	Building	288182.0	4117752.5	955.50	4.27	25.30	28.65	0
BLD38	Turbine	20	Building	288148.5	4117824.5	955.75	6.10	22.86	22.86	0
BLD39	Cogen / Electrical	21	Building	288171.0	4117883.0	955.75	4.27	24.38	18.29	0
BLD4	Guard House	4	Building	288318.5	4117928.5	954.50	3.05	10.36	3.96	0
BLD43	Cooling Tower	23	Building	288151.5	4117815.7	955.50	8.53	38.10	12.19	0
BLD45	Chemical Tote Storage	26	Building	288185.0	4117658.0	955.50	4.27	19.51	7.62	0
BLD47	Fire Pump House	28	Building	288282.5	4117683.5	954.75	3.66	7.62	12.19	0
BLD5A	Biomass Handling & Cleaning	6, 7	Building	288206.5	4117843.5	955.25	4.27	38.71	15.85	0
BLD54	Waste Water Treatment	32	Building	288311.0	4117778.5	954.50	4.27	10.67	27.43	0
BLD6	Biomass Boiler	8	Boiler	288117.0	4117833.0	956.00	21.34	24.38	13.72	0
BLD62	Foam	38	Building	288161.5	4117667.0	955.75	4.27	6.10	6.10	0
BLD63	Electrical Room #1	ECR	Building	288171.0	4117865.0	955.75	4.27	24.38	18.29	0
BLD64	Electrical Room #2	ECR	Building	288134.7	4117790.1	956.00	4.27	4.57	4.57	0
BLD65	Electrical Room #3	ECR	Building	288162.0	4117688.5	955.75	4.27	7.62	7.62	0
BLD66	Electrical Room #4	ECR	Building	288261.5	4117756.0	955.00	4.27	4.57	4.57	0
BLD8	Biomass Pretreatment	9	Building	288228.0	4117781.0	955.25	30.48	32.00	22.86	0

BUILDING PARAMETERS										Rev 5/4/2011
ID	Description	Plan Label	Type	UTM Easting (m)	UTM Northing (m)	Elevation (ft)	Height (ft)	Radius (ft)	Diameter (ft)	
CIRCULAR BUILDINGS										
BLD9	Liquefaction Tower	9	Tank	Under BLD8 (Biomass Pretreatment, Plan Label 9)			3.20	5.07	10.13	
BLD10	Yeast Propagator	9	Tank				1.40	0.70	1.40	
BLD11	Yeast Propagator	9	Tank				1.40	0.70	1.40	
BLD12	Yeast Propagator	9	Tank				5.18	2.67	5.33	
BLD13	Yeast Propagator	9	Tank				5.18	2.67	5.33	
BLD14	Soak	9	Tank				2.44	1.07	2.13	
BLD15	Fermentor	10	Tank	288255.5	4117734.0	955.00	18.14	9.14	18.29	
BLD16	Fermentor	10	Tank	288255.5	4117711.5	955.00	18.14	9.14	18.29	
BLD17	Fermentor	10	Tank	288255.5	4117685.5	955.00	18.14	9.14	18.29	
BLD21	Clarified (Thin) Stillage	14	Tank	288158.0	4117712.0	955.75	10.67	3.81	7.62	
BLD23	Filtered Water	15	Tank	288117.0	4117820.5	956.00	19.51	4.57	9.14	
BLD24	RO Water Storage	15	Tank	288133.5	4117804.0	956.00	10.67	4.57	9.14	
BLD25	Polished Water Storage	15	Tank	288116.0	4117786.5	956.00	10.67	8.84	17.68	
BLD26	Expansion	15	Tank	288098.0	4117800.0	956.00	1.52	0.61	1.22	
BLD27	HP Air	15	Tank	288095.5	4117807.5	956.00	1.68	2.44	4.88	
BLD28	HP Air	15	Tank	288101.0	4117807.5	956.00	1.68	2.44	4.88	
BLD29	LP Air	15	Tank	288095.5	4117802.5	956.00	3.05	2.59	5.18	
BLD30	LP Air	15	Tank	288101.0	4117802.5	956.00	3.05	2.59	5.18	
BLD31	Stillage Settling	17	Tank	288159.0	4117737.0	955.75	12.80	8.99	17.98	
BLD32	Stillage Flocculation	17	Tank	288147.5	4117730.0	955.75	3.66	1.68	3.35	
BLD33	Product Shift	18	Tank	288143.0	4117620.5	955.00	6.10	3.05	6.10	
BLD34	Product Shift	18	Tank	288143.0	4117628.5	955.00	6.10	3.05	6.10	
BLD35	Denaturant Storage	18	Tank	288143.0	4117636.5	955.00	5.03	2.51	5.03	
BLD36	Ethanol Product Storage	18	Tank	288127.0	4117629.5	955.00	14.78	7.39	14.78	
BLD37	Ethanol Product Storage	18	Tank	288127.0	4117609.5	955.00	14.78	7.39	14.78	
BLD40	Saccharification	22	Tank	288227.0	4117734.0	955.00	18.14	9.14	18.29	
BLD41	Saccharification	22	Tank	288227.0	4117711.5	955.00	18.14	9.14	18.29	
BLD42	Saccharification	22	Tank	288227.0	4117685.5	955.00	18.14	9.14	18.29	
BLD44	Beer Well	25	Tank	288255.5	4117662.0	955.00	20.73	9.14	18.29	
BLD46	Fire Water	27	Tank	288289.0	4117700.0	954.75	19.81	5.18	10.36	
BLD48	Cleaning in Place (CIP)	29	Tank	288192.0	4117722.0	955.50	3.66	5.33	10.67	
BLD49	Sulfuric Acid	30	Tank	288189.5	4117687.0	955.50	3.96	3.96	7.92	
BLD50	Nutrient	30	Tank	288201.0	4117675.5	955.50	3.66	1.83	3.66	
BLD51	Cellulase	30	Tank	288198.5	4117687.0	955.50	6.40	3.20	6.40	
BLD52	Media Liquid	30	Tank	288189.5	4117675.5	955.50	4.72	3.35	6.71	
BLD53	Acid	30	Tank	288196.0	4117675.5	955.50	3.35	1.98	3.96	
BLD55	Final Rinse	32	Tank	Location To Be Determined			4.88	4.72	9.45	
BLD56	2% Caustic	32	Tank	Location To Be Determined			4.88	4.72	9.45	
BLD57	Pre-Rinse	32	Tank	Location To Be Determined			4.88	4.72	9.45	
BLD58	Waste Water Mix	32	Tank	Location To Be Determined			4.11	3.66	7.32	
BLD59	Treated Waste Water Storage	32	Tank	288283.5	4117737.0	954.75	17.22	7.01	14.02	
BLD60	Evaporator Condensate	33	Tank	288283.5	4117758.0	955.00	13.11	7.01	14.02	
BLD61	Syrup	37	Tank	288144.0	4117741.0	956.00	5.94	5.03	10.06	
BLD67	Elevated Fly Ash Silo	Near 39	Tank	288127.5	4117869.5	956.25	16.76	6.10	12.19	
BLD7	Aqueous Ammonia	Near 8	Tank	288100.0	4117776.0	956.00	3.05	2.29	4.57	

Modeled Source Parameters

VOLUME SOURCE PARAMETERS

Source ID	Source Description	Road Length (m)	Volume Height (m)	Top of Plume (m)	Release Height (m)	Actual Width (m)	Adjusted Width (m)	Initial Lateral Dim. (Sigma Y) (m)	Initial Vertical Dim. (Sigma Z) (m)	Maximum Number of Sources
EP01000F	Paved Plant Roads	Note 2	Note 3	Note 4	Note 5	Note 6	Note 7	Note 8	Note 9	Note 10
PHR01 and PHR02 modeled as an area source as detailed above.										
PHR01 through PHR02	Haul Road Entrance 1 through Haul Road Entrance 2	49.9	3.7	6.2	3.1	14.6	20.6	9.60	2.89	N/A Modeled as Area Source
PHR03	Weigh Staging Lanes 3	46	3.7	6.2	3.1	29.3	35.3	16.40	2.89	1
PHR04 through PHR09	Scale Lanes 4 through Scale Lanes 9	132	3.7	6.2	3.1	14.6	20.6	9.60	2.89	6
PHR10 through PHR43	Main Road Drive Loop 10 through Main Road Drive Loop 43	454	3.7	6.2	3.1	7.3	13.3	6.19	2.89	34
PHR044 through PHR155	Ash Loadout 44 through Ash Loadout 155	308	3.7	6.2	3.1	2.7	2.7	1.28	2.89	112
PHR156 through PHR183	Center Interior Road 156 through Center Interior Road 183	76	3.7	6.2	3.1	2.7	2.7	1.28	2.89	28
PHR184 through PHR292	Ash/Etoh/Chemical Loadout 184 through Ash/Etoh/Chemical Loadout 292	305	3.7	6.2	3.1	2.7	2.7	1.28	2.89	111
EP01050F	Unpaved Biomass Roads									
BRD001 through BRD408	Biomass Road 1 through Biomass Road 408	1,225	3.7	6.2	3.1	2.7	2.7	1.28	2.89	447
BRD409 through BRD441	Biomass Staging Area 409 through Biomass Staging Area 441	91	3.7	6.2	3.1	2.7	2.7	1.28	2.89	33

(1) Plant haul roads modeled as detailed in the EPA's *Haul Road Workgroup Recommendations* , dated February 9, 2011.

(2) Actual haul roads lengths based on the following:

Haul road entrance lanes (two-way traffic) from fenceline to staging area are 163.75 feet in length and consist of 4 lanes (2 in-coming and 2-outgoing lanes).
Haul road entrance lanes (two-way traffic) at the weigh staging area are 151.75 feet in length and consists of eight lanes.
Haul road scale lanes (to-way traffic) are 433.5 feet in length and consist of four lanes.
Main haul road drive loop (one-way traffic) is 1,490 feet in length and consists of two lanes.
The ash loadout loop (one-way traffic) is 2,010 feet in length and consists of one lane.
The ethanol/denaturant/chemical loop (one-way traffic) is 1,250 feet in length and consists of one lane.
The unpaved biomass roads are over 20,000 feet in total length (when all possible driving paths are included). For modeling purposes, only the primary drive loops were included, which are approximately 4,000 feet in length.

(3) Actual height of vehicles based on 12 feet, which is the approximate average standard commercial truck height. The U.S. Department of Transportation (DOT) limits commercial vehicle heights to 13.5 feet (state height limits range from 13.6 feet to 14.6 feet).

(4) The top of the plume height is calculated using the following equation:

Top of Plume Height = 1.7 x Volume Height

(5) The release height is calculated using the following equation:

Release Height = (Top of Plume) x 0.5

(6) The actual road widths will be designed for heavy truck traffic and are based on a 12-foot standard drive lane.

The haul road entrance segment will consist of 2 in-coming drive lanes and 2 out-going lanes. (2 in-coming lanes x 12-ft width each) + (2 out-going lanes x 12-ft width each) = 48 ft wide entrance road.
The weigh staging segment will consist of 6 in-coming drive lanes and 2 out-going lanes. (6 in-coming lanes x 12-ft width each) + (2 out-going lanes x 12-ft width each) = 96 ft wide weigh staging road.
The scales segment will consist of 1 weigh-in scale lane, 1 no weigh in-coming lane, 1 weigh-out scale lane and 1 no weigh out-going lane. (2 in-coming lanes x 12-ft width each) + 2 out-going lanes x 12-ft wide lanes) = 48 ft wide scale road.
The main paved plant haul road will consist of 2 one-way drive lanes. (2 one-way drive lanes x 12-ft width each) = 24 ft wide main paved plant haul road.
The ash loadout will consist of a single one-way drive lane. (1 one-way drive lane x 9-ft vehicle width) = 9 ft wide ash loadout road.
The center interior road will consist of a single one-way drive lane. (1 one-way drive lane x 9-ft vehicle width) = 9 ft wide center interior road.
The ash/ethanol/chemical loadout will consist of a single one-way drive lane. (1 one-way drive lane x 9-ft vehicle width) = 9 ft wide ash/ethanol/chemical loadout road.
Unpaved biomass roads will consist of single one-way drive lanes. (1 one-way drive lane x 9-ft vehicle width) = 9-ft wide biomass laydown roads.
Unpaved biomass staging area roads will consist of single one-way drive lanes. (1 one-way drive lane x 9-ft vehicle width) = 9-ft wide biomass staging area roads.

(7) The adjusted width (AW), or width of plume, is calculated using the following equation:

Adjusted Road Width (Width of Plume) For Multiple Driving Lanes = Actual Road Width + 6 meters *Used for haul road entrance and main paved plant haul roads
Adjusted Road Width (Width of Plume) For Single Lane Road = Actual Vehicle Width + 6 meters *Used for single lane roads and unpaved biomass roads

(8) The initial lateral dimension (sigma y) is based on adjacent volume sauces and is calculated using the following equation:

Initial Lateral Dimension (Sigma Y) = (Adjusted Width) / 2.15

(9) The initial vertical dimension (sigma z) is calculated using the following equation:

Initial Vertical Dimension (Sigma Z) = (Top of Plume) / 2.15

(10) The maximum number of volume sources is calculated using the following equation:

Maximum Number of Volume Sources, N = (Length or Road) / (Adjusted Width)

Modeled Source Parameters

AREA SOURCE PARAMETERS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Road Length (m)	Road Width (m)	Top of Plume (m)	Release Height (m)	Adjusted Width (m)	Initial Vertical Dim. (Sigma Z) (m)	Source Area (m^2)
PHR01 through PHR02	Haul Road Entrance 1 through Haul Road Entrance 2	288274.5	4118043.0	955.00	49.9	14.6	6.22	3.11	20.6	2.89	1,030

(1) See Volume Source Parameter Table below for details on source parameter calculations.

VOLUME SOURCE PARAMETERS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)
EP01000F	Paved Plant Roads				EP01000F	Paved Plant Roads			
PHR001	Haul Road Entrance 1	N/A	N/A	N/A	PHR147	Ash Loadout 147	288152.7	4117723.5	955.75
PHR002	Haul Road Entrance 2	N/A	N/A	N/A	PHR148	Ash Loadout 148	288155.4	4117723.5	955.75
PHR003	Weigh Staging Lanes 3	288294.5	4118028.0	955.00	PHR149	Ash Loadout 149	288158.2	4117723.5	955.75
PHR004	Scale Lanes 4	288307.0	4118005.5	954.75	PHR150	Ash Loadout 150	288160.9	4117723.5	955.75
PHR005	Scale Lanes 5	288313.5	4117984.9	954.75	PHR151	Ash Loadout 151	288163.7	4117723.5	955.75
PHR006	Scale Lanes 6	288320.0	4117964.2	954.75	PHR152	Ash Loadout 152	288166.4	4117723.5	955.75
PHR007	Scale Lanes 7	288322.0	4117943.6	954.75	PHR153	Ash Loadout 153	288169.1	4117723.5	955.75
PHR008	Scale Lanes 8	288322.0	4117923.0	954.75	PHR154	Ash Loadout 154	288171.9	4117723.5	955.75
PHR009	Scale Lanes 9	288322.0	4117902.3	954.75	PHR155	Ash Loadout 155	288174.6	4117723.5	955.75
PHR010	Main Road Drive Loop 10	288317.0	4117889.0	954.75	PHR156	Center Interior Road 156	288174.6	4117797.6	955.75
PHR011	Main Road Drive Loop 11	288317.0	4117875.7	954.75	PHR157	Center Interior Road 157	288174.6	4117794.8	955.75
PHR012	Main Road Drive Loop 12	288311.0	4117867.0	954.75	PHR158	Center Interior Road 158	288174.6	4117792.1	955.75
PHR013	Main Road Drive Loop 13	288305.0	4117858.0	954.75	PHR159	Center Interior Road 159	288174.6	4117789.3	955.75
PHR014	Main Road Drive Loop 14	288292.0	4117855.7	954.75	PHR160	Center Interior Road 160	288174.6	4117786.6	955.75
PHR015	Main Road Drive Loop 15	288278.7	4117855.7	954.75	PHR161	Center Interior Road 161	288174.6	4117783.9	955.75
PHR016	Main Road Drive Loop 16	288265.4	4117855.7	955.00	PHR162	Center Interior Road 162	288174.6	4117781.1	955.75
PHR017	Main Road Drive Loop 17	288252.1	4117855.7	955.00	PHR163	Center Interior Road 163	288174.6	4117778.4	955.75
PHR018	Main Road Drive Loop 18	288238.8	4117855.7	955.00	PHR164	Center Interior Road 164	288174.6	4117775.6	955.75
PHR019	Main Road Drive Loop 19	288225.5	4117855.7	955.00	PHR165	Center Interior Road 165	288174.6	4117772.9	955.75
PHR020	Main Road Drive Loop 20	288212.1	4117855.7	955.00	PHR166	Center Interior Road 166	288174.6	4117770.1	955.75
PHR021	Main Road Drive Loop 21	288198.8	4117855.7	955.50	PHR167	Center Interior Road 167	288174.6	4117767.4	955.75
PHR022	Main Road Drive Loop 22	288185.5	4117853.0	955.50	PHR168	Center Interior Road 168	288174.6	4117764.6	955.75
PHR023	Main Road Drive Loop 23	288178.8	4117842.4	955.50	PHR169	Center Interior Road 169	288174.6	4117761.9	955.75
PHR024	Main Road Drive Loop 24	288178.8	4117829.1	955.75	PHR170	Center Interior Road 170	288174.6	4117759.2	955.75
PHR025	Main Road Drive Loop 25	288178.8	4117815.8	955.75	PHR171	Center Interior Road 171	288174.6	4117756.4	955.75
PHR026	Main Road Drive Loop 26	288185.5	4117802.5	955.75	PHR172	Center Interior Road 172	288174.6	4117753.7	955.75
PHR027	Main Road Drive Loop 27	288197.0	4117792.0	955.75	PHR173	Center Interior Road 173	288174.6	4117750.9	955.75
PHR028	Main Road Drive Loop 28	288212.1	4117789.2	955.50	PHR174	Center Interior Road 174	288174.6	4117748.2	955.75
PHR029	Main Road Drive Loop 29	288225.5	4117789.2	955.50	PHR175	Center Interior Road 175	288174.6	4117745.4	955.75
PHR030	Main Road Drive Loop 30	288238.8	4117789.2	955.50	PHR176	Center Interior Road 176	288174.6	4117742.7	955.75
PHR031	Main Road Drive Loop 31	288252.1	4117789.2	955.50	PHR177	Center Interior Road 177	288174.6	4117740.0	955.75
PHR032	Main Road Drive Loop 32	288265.4	4117789.2	955.50	PHR178	Center Interior Road 178	288174.6	4117737.2	955.75
PHR033	Main Road Drive Loop 33	288278.7	4117789.2	954.75	PHR179	Center Interior Road 179	288174.6	4117734.5	955.75
PHR034	Main Road Drive Loop 34	288292.0	4117793.0	954.75	PHR180	Center Interior Road 180	288174.6	4117731.7	955.75
PHR035	Main Road Drive Loop 35	288305.3	4117793.0	954.75	PHR181	Center Interior Road 181	288174.6	4117729.0	955.75
PHR036	Main Road Drive Loop 36	288318.7	4117795.0	954.75	PHR182	Center Interior Road 182	288174.6	4117726.2	955.75
PHR037	Main Road Drive Loop 37	288326.5	4117805.0	954.75	PHR183	Center Interior Road 183	288174.6	4117723.5	955.75
PHR038	Main Road Drive Loop 38	288326.5	4117818.3	954.75	PHR184	Ash/Etoh/Chemical Loadout 184	288174.6	4117720.8	955.75
PHR039	Main Road Drive Loop 39	288326.5	4117831.6	954.75	PHR185	Ash/Etoh/Chemical Loadout 185	288174.6	4117718.0	955.75
PHR040	Main Road Drive Loop 40	288326.5	4117844.9	954.75	PHR186	Ash/Etoh/Chemical Loadout 186	288174.6	4117715.3	955.75
PHR041	Main Road Drive Loop 41	288326.5	4117858.3	954.75	PHR187	Ash/Etoh/Chemical Loadout 187	288174.6	4117712.5	955.75
PHR042	Main Road Drive Loop 42	288326.5	4117871.6	954.75	PHR188	Ash/Etoh/Chemical Loadout 188	288174.6	4117709.8	955.75
PHR043	Main Road Drive Loop 43	288326.5	4117884.9	954.75	PHR189	Ash/Etoh/Chemical Loadout 189	288174.6	4117707.0	955.75
PHR044	Ash Loadout 44	288183.5	4117858.5	955.75	PHR190	Ash/Etoh/Chemical Loadout 190	288174.6	4117704.3	955.75
PHR045	Ash Loadout 45	288180.8	4117858.5	955.75	PHR191	Ash/Etoh/Chemical Loadout 191	288174.6	4117701.6	955.8
PHR046	Ash Loadout 46	288178.0	4117858.5	955.75	PHR192	Ash/Etoh/Chemical Loadout 192	288174.6	4117698.8	955.8
PHR047	Ash Loadout 47	288175.3	4117858.5	955.75	PHR193	Ash/Etoh/Chemical Loadout 193	288174.6	4117696.1	955.8
PHR048	Ash Loadout 48	288172.5	4117858.5	955.75	PHR194	Ash/Etoh/Chemical Loadout 194	288174.6	4117693.3	955.8
PHR049	Ash Loadout 49	288169.8	4117858.5	955.75	PHR195	Ash/Etoh/Chemical Loadout 195	288174.6	4117690.6	955.8
PHR050	Ash Loadout 50	288167.0	4117858.5	955.75	PHR196	Ash/Etoh/Chemical Loadout 196	288174.6	4117687.8	955.8
PHR051	Ash Loadout 51	288164.3	4117858.5	955.75	PHR197	Ash/Etoh/Chemical Loadout 197	288174.6	4117685.1	955.8
PHR052	Ash Loadout 52	288161.6	4117858.5	955.75	PHR198	Ash/Etoh/Chemical Loadout 198	288174.6	4117682.4	955.8
PHR053	Ash Loadout 53	288158.8	4117858.5	955.75	PHR199	Ash/Etoh/Chemical Loadout 199	288174.6	4117679.6	955.8
PHR054	Ash Loadout 54	288156.1	4117858.5	955.75	PHR200	Ash/Etoh/Chemical Loadout 200	288174.6	4117676.9	955.8
PHR055	Ash Loadout 55	288153.3	4117858.5	955.75	PHR201	Ash/Etoh/Chemical Loadout 201	288174.6	4117674.1	955.8
PHR056	Ash Loadout 56	288150.6	4117858.5	955.75	PHR202	Ash/Etoh/Chemical Loadout 202	288174.6	4117671.4	955.8
PHR057	Ash Loadout 57	288147.8	4117858.5	955.75	PHR203	Ash/Etoh/Chemical Loadout 203	288174.6	4117668.6	955.8
PHR058	Ash Loadout 58	288145.1	4117858.5	956.00	PHR204	Ash/Etoh/Chemical Loadout 204	288174.6	4117665.9	955.8
PHR059	Ash Loadout 59	288142.4	4117858.5	956.00	PHR205	Ash/Etoh/Chemical Loadout 205	288174.6	4117663.1	955.8
PHR060	Ash Loadout 60	288139.6	4117858.5	956.00	PHR206	Ash/Etoh/Chemical Loadout 206	288174.6	4117660.4	955.8
PHR061	Ash Loadout 61	288136.9	4117858.5	956.00	PHR207	Ash/Etoh/Chemical Loadout 207	288174.6	4117657.7	955.8
PHR062	Ash Loadout 62	288134.1	4117858.5	956.00	PHR208	Ash/Etoh/Chemical Loadout 208	288176.6	4117655.9	955.8
PHR063	Ash Loadout 63	288131.4	4117858.5	956.00	PHR209	Ash/Etoh/Chemical Loadout 209	288178.6	4117654.1	955.8

Modeled Source Parameters

VOLUME SOURCE PARAMETERS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)
EP01000F	Paved Plant Roads				EP01000F	Paved Plant Roads			
PHR064	Ash Loadout 64	288128.6	4117858.5	956.00	PHR210	Ash/Etoh/Chemical Loadout 210	288180.6	4117652.3	955.8
PHR065	Ash Loadout 65	288125.9	4117858.5	956.00	PHR211	Ash/Etoh/Chemical Loadout 211	288182.6	4117650.5	955.8
PHR066	Ash Loadout 66	288123.1	4117858.5	956.00	PHR212	Ash/Etoh/Chemical Loadout 212	288184.6	4117648.7	955.8
PHR067	Ash Loadout 67	288120.4	4117858.5	956.00	PHR213	Ash/Etoh/Chemical Loadout 213	288186.6	4117646.9	955.8
PHR068	Ash Loadout 68	288117.7	4117858.5	956.00	PHR214	Ash/Etoh/Chemical Loadout 214	288189.4	4117646.9	955.8
PHR069	Ash Loadout 69	288114.9	4117858.5	956.00	PHR215	Ash/Etoh/Chemical Loadout 215	288192.1	4117646.9	955.8
PHR070	Ash Loadout 70	288112.2	4117858.5	956.00	PHR216	Ash/Etoh/Chemical Loadout 216	288194.9	4117646.9	955.8
PHR071	Ash Loadout 71	288109.4	4117858.5	956.00	PHR217	Ash/Etoh/Chemical Loadout 217	288197.6	4117646.9	955.8
PHR072	Ash Loadout 72	288106.7	4117858.5	956.00	PHR218	Ash/Etoh/Chemical Loadout 218	288200.3	4117646.9	955.8
PHR073	Ash Loadout 73	288103.9	4117858.5	956.00	PHR219	Ash/Etoh/Chemical Loadout 219	288203.1	4117646.9	955.8
PHR074	Ash Loadout 74	288101.2	4117858.5	956.00	PHR220	Ash/Etoh/Chemical Loadout 220	288205.8	4117646.9	955.5
PHR075	Ash Loadout 75	288098.5	4117858.5	956.00	PHR221	Ash/Etoh/Chemical Loadout 221	288208.6	4117646.9	955.5
PHR076	Ash Loadout 76	288096.9	4117856.4	956.00	PHR222	Ash/Etoh/Chemical Loadout 222	288211.3	4117646.9	955.5
PHR077	Ash Loadout 77	288095.3	4117854.3	956.00	PHR223	Ash/Etoh/Chemical Loadout 223	288214.1	4117646.9	955.5
PHR078	Ash Loadout 78	288093.8	4117852.2	956.00	PHR224	Ash/Etoh/Chemical Loadout 224	288216.8	4117646.9	955.5
PHR079	Ash Loadout 79	288092.2	4117850.1	956.00	PHR225	Ash/Etoh/Chemical Loadout 225	288219.5	4117646.9	955.5
PHR080	Ash Loadout 80	288090.7	4117848.0	956.00	PHR226	Ash/Etoh/Chemical Loadout 226	288222.3	4117646.9	955.5
PHR081	Ash Loadout 81	288089.1	4117845.9	956.00	PHR227	Ash/Etoh/Chemical Loadout 227	288225.0	4117646.9	955.5
PHR082	Ash Loadout 82	288089.1	4117845.9	956.00	PHR228	Ash/Etoh/Chemical Loadout 228	288227.8	4117646.9	955.5
PHR083	Ash Loadout 83	288089.1	4117843.2	956.00	PHR229	Ash/Etoh/Chemical Loadout 229	288230.5	4117646.9	955.5
PHR084	Ash Loadout 84	288089.1	4117840.4	956.00	PHR230	Ash/Etoh/Chemical Loadout 230	288233.3	4117646.9	955.5
PHR085	Ash Loadout 85	288089.1	4117837.7	956.00	PHR231	Ash/Etoh/Chemical Loadout 231	288236.0	4117646.9	955.5
PHR086	Ash Loadout 86	288089.1	4117834.9	956.00	PHR232	Ash/Etoh/Chemical Loadout 232	288238.7	4117646.9	955.5
PHR087	Ash Loadout 87	288089.1	4117832.2	956.00	PHR233	Ash/Etoh/Chemical Loadout 233	288241.5	4117646.9	955.5
PHR088	Ash Loadout 88	288089.1	4117829.4	956.00	PHR234	Ash/Etoh/Chemical Loadout 234	288244.2	4117646.9	955.5
PHR089	Ash Loadout 89	288089.1	4117826.7	956.00	PHR235	Ash/Etoh/Chemical Loadout 235	288247.0	4117646.9	955.5
PHR090	Ash Loadout 90	288089.1	4117824.0	956.00	PHR236	Ash/Etoh/Chemical Loadout 236	288249.7	4117646.9	955.5
PHR091	Ash Loadout 91	288089.1	4117821.2	956.00	PHR237	Ash/Etoh/Chemical Loadout 237	288252.5	4117646.9	955.5
PHR092	Ash Loadout 92	288089.1	4117818.5	956.00	PHR238	Ash/Etoh/Chemical Loadout 238	288255.2	4117646.9	955.0
PHR093	Ash Loadout 93	288089.1	4117815.7	956.00	PHR239	Ash/Etoh/Chemical Loadout 239	288257.9	4117646.9	955.0
PHR094	Ash Loadout 94	288089.1	4117813.0	956.00	PHR240	Ash/Etoh/Chemical Loadout 240	288260.7	4117646.9	955.0
PHR095	Ash Loadout 95	288089.1	4117810.2	956.00	PHR241	Ash/Etoh/Chemical Loadout 241	288262.7	4117648.7	955.0
PHR096	Ash Loadout 96	288089.1	4117807.5	956.00	PHR242	Ash/Etoh/Chemical Loadout 242	288264.7	4117650.5	955.0
PHR097	Ash Loadout 97	288089.1	4117804.8	956.00	PHR243	Ash/Etoh/Chemical Loadout 243	288266.7	4117652.3	955.0
PHR098	Ash Loadout 98	288089.1	4117802.0	956.00	PHR244	Ash/Etoh/Chemical Loadout 244	288268.7	4117654.1	955.0
PHR099	Ash Loadout 99	288089.1	4117799.3	956.00	PHR245	Ash/Etoh/Chemical Loadout 245	288270.7	4117655.9	955.0
PHR100	Ash Loadout 100	288089.1	4117796.5	956.00	PHR246	Ash/Etoh/Chemical Loadout 246	288270.7	4117658.6	955.0
PHR101	Ash Loadout 101	288089.1	4117793.8	956.00	PHR247	Ash/Etoh/Chemical Loadout 247	288270.7	4117661.3	955.0
PHR102	Ash Loadout 102	288089.1	4117791.0	956.00	PHR248	Ash/Etoh/Chemical Loadout 248	288270.7	4117664.1	955.0
PHR103	Ash Loadout 103	288089.1	4117788.3	956.00	PHR249	Ash/Etoh/Chemical Loadout 249	288270.7	4117666.8	955.0
PHR104	Ash Loadout 104	288089.1	4117785.5	956.00	PHR250	Ash/Etoh/Chemical Loadout 250	288270.7	4117669.6	955.0
PHR105	Ash Loadout 105	288089.1	4117782.8	956.00	PHR251	Ash/Etoh/Chemical Loadout 251	288270.7	4117672.3	955.0
PHR106	Ash Loadout 106	288089.1	4117780.1	956.00	PHR252	Ash/Etoh/Chemical Loadout 252	288270.7	4117675.1	955.0
PHR107	Ash Loadout 107	288089.1	4117777.3	956.00	PHR253	Ash/Etoh/Chemical Loadout 253	288270.7	4117677.8	955.0
PHR108	Ash Loadout 108	288089.1	4117774.6	956.00	PHR254	Ash/Etoh/Chemical Loadout 254	288270.7	4117680.6	955.0
PHR109	Ash Loadout 109	288089.1	4117771.8	956.00	PHR255	Ash/Etoh/Chemical Loadout 255	288270.7	4117683.3	955.0
PHR110	Ash Loadout 110	288089.1	4117769.1	956.00	PHR256	Ash/Etoh/Chemical Loadout 256	288270.7	4117686.0	955.0
PHR111	Ash Loadout 111	288089.1	4117766.3	956.00	PHR257	Ash/Etoh/Chemical Loadout 257	288270.7	4117688.8	955.0
PHR112	Ash Loadout 112	288089.1	4117763.6	956.00	PHR258	Ash/Etoh/Chemical Loadout 258	288270.7	4117691.5	955.0
PHR113	Ash Loadout 113	288089.1	4117760.9	956.00	PHR259	Ash/Etoh/Chemical Loadout 259	288270.7	4117694.3	955.0
PHR114	Ash Loadout 114	288089.1	4117758.1	956.00	PHR260	Ash/Etoh/Chemical Loadout 260	288270.7	4117697.0	955.0
PHR115	Ash Loadout 115	288089.1	4117755.4	956.00	PHR261	Ash/Etoh/Chemical Loadout 261	288270.7	4117699.8	955.0
PHR116	Ash Loadout 116	288089.1	4117752.6	956.00	PHR262	Ash/Etoh/Chemical Loadout 262	288270.7	4117702.5	955.0
PHR117	Ash Loadout 117	288089.1	4117749.9	956.00	PHR263	Ash/Etoh/Chemical Loadout 263	288270.7	4117705.2	955.0
PHR118	Ash Loadout 118	288089.1	4117747.1	956.00	PHR264	Ash/Etoh/Chemical Loadout 264	288270.7	4117708.0	955.0
PHR119	Ash Loadout 119	288089.1	4117744.4	956.00	PHR265	Ash/Etoh/Chemical Loadout 265	288270.7	4117710.7	955.0
PHR120	Ash Loadout 120	288089.1	4117741.7	956.00	PHR266	Ash/Etoh/Chemical Loadout 266	288270.7	4117713.5	955.0
PHR121	Ash Loadout 121	288089.1	4117738.9	956.00	PHR267	Ash/Etoh/Chemical Loadout 267	288270.7	4117716.2	955.0
PHR122	Ash Loadout 122	288089.1	4117736.2	956.00	PHR268	Ash/Etoh/Chemical Loadout 268	288270.7	4117719.0	955.0
PHR123	Ash Loadout 123	288091.1	4117734.4	956.00	PHR269	Ash/Etoh/Chemical Loadout 269	288270.7	4117721.7	955.0
PHR124	Ash Loadout 124	288093.2	4117732.6	956.00	PHR270	Ash/Etoh/Chemical Loadout 270	288270.7	4117724.4	955.0
PHR125	Ash Loadout 125	288095.2	4117730.8	956.00	PHR271	Ash/Etoh/Chemical Loadout 271	288270.7	4117727.2	955.0
PHR126	Ash Loadout 126	288097.2	4117728.9	956.00	PHR272	Ash/Etoh/Chemical Loadout 272	288270.7	4117729.9	955.0
PHR127	Ash Loadout 127	288099.2	4117727.1	956.00	PHR273	Ash/Etoh/Chemical Loadout 273	288270.7	4117732.7	955.0
PHR128	Ash Loadout 128	288101.3	4117725.3	956.00	PHR274	Ash/Etoh/Chemical Loadout 274	288270.7	4117735.4	955.0
PHR129	Ash Loadout 129	288103.3	4117723.5	956.00	PHR275	Ash/Etoh/Chemical Loadout 275	288270.7	4117738.2	955.0
PHR130	Ash Loadout 130	288106.0	4117723.5	956.00	PHR276	Ash/Etoh/Chemical Loadout 276	288270.7	4117740.9	955.0
PHR131	Ash Loadout 131	288108.8	4117723.5	956.00	PHR277	Ash/Etoh/Chemical Loadout 277	288270.7	4117743.6	955.0
PHR132	Ash Loadout 132	288111.5	4117723.5	956.00	PHR278	Ash/Etoh/Chemical Loadout 278	288270.7	4117746.4	955.0
PHR133	Ash Loadout 133	288114.3	4117723.5	956.00	PHR279	Ash/Etoh/Chemical Loadout 279	288270.7	4117749.1	955.0
PHR134	Ash Loadout 134	288117.0	4117723.5	956.00	PHR280	Ash/Etoh/Chemical Loadout 280	288270.7	4117751.9	955.0
PHR135	Ash Loadout 135	288119.8	4117723.5	956.00	PHR281	Ash/Etoh/Chemical Loadout 281	288270.7	4117754.6	954.8
PHR136	Ash Loadout 136	288122.5	4117723.5	956.00	PHR282	Ash/Etoh/Chemical Loadout 282	288270.7	4117757.4	954.8
PHR137	Ash Loadout 137	288125.2	4117723.5	956.00	PHR283	Ash/Etoh/Chemical Loadout 283	288270.7	4117760.1	954.8

Modeled Source Parameters

VOLUME SOURCE PARAMETERS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)
EP01000F	Paved Plant Roads				EP01000F	Paved Plant Roads			
PHR138	Ash Loadout 138	288128.0	4117723.5	956.00	PHR284	Ash/Etoh/Chemical Loadout 284	288270.7	4117762.8	954.8
PHR139	Ash Loadout 139	288130.7	4117723.5	956.00	PHR285	Ash/Etoh/Chemical Loadout 285	288270.7	4117765.6	954.8
PHR140	Ash Loadout 140	288133.5	4117723.5	956.00	PHR286	Ash/Etoh/Chemical Loadout 286	288270.7	4117768.3	954.8
PHR141	Ash Loadout 141	288136.2	4117723.5	955.75	PHR287	Ash/Etoh/Chemical Loadout 287	288270.7	4117771.1	954.8
PHR142	Ash Loadout 142	288139.0	4117723.5	955.75	PHR288	Ash/Etoh/Chemical Loadout 288	288270.7	4117773.8	954.8
PHR143	Ash Loadout 143	288141.7	4117723.5	955.75	PHR289	Ash/Etoh/Chemical Loadout 289	288272.7	4117776.6	954.8
PHR144	Ash Loadout 144	288144.4	4117723.5	955.75	PHR290	Ash/Etoh/Chemical Loadout 290	288274.7	4117779.3	954.8
PHR145	Ash Loadout 145	288147.2	4117723.5	955.75	PHR291	Ash/Etoh/Chemical Loadout 291	288276.7	4117782.1	954.8
PHR146	Ash Loadout 146	288149.9	4117723.5	955.75	PHR292	Ash/Etoh/Chemical Loadout 292	288278.7	4117784.8	954.8

Modeled Source Parameters

VOLUME SOURCE PARAMETERS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)
EP01050F	Biomass Laydown Roads				EP01050F	Biomass Laydown Roads			
BRD001	Biomass Road 1	288331.0	4117853.5	954.50	BRD241	Biomass Road 241	288424.3	4117694.4	954.25
BRD002	Biomass Road 2	288333.7	4117853.5	954.50	BRD242	Biomass Road 242	288424.3	4117691.7	954.25
BRD003	Biomass Road 3	288336.5	4117853.5	954.50	BRD243	Biomass Road 243	288424.3	4117688.9	954.25
BRD004	Biomass Road 4	288339.2	4117853.5	954.50	BRD244	Biomass Road 244	288424.3	4117686.2	954.25
BRD005	Biomass Road 5	288342.0	4117853.5	954.50	BRD245	Biomass Road 245	288424.3	4117683.4	954.25
BRD006	Biomass Road 6	288344.7	4117853.5	954.50	BRD246	Biomass Road 246	288424.3	4117680.7	954.25
BRD007	Biomass Road 7	288347.5	4117853.5	954.50	BRD247	Biomass Road 247	288424.3	4117677.9	954.25
BRD008	Biomass Road 8	288350.2	4117853.5	954.50	BRD248	Biomass Road 248	288424.3	4117675.2	954.25
BRD009	Biomass Road 9	288352.9	4117853.5	954.50	BRD249	Biomass Road 249	288427.0	4117675.2	954.00
BRD010	Biomass Road 10	288355.7	4117853.5	954.50	BRD250	Biomass Road 250	288429.8	4117675.2	954.00
BRD011	Biomass Road 11	288358.4	4117853.5	954.50	BRD251	Biomass Road 251	288432.5	4117675.2	954.00
BRD012	Biomass Road 12	288361.2	4117853.5	954.50	BRD252	Biomass Road 252	288435.3	4117675.2	954.00
BRD013	Biomass Road 13	288363.9	4117853.5	954.50	BRD253	Biomass Road 253	288438.0	4117675.2	954.00
BRD014	Biomass Road 14	288366.7	4117853.5	954.50	BRD254	Biomass Road 254	288440.8	4117675.2	954.00
BRD015	Biomass Road 15	288369.4	4117853.5	954.50	BRD255	Biomass Road 255	288443.5	4117675.2	954.00
BRD016	Biomass Road 16	288372.1	4117853.5	954.50	BRD256	Biomass Road 256	288446.2	4117675.2	954.00
BRD017	Biomass Road 17	288374.9	4117853.5	954.50	BRD257	Biomass Road 257	288449.0	4117675.2	954.00
BRD018	Biomass Road 18	288377.6	4117853.5	954.50	BRD258	Biomass Road 258	288451.7	4117675.2	954.00
BRD019	Biomass Road 19	288380.4	4117853.5	954.50	BRD259	Biomass Road 259	288454.5	4117675.2	954.00
BRD020	Biomass Road 20	288383.1	4117853.5	954.50	BRD260	Biomass Road 260	288457.2	4117675.2	954.00
BRD021	Biomass Road 21	288385.9	4117853.5	954.25	BRD261	Biomass Road 261	288460.0	4117675.2	954.00
BRD022	Biomass Road 22	288388.6	4117853.5	954.25	BRD262	Biomass Road 262	288462.7	4117675.2	954.00
BRD023	Biomass Road 23	288391.4	4117853.5	954.25	BRD263	Biomass Road 263	288465.4	4117675.2	954.00
BRD024	Biomass Road 24	288394.1	4117853.5	954.25	BRD264	Biomass Road 264	288468.2	4117675.2	954.00
BRD025	Biomass Road 25	288396.8	4117853.5	954.25	BRD265	Biomass Road 265	288470.9	4117675.2	954.00
BRD026	Biomass Road 26	288399.6	4117853.5	954.25	BRD266	Biomass Road 266	288473.7	4117675.2	954.00
BRD027	Biomass Road 27	288402.3	4117853.5	954.25	BRD267	Biomass Road 267	288476.4	4117675.2	954.00
BRD028	Biomass Road 28	288405.1	4117853.5	954.25	BRD268	Biomass Road 268	288479.2	4117675.2	953.75
BRD029	Biomass Road 29	288407.8	4117853.5	954.25	BRD269	Biomass Road 269	288481.9	4117675.2	953.75
BRD030	Biomass Road 30	288410.6	4117853.5	954.25	BRD270	Biomass Road 270	288484.7	4117675.2	953.75
BRD031	Biomass Road 31	288413.3	4117853.5	954.25	BRD271	Biomass Road 271	288487.4	4117675.2	953.75
BRD032	Biomass Road 32	288416.0	4117853.5	954.25	BRD272	Biomass Road 272	288490.1	4117675.2	953.75
BRD033	Biomass Road 33	288418.8	4117853.5	954.25	BRD273	Biomass Road 273	288492.9	4117675.2	953.75
BRD034	Biomass Road 34	288421.5	4117853.5	954.25	BRD274	Biomass Road 274	288495.6	4117675.2	953.75
BRD035	Biomass Road 35	288424.3	4117853.5	954.25	BRD275	Biomass Road 275	288498.4	4117675.2	953.75
BRD036	Biomass Road 36	288427.0	4117853.5	954.25	BRD276	Biomass Road 276	288501.1	4117675.2	953.75
BRD037	Biomass Road 37	288429.8	4117853.5	954.25	BRD277	Biomass Road 277	288503.9	4117675.2	953.75
BRD038	Biomass Road 38	288432.5	4117853.5	954.25	BRD278	Biomass Road 278	288506.6	4117675.2	953.75
BRD039	Biomass Road 39	288435.2	4117853.5	954.25	BRD279	Biomass Road 279	288509.3	4117675.2	953.75
BRD040	Biomass Road 40	288438.0	4117853.5	954.25	BRD280	Biomass Road 280	288512.1	4117675.2	953.75
BRD041	Biomass Road 41	288440.7	4117853.5	954.00	BRD281	Biomass Road 281	288514.8	4117675.2	953.75
BRD042	Biomass Road 42	288443.5	4117853.5	954.00	BRD282	Biomass Road 282	288517.6	4117675.2	953.75
BRD043	Biomass Road 43	288446.2	4117853.5	954.00	BRD283	Biomass Road 283	288520.3	4117675.2	953.75
BRD044	Biomass Road 44	288449.0	4117853.5	954.00	BRD284	Biomass Road 284	288523.1	4117675.2	953.75
BRD045	Biomass Road 45	288451.7	4117853.5	954.00	BRD285	Biomass Road 285	288525.8	4117675.2	953.75
BRD046	Biomass Road 46	288454.4	4117853.5	954.00	BRD286	Biomass Road 286	288528.5	4117675.2	953.75
BRD047	Biomass Road 47	288457.2	4117853.5	954.00	BRD287	Biomass Road 287	288531.3	4117675.2	953.50
BRD048	Biomass Road 48	288459.9	4117853.5	954.00	BRD288	Biomass Road 288	288534.0	4117675.2	953.50
BRD049	Biomass Road 49	288462.7	4117853.5	954.00	BRD289	Biomass Road 289	288536.8	4117675.2	953.50
BRD050	Biomass Road 50	288465.4	4117853.5	954.00	BRD290	Biomass Road 290	288539.5	4117675.2	953.50
BRD051	Biomass Road 51	288468.2	4117853.5	954.00	BRD291	Biomass Road 291	288542.3	4117675.2	953.50
BRD052	Biomass Road 52	288470.9	4117853.5	954.00	BRD292	Biomass Road 292	288545.0	4117675.2	953.50
BRD053	Biomass Road 53	288473.6	4117853.5	954.00	BRD293	Biomass Road 293	288547.7	4117675.2	953.50
BRD054	Biomass Road 54	288476.4	4117853.5	954.00	BRD294	Biomass Road 294	288550.5	4117675.2	953.50
BRD055	Biomass Road 55	288479.1	4117853.5	954.00	BRD295	Biomass Road 295	288553.2	4117675.2	953.50
BRD056	Biomass Road 56	288481.9	4117853.5	954.00	BRD296	Biomass Road 296	288556.0	4117675.2	953.50
BRD057	Biomass Road 57	288484.6	4117853.5	954.00	BRD297	Biomass Road 297	288558.7	4117675.2	953.50
BRD058	Biomass Road 58	288487.4	4117853.5	954.00	BRD298	Biomass Road 298	288561.5	4117675.2	953.50
BRD059	Biomass Road 59	288490.1	4117853.5	954.00	BRD299	Biomass Road 299	288564.2	4117675.2	953.50
BRD060	Biomass Road 60	288492.8	4117853.5	954.00	BRD300	Biomass Road 300	288566.9	4117675.2	953.50
BRD061	Biomass Road 61	288495.6	4117853.5	953.75	BRD301	Biomass Road 301	288569.7	4117675.2	953.50
BRD062	Biomass Road 62	288498.3	4117853.5	953.75	BRD302	Biomass Road 302	288572.4	4117675.2	953.50
BRD063	Biomass Road 63	288501.1	4117853.5	953.75	BRD303	Biomass Road 303	288575.2	4117675.2	953.50
BRD064	Biomass Road 64	288503.8	4117853.5	953.75	BRD304	Biomass Road 304	288577.9	4117675.2	953.50
BRD065	Biomass Road 65	288506.6	4117853.5	953.75	BRD305	Biomass Road 305	288580.7	4117675.2	953.50
BRD066	Biomass Road 66	288509.3	4117853.5	953.75	BRD306	Biomass Road 306	288583.4	4117675.2	953.50
BRD067	Biomass Road 67	288512.1	4117853.5	953.75	BRD307	Biomass Road 307	288586.1	4117675.2	953.50
BRD068	Biomass Road 68	288514.8	4117853.5	953.75	BRD308	Biomass Road 308	288588.9	4117675.2	953.50
BRD069	Biomass Road 69	288517.5	4117853.5	953.75	BRD309	Biomass Road 309	288591.6	4117675.2	953.50
BRD070	Biomass Road 70	288520.3	4117853.5	953.75	BRD310	Biomass Road 310	288594.4	4117675.2	953.50
BRD071	Biomass Road 71	288523.0	4117853.5	953.75	BRD311	Biomass Road 311	288597.1	4117675.2	953.50
BRD072	Biomass Road 72	288525.8	4117853.5	953.75	BRD312	Biomass Road 312	288599.9	4117675.2	953.50
BRD073	Biomass Road 73	288528.5	4117853.5	953.75	BRD313	Biomass Road 313	288602.6	4117675.2	953.50
BRD074	Biomass Road 74	288531.3	4117853.5	953.75	BRD314	Biomass Road 314	288605.4	4117675.2	953.50

Modeled Source Parameters

VOLUME SOURCE PARAMETERS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)
EP01050F	Biomass Laydown Roads				EP01050F	Biomass Laydown Roads			
BRD075	Biomass Road 75	288534.0	4117853.5	953.75	BRD315	Biomass Road 315	288608.1	4117675.2	953.50
BRD076	Biomass Road 76	288536.7	4117853.5	953.75	BRD316	Biomass Road 316	288610.8	4117675.2	953.50
BRD077	Biomass Road 77	288539.5	4117853.5	953.75	BRD317	Biomass Road 317	288613.6	4117675.2	953.50
BRD078	Biomass Road 78	288542.2	4117853.5	953.75	BRD318	Biomass Road 318	288616.3	4117675.2	953.50
BRD079	Biomass Road 79	288545.0	4117853.5	953.75	BRD319	Biomass Road 319	288619.1	4117675.2	953.50
BRD080	Biomass Road 80	288547.7	4117853.5	953.75	BRD320	Biomass Road 320	288621.8	4117675.2	953.50
BRD081	Biomass Road 81	288550.5	4117853.5	953.50	BRD321	Biomass Road 321	288624.6	4117675.2	953.50
BRD082	Biomass Road 82	288553.2	4117853.5	953.50	BRD322	Biomass Road 322	288627.3	4117675.2	953.50
BRD083	Biomass Road 83	288555.9	4117853.5	953.50	BRD323	Biomass Road 323	288630.0	4117675.2	953.25
BRD084	Biomass Road 84	288558.7	4117853.5	953.50	BRD324	Biomass Road 324	288632.8	4117675.2	953.25
BRD085	Biomass Road 85	288561.4	4117853.5	953.50	BRD325	Biomass Road 325	288635.5	4117675.2	953.25
BRD086	Biomass Road 86	288564.2	4117853.5	953.50	BRD326	Biomass Road 326	288638.3	4117675.2	953.25
BRD087	Biomass Road 87	288566.9	4117853.5	953.50	BRD327	Biomass Road 327	288641.0	4117675.2	953.25
BRD088	Biomass Road 88	288569.7	4117853.5	953.50	BRD328	Biomass Road 328	288643.8	4117675.2	953.25
BRD089	Biomass Road 89	288572.4	4117853.5	953.50	BRD329	Biomass Road 329	288646.5	4117675.2	953.25
BRD090	Biomass Road 90	288575.1	4117853.5	953.50	BRD330	Biomass Road 330	288649.2	4117675.2	953.25
BRD091	Biomass Road 91	288577.9	4117853.5	953.50	BRD331	Biomass Road 331	288652.0	4117675.2	953.25
BRD092	Biomass Road 92	288580.6	4117853.5	953.50	BRD332	Biomass Road 332	288331.0	4117786.3	954.50
BRD093	Biomass Road 93	288583.4	4117853.5	953.50	BRD333	Biomass Road 333	288333.7	4117786.3	954.50
BRD094	Biomass Road 94	288586.1	4117853.5	953.50	BRD334	Biomass Road 334	288336.5	4117786.3	954.50
BRD095	Biomass Road 95	288588.9	4117853.5	953.50	BRD335	Biomass Road 335	288339.2	4117786.3	954.50
BRD096	Biomass Road 96	288591.6	4117853.5	953.50	BRD336	Biomass Road 336	288342.0	4117786.3	954.50
BRD097	Biomass Road 97	288594.3	4117853.5	953.50	BRD337	Biomass Road 337	288344.7	4117786.3	954.50
BRD098	Biomass Road 98	288597.1	4117853.5	953.50	BRD338	Biomass Road 338	288347.5	4117786.3	954.50
BRD099	Biomass Road 99	288599.8	4117853.5	953.50	BRD339	Biomass Road 339	288350.2	4117786.3	954.50
BRD100	Biomass Road 100	288602.6	4117853.5	953.50	BRD340	Biomass Road 340	288352.9	4117786.3	954.50
BRD101	Biomass Road 101	288605.3	4117853.5	953.25	BRD341	Biomass Road 341	288355.7	4117786.3	954.50
BRD102	Biomass Road 102	288608.1	4117853.5	953.25	BRD342	Biomass Road 342	288358.4	4117786.3	954.50
BRD103	Biomass Road 103	288610.8	4117853.5	953.25	BRD343	Biomass Road 343	288361.2	4117786.3	954.50
BRD104	Biomass Road 104	288613.5	4117853.5	953.25	BRD344	Biomass Road 344	288363.9	4117786.3	954.50
BRD105	Biomass Road 105	288616.3	4117853.5	953.25	BRD345	Biomass Road 345	288366.7	4117786.3	954.50
BRD106	Biomass Road 106	288619.0	4117853.5	953.25	BRD346	Biomass Road 346	288369.4	4117786.3	954.50
BRD107	Biomass Road 107	288621.8	4117853.5	953.25	BRD347	Biomass Road 347	288372.1	4117786.3	954.50
BRD108	Biomass Road 108	288624.5	4117853.5	953.25	BRD348	Biomass Road 348	288374.9	4117786.3	954.50
BRD109	Biomass Road 109	288627.3	4117853.5	953.25	BRD349	Biomass Road 349	288377.6	4117786.3	954.50
BRD110	Biomass Road 110	288630.0	4117853.5	953.25	BRD350	Biomass Road 350	288380.4	4117786.3	954.50
BRD111	Biomass Road 111	288632.8	4117853.5	953.25	BRD351	Biomass Road 351	288383.1	4117786.3	954.50
BRD112	Biomass Road 112	288635.5	4117853.5	953.25	BRD352	Biomass Road 352	288385.9	4117786.3	954.50
BRD113	Biomass Road 113	288638.2	4117853.5	953.25	BRD353	Biomass Road 353	288388.6	4117786.3	954.50
BRD114	Biomass Road 114	288641.0	4117853.5	953.25	BRD354	Biomass Road 354	288391.4	4117786.3	954.50
BRD115	Biomass Road 115	288643.7	4117853.5	953.25	BRD355	Biomass Road 355	288394.1	4117786.3	954.50
BRD116	Biomass Road 116	288646.5	4117853.5	953.25	BRD356	Biomass Road 356	288396.8	4117786.3	954.50
BRD117	Biomass Road 117	288649.2	4117853.5	953.25	BRD357	Biomass Road 357	288399.6	4117786.3	954.50
BRD118	Biomass Road 118	288652.0	4117853.5	953.25	BRD358	Biomass Road 358	288402.3	4117786.3	954.50
BRD119	Biomass Road 119	288652.0	4117850.8	953.25	BRD359	Biomass Road 359	288405.1	4117786.3	954.50
BRD120	Biomass Road 120	288652.0	4117848.0	953.25	BRD360	Biomass Road 360	288407.8	4117786.3	954.50
BRD121	Biomass Road 121	288652.0	4117845.3	953.25	BRD361	Biomass Road 361	288410.6	4117786.3	954.50
BRD122	Biomass Road 122	288652.0	4117842.5	953.25	BRD362	Biomass Road 362	288413.3	4117786.3	954.25
BRD123	Biomass Road 123	288652.0	4117839.8	953.25	BRD363	Biomass Road 363	288416.0	4117786.3	954.25
BRD124	Biomass Road 124	288652.0	4117837.0	953.25	BRD364	Biomass Road 364	288418.8	4117786.3	954.25
BRD125	Biomass Road 125	288652.0	4117834.3	953.25	BRD365	Biomass Road 365	288421.5	4117786.3	954.25
BRD126	Biomass Road 126	288652.0	4117831.6	953.25	BRD366	Biomass Road 366	288424.3	4117786.3	954.25
BRD127	Biomass Road 127	288652.0	4117828.8	953.25	BRD367	Biomass Road 367	288429.8	4117786.3	954.25
BRD128	Biomass Road 128	288652.0	4117826.1	953.25	BRD368	Biomass Road 368	288432.5	4117786.3	954.25
BRD129	Biomass Road 129	288652.0	4117823.3	953.25	BRD369	Biomass Road 369	288435.2	4117786.3	954.25
BRD130	Biomass Road 130	288652.0	4117820.6	953.25	BRD370	Biomass Road 370	288438.0	4117786.3	954.25
BRD131	Biomass Road 131	288652.0	4117817.8	953.25	BRD371	Biomass Road 371	288440.7	4117786.3	954.25
BRD132	Biomass Road 132	288652.0	4117815.1	953.25	BRD372	Biomass Road 372	288443.5	4117786.3	954.25
BRD133	Biomass Road 133	288652.0	4117812.4	953.25	BRD373	Biomass Road 373	288446.2	4117786.3	954.00
BRD134	Biomass Road 134	288652.0	4117809.6	953.25	BRD374	Biomass Road 374	288449.0	4117786.3	954.00
BRD135	Biomass Road 135	288652.0	4117806.9	953.25	BRD375	Biomass Road 375	288451.7	4117786.3	954.00
BRD136	Biomass Road 136	288652.0	4117804.1	953.25	BRD376	Biomass Road 376	288454.4	4117786.3	954.00
BRD137	Biomass Road 137	288652.0	4117801.4	953.25	BRD377	Biomass Road 377	288457.2	4117786.3	954.00
BRD138	Biomass Road 138	288652.0	4117798.6	953.25	BRD378	Biomass Road 378	288459.9	4117786.3	954.00
BRD139	Biomass Road 139	288652.0	4117795.9	953.25	BRD379	Biomass Road 379	288462.7	4117786.3	954.00
BRD140	Biomass Road 140	288652.0	4117793.1	953.25	BRD380	Biomass Road 380	288465.4	4117786.3	954.00
BRD141	Biomass Road 141	288652.0	4117790.4	953.25	BRD381	Biomass Road 381	288468.2	4117786.3	954.00
BRD142	Biomass Road 142	288652.0	4117787.7	953.25	BRD382	Biomass Road 382	288470.9	4117786.3	954.00
BRD143	Biomass Road 143	288652.0	4117784.9	953.25	BRD383	Biomass Road 383	288473.6	4117786.3	954.00
BRD144	Biomass Road 144	288652.0	4117782.2	953.25	BRD384	Biomass Road 384	288476.4	4117786.3	954.00
BRD145	Biomass Road 145	288652.0	4117779.4	953.25	BRD385	Biomass Road 385	288479.1	4117786.3	954.00
BRD146	Biomass Road 146	288652.0	4117776.7	953.25	BRD386	Biomass Road 386	288481.9	4117786.3	954.00
BRD147	Biomass Road 147	288652.0	4117773.9	953.25	BRD387	Biomass Road 387	288484.6	4117786.3	954.00
BRD148	Biomass Road 148	288652.0	4117771.2	953.25	BRD388	Biomass Road 388	288487.4	4117786.3	954.00

Modeled Source Parameters

VOLUME SOURCE PARAMETERS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)
EP01050F	Biomass Laydown Roads				EP01050F	Biomass Laydown Roads			
BRD149	Biomass Road 149	288652.0	4117768.5	953.25	BRD389	Biomass Road 389	288490.1	4117786.3	954.00
BRD150	Biomass Road 150	288652.0	4117765.7	953.25	BRD390	Biomass Road 390	288492.8	4117786.3	954.00
BRD151	Biomass Road 151	288652.0	4117763.0	953.25	BRD391	Biomass Road 391	288495.6	4117786.3	954.00
BRD152	Biomass Road 152	288652.0	4117760.2	953.25	BRD392	Biomass Road 392	288498.3	4117786.3	954.00
BRD153	Biomass Road 153	288652.0	4117757.5	953.25	BRD393	Biomass Road 393	288501.1	4117786.3	954.00
BRD154	Biomass Road 154	288652.0	4117754.7	953.25	BRD394	Biomass Road 394	288503.8	4117786.3	954.00
BRD155	Biomass Road 155	288652.0	4117752.0	953.25	BRD395	Biomass Road 395	288506.6	4117786.3	953.75
BRD156	Biomass Road 156	288652.0	4117749.3	953.25	BRD396	Biomass Road 396	288509.3	4117786.3	953.75
BRD157	Biomass Road 157	288652.0	4117746.5	953.25	BRD397	Biomass Road 397	288512.1	4117786.3	953.75
BRD158	Biomass Road 158	288652.0	4117743.8	953.25	BRD398	Biomass Road 398	288514.8	4117786.3	953.75
BRD159	Biomass Road 159	288652.0	4117741.0	953.25	BRD399	Biomass Road 399	288517.5	4117786.3	953.75
BRD160	Biomass Road 160	288652.0	4117738.3	953.25	BRD400	Biomass Road 400	288520.3	4117786.3	953.75
BRD161	Biomass Road 161	288652.0	4117735.5	953.25	BRD401	Biomass Road 401	288523.0	4117786.3	953.75
BRD162	Biomass Road 162	288652.0	4117732.8	953.25	BRD402	Biomass Road 402	288525.8	4117786.3	953.75
BRD163	Biomass Road 163	288652.0	4117730.1	953.25	BRD403	Biomass Road 403	288528.5	4117786.3	953.75
BRD164	Biomass Road 164	288652.0	4117727.3	953.25	BRD404	Biomass Road 404	288531.3	4117786.3	953.75
BRD165	Biomass Road 165	288652.0	4117724.6	953.25	BRD405	Biomass Road 405	288534.0	4117786.3	953.75
BRD166	Biomass Road 166	288652.0	4117721.8	953.25	BRD406	Biomass Road 406	288536.7	4117786.3	953.75
BRD167	Biomass Road 167	288652.0	4117719.1	953.25	BRD407	Biomass Road 407	288539.5	4117786.3	953.75
BRD168	Biomass Road 168	288652.0	4117716.3	953.25	BRD408	Biomass Road 408	288542.2	4117786.3	953.75
BRD169	Biomass Road 169	288652.0	4117713.6	953.25	BRD409	Biomass Road 409	288545.0	4117786.3	953.75
BRD170	Biomass Road 170	288652.0	4117710.9	953.25	BRD410	Biomass Road 410	288547.7	4117786.3	953.75
BRD171	Biomass Road 171	288652.0	4117708.1	953.25	BRD411	Biomass Road 411	288550.5	4117786.3	953.75
BRD172	Biomass Road 172	288652.0	4117705.4	953.25	BRD412	Biomass Road 412	288553.2	4117786.3	953.75
BRD173	Biomass Road 173	288652.0	4117702.6	953.25	BRD413	Biomass Road 413	288555.9	4117786.3	953.75
BRD174	Biomass Road 174	288652.0	4117699.9	953.25	BRD414	Biomass Road 414	288558.7	4117786.3	953.75
BRD175	Biomass Road 175	288652.0	4117697.1	953.25	BRD415	Biomass Road 415	288561.4	4117786.3	953.75
BRD176	Biomass Road 176	288652.0	4117694.4	953.25	BRD416	Biomass Road 416	288564.2	4117786.3	953.75
BRD177	Biomass Road 177	288652.0	4117691.7	953.25	BRD417	Biomass Road 417	288566.9	4117786.3	953.75
BRD178	Biomass Road 178	288652.0	4117688.9	953.25	BRD418	Biomass Road 418	288569.7	4117786.3	953.50
BRD179	Biomass Road 179	288652.0	4117686.2	953.25	BRD419	Biomass Road 419	288572.4	4117786.3	953.50
BRD180	Biomass Road 180	288652.0	4117683.4	953.25	BRD420	Biomass Road 420	288575.1	4117786.3	953.50
BRD181	Biomass Road 181	288652.0	4117680.7	953.25	BRD421	Biomass Road 421	288577.9	4117786.3	953.50
BRD182	Biomass Road 182	288652.0	4117677.9	953.25	BRD422	Biomass Road 422	288580.6	4117786.3	953.50
BRD183	Biomass Road 183	288652.0	4117675.2	953.25	BRD423	Biomass Road 423	288583.4	4117786.3	953.50
BRD184	Biomass Road 184	288424.3	4117850.8	954.25	BRD424	Biomass Road 424	288586.1	4117786.3	953.50
BRD185	Biomass Road 185	288424.3	4117848.0	953.25	BRD425	Biomass Road 425	288588.9	4117786.3	953.50
BRD186	Biomass Road 186	288424.3	4117845.3	953.25	BRD426	Biomass Road 426	288591.6	4117786.3	953.50
BRD187	Biomass Road 187	288424.3	4117842.5	953.25	BRD427	Biomass Road 427	288594.3	4117786.3	953.50
BRD188	Biomass Road 188	288424.3	4117839.8	953.25	BRD428	Biomass Road 428	288597.1	4117786.3	953.50
BRD189	Biomass Road 189	288424.3	4117837.0	953.25	BRD429	Biomass Road 429	288599.8	4117786.3	953.5
BRD190	Biomass Road 190	288424.3	4117834.3	953.25	BRD430	Biomass Road 430	288602.6	4117786.3	953.5
BRD191	Biomass Road 191	288424.3	4117831.6	953.25	BRD431	Biomass Road 431	288605.3	4117786.3	953.5
BRD192	Biomass Road 192	288424.3	4117828.8	953.25	BRD432	Biomass Road 432	288608.1	4117786.3	953.5
BRD193	Biomass Road 193	288424.3	4117826.1	953.25	BRD433	Biomass Road 433	288610.8	4117786.3	953.5
BRD194	Biomass Road 194	288424.3	4117823.3	953.25	BRD434	Biomass Road 434	288613.5	4117786.3	953.5
BRD195	Biomass Road 195	288424.3	4117820.6	953.25	BRD435	Biomass Road 435	288616.3	4117786.3	953.5
BRD196	Biomass Road 196	288424.3	4117817.8	953.25	BRD436	Biomass Road 436	288619.0	4117786.3	953.5
BRD197	Biomass Road 197	288424.3	4117815.1	953.25	BRD437	Biomass Road 437	288621.8	4117786.3	953.5
BRD198	Biomass Road 198	288424.3	4117812.4	953.25	BRD438	Biomass Road 438	288624.5	4117786.3	953.5
BRD199	Biomass Road 199	288424.3	4117809.6	953.25	BRD439	Biomass Road 439	288627.3	4117786.3	953.5
BRD200	Biomass Road 200	288424.3	4117806.9	953.25	BRD440	Biomass Road 440	288630.0	4117786.3	953.5
BRD201	Biomass Road 201	288424.3	4117804.1	953.25	BRD441	Biomass Road 441	288632.8	4117786.3	953.5
BRD202	Biomass Road 202	288424.3	4117801.4	953.25	BRD442	Biomass Road 442	288635.5	4117786.3	953.5
BRD203	Biomass Road 203	288424.3	4117798.6	954.25	BRD443	Biomass Road 443	288638.2	4117786.3	953.5
BRD204	Biomass Road 204	288424.3	4117795.9	954.25	BRD444	Biomass Road 444	288641.0	4117786.3	953.5
BRD205	Biomass Road 205	288424.3	4117793.1	954.3	BRD445	Biomass Road 445	288643.7	4117786.3	953.5
BRD206	Biomass Road 206	288424.3	4117790.4	954.3	BRD446	Biomass Road 446	288646.5	4117786.3	953.5
BRD207	Biomass Road 207	288424.3	4117787.7	954.3	BRD447	Biomass Road 447	288649.2	4117786.3	953.5
BRD208	Biomass Road 208	288424.3	4117784.9	954.3	BRD448	Biomass Road 448	288226.5	4117825	955.50
BRD209	Biomass Road 209	288424.3	4117782.2	954.3	BRD449	Biomass Road 449	288229.2	4117825	955.50
BRD210	Biomass Road 210	288424.3	4117779.4	954.3	BRD450	Biomass Road 450	288232.0	4117825	955.50
BRD211	Biomass Road 211	288424.3	4117776.7	954.3	BRD451	Biomass Road 451	288234.7	4117825	955.50
BRD212	Biomass Road 212	288424.3	4117773.9	954.3	BRD452	Biomass Road 452	288237.5	4117825	955.50
BRD213	Biomass Road 213	288424.3	4117771.2	954.3	BRD453	Biomass Road 453	288240.2	4117825	955.50
BRD214	Biomass Road 214	288424.3	4117768.5	954.3	BRD454	Biomass Road 454	288243.0	4117825	955.50
BRD215	Biomass Road 215	288424.3	4117765.7	954.3	BRD455	Biomass Road 455	288245.7	4117825	955.50
BRD216	Biomass Road 216	288424.3	4117763.0	954.3	BRD456	Biomass Road 456	288248.4	4117825	955.50
BRD217	Biomass Road 217	288424.3	4117760.2	954.3	BRD457	Biomass Road 457	288251.2	4117825	955.50
BRD218	Biomass Road 218	288424.3	4117757.5	954.3	BRD458	Biomass Road 458	288253.9	4117825	955.50
BRD219	Biomass Road 219	288424.3	4117754.7	954.3	BRD459	Biomass Road 459	288256.7	4117825	955.25
BRD220	Biomass Road 220	288424.3	4117752.0	954.3	BRD460	Biomass Road 460	288259.4	4117825	955.25
BRD221	Biomass Road 221	288424.3	4117749.3	954.3	BRD461	Biomass Road 461	288262.2	4117825	955.25
BRD222	Biomass Road 222	288424.3	4117746.5	954.3	BRD462	Biomass Road 462	288264.9	4117825	955.25

Modeled Source Parameters

VOLUME SOURCE PARAMETERS									
Source ID	**Source Description**	**UTM Easting (m)**	**UTM Northing (m)**	**Elevation (m)**	**Source ID**	**Source Description**	**UTM Easting (m)**	**UTM Northing (m)**	**Elevation (m)**
EP01050F	Biomass Laydown Roads				EP01050F	Biomass Laydown Roads			
BRD223	Biomass Road 223	288424.3	4117743.8	954.3	BRD463	Biomass Road 463	288267.6	4117825	955.25
BRD224	Biomass Road 224	288424.3	4117741.0	954.3	BRD464	Biomass Road 464	288270.4	4117825	955.25
BRD225	Biomass Road 225	288424.3	4117738.3	954.3	BRD465	Biomass Road 465	288273.1	4117825	955.25
BRD226	Biomass Road 226	288424.3	4117735.5	954.3	BRD466	Biomass Road 466	288275.9	4117825	955.25
BRD227	Biomass Road 227	288424.3	4117732.8	954.3	BRD467	Biomass Road 467	288278.6	4117825	955.25
BRD228	Biomass Road 228	288424.3	4117730.1	954.3	BRD468	Biomass Road 468	288281.4	4117825	955.25
BRD229	Biomass Road 229	288424.3	4117727.3	954.3	BRD469	Biomass Road 469	288284.1	4117825	955.25
BRD230	Biomass Road 230	288424.3	4117724.6	954.3	BRD470	Biomass Road 470	288286.9	4117825	955.00
BRD231	Biomass Road 231	288424.3	4117721.8	954.3	BRD471	Biomass Road 471	288289.6	4117825	955.00
BRD232	Biomass Road 232	288424.3	4117719.1	954.3	BRD472	Biomass Road 472	288292.3	4117825	955.00
BRD233	Biomass Road 233	288424.3	4117716.3	954.3	BRD473	Biomass Road 473	288295.1	4117825	955.00
BRD234	Biomass Road 234	288424.3	4117713.6	954.3	BRD474	Biomass Road 474	288297.8	4117825	955.00
BRD235	Biomass Road 235	288424.3	4117710.9	954.3	BRD475	Biomass Road 475	288300.6	4117825	955.00
BRD236	Biomass Road 236	288424.3	4117708.1	954.3	BRD476	Biomass Road 476	288303.3	4117825	955.00
BRD237	Biomass Road 237	288424.3	4117705.4	954.3	BRD477	Biomass Road 477	288306.1	4117825	955.00
BRD238	Biomass Road 238	288424.3	4117702.6	954.3	BRD478	Biomass Road 478	288308.8	4117825	955.00
BRD239	Biomass Road 239	288424.3	4117699.9	954.3	BRD479	Biomass Road 479	288311.5	4117825	955.00
BRD240	Biomass Road 240	288424.3	4117697.1	954.25	BRD480	Biomass Road 480	288314.3	4117825	955.00

Modeled Source Emissions

VOLUME SOURCE PM_{10} EMISSIONS

Source ID	Source Description	24-Hour Averaging Period: PM_{10} 24-Hour Emission Rate (lb/day)	24-Hour Averaging Period: PM_{10} Modeled 24-Hour Emission Rate (g/s)	Annual Averaging Period: PM_{10} Annual Emission Rate (tons/yr)	Annual Averaging Period: PM_{10} Modeled Annual Emission Rate (g/s)
EP11110F	Crops Grinding and Handling	0.815	4.28E-03	0.0745	2.14E-03

VOLUME & AREA SOURCE (HAUL ROADS) PM_{10} EMISSIONS

Source ID	Source Description	Number of Sources	24-Hour Averaging Period: PM_{10} 24-Hour Emission Rate (lb/day)	24-Hour Averaging Period: PM_{10} Modeled 24-Hour Emission Rate (g/s)	Annual Averaging Period: PM_{10} Annual Emission Rate (tons/yr)	Annual Averaging Period: PM_{10} Modeled Annual Emission Rate (g/s)	Notes:
EP01000F	Paved Plant Roads	292	9.55	See Distribution Calculations	1.50	See Distribution Calculations	Note 1
PHR003 through PHR294		Emission rates for paved haul roads calculated based on the percentage of truck traffic per area. Please see the Paved Haul Roads Emissions Distribution Calculations.					
EP01050F	Unpaved Biomass Roads	480	4.11	See Distribution Calculations	0.73	See Distribution Calculations	Note 2
BRD001 through BRD447		Emission rates for biomass laydown roads calculated based on the percentage of truck traffic per area (storage field and staging area). Please see the Biomass Haul Roads Emissions Distribution Calculations.					

(1) The daily haul road traffic is based on the "typical scenario" for shipping and receiving, which assumes that all shipping and receiving will occur 6:00 AM to 6:00 PM only, or 12 hours per day. 24-hour PM_{10} emissions from haul roads were also modeled based on "alternate scenarios", which assumes various traffic configurations to ensure the modeling analysis has captured the highest impacts. Annual emissions were modeled consistent with the short term PM_{10} analysis.
(2) 24-hour PM_{10} emissions from biomass storage area roads and the biomass staging area were modeled based on the areas being active constantly.

POINT SOURCE PM_{10} EMISSIONS

Source ID	Source Description	24-Hour Averaging Period: PM_{10} 24-Hour Emission Rate (lb/day)	24-Hour Averaging Period: PM_{10} Modeled 24-Hour Emission Rate (g/s)	Annual Averaging Period: PM_{10} Annual Emission Rate (tons/yr)	Annual Averaging Period: PM_{10} Modeled Annual Emission Rate (g/s)	Notes:
ENZYMATIC HYDROLYSIS PLANT						--
EP11120	Floor Sweep System DC	6.42	3.37E-02	1.17	3.37E-02	--
EP11110	Bale Grinder DC	118.41	6.22E-01	21.61	6.22E-01	--
EP11170	Classifier Cyclone # 1 DC	17.77	9.33E-02	3.24	9.33E-02	--
EP11270	Classifier Cyclone # 2 DC	17.77	9.33E-02	3.24	9.33E-02	--
EP11711	Boiler Feed System DC	17.77	9.33E-02	3.24	9.33E-02	--
EP18185	EH Fermentation CO_2 Scrubber	2.40	1.26E-02	0.44	1.26E-02	--
UTILITIES						--
EP02710	Bulk Fly Ash Load-Out Silo	23.12	1.21E-01	4.22	1.21E-01	--
EP02711	Bulk Fly Ash Load-Out Silo Spout	23.12	1.21E-01	4.22	1.21E-01	--
EP04001	Cooling Water Tower	2.85	1.50E-02	0.52	1.50E-02	--
EP04001A	Cell 1	0.95	4.99E-03	0.17	4.99E-03	Note 1
EP04001B	Cell 2	0.95	4.99E-03	0.17	4.99E-03	
EP04001C	Cell 3	0.95	4.99E-03	0.17	4.99E-03	
EP20512	Lime Handling DC #1	1.65	8.64E-03	0.30	8.64E-03	--
EP20514	Boiler Bottoms Ash Handling DC #1	23.12	1.21E-01	4.22	1.21E-01	--
EP20510	Boiler Fly Ash Handling DC #1	11.56	6.07E-02	2.11	6.07E-02	--
EP20520	Boiler Fly Ash Handling DC #2	11.56	6.07E-02	2.11	6.07E-02	--
EP09001	Flare FWP Engine Operating (Pilot Only)	0.02	9.58E-05	0.00	9.58E-05	--
EP09001	Flare No FWP Engine	0.02	9.58E-05	0.00	9.58E-05	
EP06000	Firewater Pump Engine	0.08	4.26E-04	0.00	1.17E-04	Note 2
EP20001	Biomass-Fired Boiler #1 30% Load (141 MMBtu)	101.67	5.34E-01	--	--	Note 3
	50% Load (236 MMBtu)	169.45	8.90E-01	--	--	
	75% Load (353 MMBtu)	254.17	1.33E+00	46.39	1.33E+00	
	100% Load (471 MMBtu)	338.89	1.78E+00	61.85	1.78E+00	
	120% Load (500 MMBtu)	359.82	1.89E+00	65.67	1.89E+00	

(1) Cooling tower emissions divided by the number of cells to obtain an emission rate per cell.
(2) Emergency equipment will operate a maximum of 1 hour per day for testing, no more than 100 hours per year, during normal facility operations. In the event of an emergency, operations at the facility will be shutdown at all of the major processes during the event, and an emergency event will not be modeled.
(3) Reduced load emissions were only evaluated for the maximum short-term emissions. Annual emissions were evaluated based on the normal operating loads (75%, 100% and 120% load).

Modeled Source Emissions

VOLUME SOURCE $PM_{2.5}$ EMISSIONS

Source ID	Source Description	24-Hour Averaging Period: $PM_{2.5}$ 24-Hour Emission Rate (lb/day)	24-Hour Averaging Period: $PM_{2.5}$ Modeled 24-Hour Emission Rate (g/s)	Annual Averaging Period: $PM_{2.5}$ Annual Emission Rate (tons/yr)	Annual Averaging Period: $PM_{2.5}$ Modeled Annual Emission Rate (g/s)
EP11110F	Crops Grinding and Handling	0.123	6.48E-04	0.0113	3.25E-04

VOLUME & AREA SOURCE (HAUL ROAD) $PM_{2.5}$EMISSIONS

Source ID	Source Description	Number of Sources	24-Hour Averaging Period: $PM_{2.5}$ 24-Hour Emission Rate (lb/day)	24-Hour Averaging Period: $PM_{2.5}$ Modeled 24-Hour Emission Rate (g/s)	Annual Averaging Period: $PM_{2.5}$ Annual Emission Rate (tons/yr)	Annual Averaging Period: $PM_{2.5}$ Modeled Annual Emission Rate (g/s)	Notes:
EP01000F	Paved Plant Roads	292	2.34	See Distribution Calculations	0.37	See Distribution Calculations	Note 1
PHR003 through PHR294		Emission rates for paved haul roads calculated based on the percentage of truck traffic per area. Please see the Paved Haul Roads Emissions Distribution Calculations.					
EP01050F	Unpaved Biomass Roads	480	0.41	See Distribution Calculations	0.07	See Distribution Calculations	Note 2
BRD001 through BRD447		Emission rates for biomass laydown roads calculated based on the percentage of truck traffic per area (storage field and staging area). Please see the Biomass Haul Roads Emissions Distribution Calculations.					

(1) The daily haul road traffic is based on the "typical scenario" for shipping and receiving, which assumes that all shipping and receiving will occur 6:00 AM to 6:00 PM only, or 12 hours per day. 24-hour $PM_{2.5}$ emissions from haul roads were also modeled based on "alternate scenarios", which assumes various traffic configurations to ensure the modeling analysis has captured the highest impacts. Annual emissions were modeled consistent with the short term $PM_{2.5}$ analysis.

(2) 24-hour PM_{10} emissions from biomass storage area roads and the biomass staging area were modeled based on the areas being active constantly.

POINT SOURCE $PM_{2.5}$ EMISSIONS

Source ID	Source Description	24-Hour Averaging Period: $PM_{2.5}$ 24-Hour Emission Rate (lb/day)	24-Hour Averaging Period: $PM_{2.5}$ Modeled 24-Hour Emission Rate (g/s)	Annual Averaging Period: $PM_{2.5}$ Annual Emission Rate (tons/yr)	Annual Averaging Period: $PM_{2.5}$ Modeled Annual Emission Rate (g/s)	Notes:
ENZYMATIC HYDROLYSIS PLANT						
EP11120	Floor Sweep System DC	1.09	5.73E-03	0.20	5.73E-03	--
EP11110	Bale Grinder DC	20.13	1.06E-01	3.67	1.06E-01	--
EP11170	Classifier Cyclone # 1 DC	3.02	1.59E-02	0.55	1.59E-02	--
EP11270	Classifier Cyclone # 2 DC	3.02	1.59E-02	0.55	1.59E-02	--
EP11711	Boiler Feed System DC	3.02	1.59E-02	0.55	1.59E-02	--
EP18185	EH Fermentation CO_2 Scrubber	2.40	1.26E-02	0.44	1.26E-02	--
UTILITIES						
EP02710	Bulk Fly Ash Load-Out Silo	11.56	6.07E-02	2.11	6.07E-02	--
EP02711	Bulk Fly Ash Load-Out Silo Spout	11.56	6.07E-02	2.11	6.07E-02	--
EP04001	Cooling Water Tower	1.71	8.98E-03	0.31	8.98E-03	--
EP04001A	Cell 1	0.57	2.99E-03	0.10	2.99E-03	Note 1
EP04001B	Cell 2	0.57	2.99E-03	0.10	2.99E-03	
EP04001C	Cell 3	0.57	2.99E-03	0.10	2.99E-03	
EP20512	Lime Handling DC #1	0.82	4.32E-03	0.15	4.32E-03	--
EP20514	Boiler Bottoms Ash Handling DC #1	11.56	6.07E-02	2.11	6.07E-02	--
EP20510	Boiler Fly Ash Handling DC #1	5.78	3.03E-02	1.05	3.03E-02	--
EP20520	Boiler Fly Ash Handling DC #2	5.78	3.03E-02	1.05	3.03E-02	--
EP06001	Firewater Pump Engine	0.08	4.26E-04	0.00	1.17E-04	Note 2
EP09001	Flare FWP Engine Operating (Pilot Only)	0.02	9.58E-05	0.00	9.58E-05	--
EP09001	Flare No FWP Engine	0.02	9.58E-05	0.00	9.58E-05	
EP20001	Biomass-Fired Boiler #1 30% Load (141 MMBtu)	95.51	5.014E-01	--	--	Note 3
	50% Load (236 MMBtu)	159.18	8.357E-01	--	--	
	75% Load (353 MMBtu)	238.76	1.254E+00	43.57	1.25E+00	
	100% Load (471 MMBtu)	318.35	1.671E+00	58.10	1.67E+00	
	120% Load (500 MMBtu)	338.01	1.775E+00	61.69	1.77E+00	

(1) Cooling tower emissions divided by the number of cells to obtain an emission rate per cell.

(2) Emergency equipment will operate a maximum of 1 hour per day for testing, no more than 100 hours per year, during normal facility operations. In the event of an emergency, operations at the facility will be shutdown at all of the major processes during the event, and an emergency event will not be modeled.

(3) Reduced load emissions were only evaluated for the maximum short-term emissions. Annual emissions were evaluated based on the normal operating loads (75%, 100% and 120% load).

Modeled Source Emissions

POINT SOURCE NOx EMISSIONS

Source ID	Source Description	Tier 1 NOx Hourly Emission Rate (lb/hr)	1-Hour Averaging Period: Tier 1 NOx Modeled 1-Hour Emission Rate (g/s)	1-Hour Averaging Period: NO_2/NOx Ratio	1-Month Averaging Period: Tier 1 NOx Modeled 1-Month Emission Rate (g/s)	Annual Averaging Period: Tier 1 NO_x Annual Emission Rate (tons/yr)	Annual Averaging Period: Tier 1 NO_2 Modeled Annual Emission Rate (g/s)
EP18185	EH Fermentation CO_2 Scrubber	0.067	8.39E-03	0.50	8.39E-03	0.29	8.39E-03
EP09001	Flare FWP Engine Operating (Pilot Only)	0.010	1.26E-03	0.50	1.26E-03	0.04	1.26E-03
EP09001	Flare No FWP Engine	3.48	4.39E-01	0.50	4.39E-01	6.92	1.99E-01
EP06001	Firewater Pump Engine (1) Normal	2.61	3.28E-01	0.34	2.19E-02	0.13	3.75E-03
EP20001	Biomass-Fired Boiler #1 30% Load (141 MMBtu)	107.39	1.35E+01	0.05	1.35E+01	--	--
	50% Load (236 MMBtu)	98.44	1.24E+01	0.05	1.24E+01	--	--
	75% Load (353 MMBtu)	147.66	1.86E+01	0.05	1.86E+01	646.74	1.86E+01
	100% Load (471 MMBtu)	196.88	2.48E+01	0.05	2.48E+01	862.33	2.48E+01
	120% Load (500 MMBtu)	207.56	2.62E+01	0.05	2.62E+01	909.10	2.62E+01

(1) Emergency equipment will operate a maximum of 1 hour per day for testing, no more than 100 hours per year, during normal facility operations. In the event of an emergency, operations at the facility will be shutdown at all of the major processes during the event, and an emergency event will not be modeled.

(2) For the 1-month NOx average, the NOx significance run file was reran for the 2006 to 2010 period and the worst month was identified. The 1-month NOx emission rate was based 1 hour per day times 4 weeks (4 total hours per month) and an average of 30 days per month, or 720 hours total averaging period hours..

(3) Reduced load emissions were only evaluated for the maximum short-term emissions. Annual emissions were evaluated based on the normal operating loads (75%, 100% and 120% load).

POINT SOURCE SO_2 EMISSIONS

Source ID	Source Description	SO_2 Hourly Emission Rate (lb/hr)	1-Hour Averaging Period: SO_2 Modeled 1-Hour Emission Rate (g/s)	3-Hour Averaging Period: SO_2 Modeled 3-Hour Emission Rate (g/s)	24-Hour Averaging Period: SO_2 Modeled 24-Hour Emission Rate (g/s)	Annual Averaging Period: SO_2 Annual Emission Rate (tons/yr)	Annual Averaging Period: SO_2 Modeled Annual Emission Rate (g/s)
EP09001	Flare FWP Engine Operating (Pilot Only)	0.00006	7.56E-06	7.56E-06	7.56E-06	2.63E-04	7.56E-06
EP09001	Flare No FWP Engine	9.31	1.173E+00	1.173E+00	1.173E+00	18.43	5.30E-01
EP06001	Firewater Pump Engine (1) Normal	0.94	1.19E-01	3.96E-02	4.95E-03	0.05	1.36E-03
EP20001	Biomass-Fired Boiler #1 30% Load (141 MMBtu)	29.99	3.78E+00	3.78E+00	3.78E+00	--	--
	50% Load (236 MMBtu)	49.99	6.30E+00	6.30E+00	6.30E+00	--	--
	75% Load (353 MMBtu)	74.99	9.45E+00	9.45E+00	9.45E+00	328.43	9.45E+00
	100% Load (471 MMBtu)	99.98	1.26E+01	1.26E+01	1.26E+01	437.91	1.26E+01
	120% Load (500 MMBtu)	106.16	1.34E+01	1.34E+01	1.34E+01	464.96	1.34E+01

(1) Emergency equipment will operate a maximum of 1 hour per day for testing, no more than 100 hours per year, during normal facility operations. In the event of an emergency, operations at the facility will be shutdown at all of the major processes during the event, and an emergency event will not be modeled.

(2) Reduced load emissions were only evaluated for the maximum short-term emissions. Annual emissions were evaluated based on the normal operating loads (75%, 100% and 120% load).

Modeled Source Emissions

POINT SOURCE CO EMISSIONS

Source ID	Source Description		CO Hourly Emission Rate (lb/hr)	1-Hour Averaging Period: CO Modeled 1-Hour Emission Rate (g/s)	8-Hour Averaging Period: CO Modeled 8-Hour Emission Rate (g/s)	1-Week Averaging Period: CO Modeled 1-Week Emission Rate (g/s)
EP09001	Flare	FWP Engine Operating (Pilot Only)	0.008	1.06E-03	1.06E-03	1.06E-03
EP09001	Flare	No FWP Engine	18.92	2.38E+00	2.38E+00	2.38E+00
EP06001	Firewater Pump Engine (1)	Normal	0.68	8.56E-02	1.07E-02	2.04E-03
EP20001	Biomass-Fired Boiler #1	30% Load (141 MMBtu)	31.09	3.92E+00	3.92E+00	3.92E+00
		50% Load (236 MMBtu)	51.81	6.53E+00	6.53E+00	6.53E+00
		75% Load (353 MMBtu)	77.72	9.79E+00	9.79E+00	9.79E+00
		100% Load (471 MMBtu)	103.62	1.31E+01	1.31E+01	1.31E+01
		120% Load (500 MMBtu)	110.04	1.39E+01	1.39E+01	1.39E+01

(1) Emergency equipment will operate a maximum of 1 hour per day for testing, no more than 100 hours per year, during normal facility operations. In the event of an emergency, operations at the facility will be shutdown at all of the major processes during the event, and an emergency event will not be modeled.

(2) For the 1-week CO average, the CO significance run file was reran for the 2006 to 2010 period and the worst month was identified. Impacts from the worst month were assumed equivalent to the 1-week averaging period. The 1-week CO emission rate was based on 168 hours.

Unpaved Biomass Haul Roads Emissions Distribution Calculations

Daily VMT Calculations:	Total Feet Per Trip	Daily VMT
Biomass Storage Field	2424	1.38
Biomass Staging Area	460	9.23
	Facility-wide	**10.61**

Biomass Laydown Emissions - PM_{10}	**4.11 lb/day**
Biomass Laydown Emissions - $PM_{2.5}$	**0.41 lb/day**

	Daily VMT Per Volume Group	
	Volume Group 1	**Volume Group 2**
Total Daily VMT Per Volume Group	1.38	9.23
Percentage of Facility-wide VMT	12.98%	87.02%
PM_{10} Emissions Per Volume Group (lb/day)	0.53	3.58
No. of Sources Per Volume Group	447	33
PM_{10} Emissions Per Volume Source (g/s)	**6.27E-06**	**5.70E-04**
$PM_{2.5}$ Emissions Per Volume Group (lb/day)	0.05	0.36
No. of Sources Per Volume Group	447	33
$PM_{2.5}$ Emissions Per Volume Source (g/s)	**6.27E-07**	**5.70E-05**

Annual VMT Calculations:	Total Feet Per Trip	Annual VMT
Biomass Storage Field	2424	414.10
Biomass Staging Area	460	3,356.61
	Facility-wide	**3,770.71**

Biomass Laydown Emissions - PM_{10}	**0.73 ton/yr**
Biomass Laydown Emissions - $PM_{2.5}$	**0.07 ton/yr**

	Group	
	Volume Group 1	**Volume Group 2**
Total Annual VMT Per Volume Group	414.10	3,356.61
Percentage of Facility-wide VMT	10.98%	89.02%
PM_{10} Emissions Per Volume Group (ton/yr)	0.08	0.65
No. of Sources Per Volume Group	447	33
PM_{10} Emissions Per Volume Source (g/s)	**5.17E-06**	**5.67E-04**
$PM_{2.5}$ Emissions Per Volume Group (ton/yr)	0.008	0.07
No. of Sources Per Volume Group	447	33
$PM_{2.5}$ Emissions Per Volume Source (g/s)	**5.17E-07**	**5.67E-05**

Note 1: Emissions per volume group based on the following equations:
Emissions per Volume Group (lb/day or ton/yr) = [Total Haul Road Emissions (lb/day or ton/yr)] x [Percentage of Facility-wide VMT]
Emissions per Volume Source (g/s) = [Emissions per Volume Group] x [unit conversion factors for lb/day or ton/yr to g/s] / [No. of Volume Sources]

Paved Haul Roads Emissions Distribution Calculations

Daily VMT Calculations:	Total Feet Per Trip	Daily VMT
Two Way Traffic (Entrance and Scale Lanes)	749	41.99
One Way Traffic (Main Loop - Biomass Delivery)**	1490	39.03
One Way Traffic (Secondary Loop - Ash Loadout)	1010	3.06
One Way Traffic (Center Interior Road - To Etoh/Chemical Load	250	0.85
One Way Traffic (Tertiary Loop - Ash/Etoh/Chemical Loadout)	1000	6.44
	Facility-wide	**91.37**

Paved Haul Road Emissions - PM_{10}	**9.55 lb/day**
Paved Haul Road Emissions - $PM_{2.5}$	**2.34 lb/day**

	Daily VMT Per Volume or Area Group				
	Volume and Area Group 1	**Volume Group 2**	**Volume Group 3**	**Volume Group 4**	**Volume Group 5**
Total Daily VMT Per Volume Group	42.0	39.0	3.1	0.9	6.4
Percentage of Facility-wide VMT	45.96%	42.72%	3.35%	0.93%	7.05%
PM_{10} Emissions Per Volume Group (lb/day)	4.39	4.08	0.32	0.09	0.67
No. of Sources Per Volume Group	9	34	112	28	109
PM_{10} Emissions Per Volume Source (g/s)	**5.12E-03**	**1.26E-03**	**3.00E-05**	**3.33E-05**	**6.48E-05**
PM_{10} Emissions Per Area Source (g/s/m^2)	**9.94E-06**	--	--	--	--
$PM_{2.5}$ Emissions Per Volume Group (lb/day)	1.08	1.00	0.08	0.02	0.17
No. of Sources Per Volume Group	9	34	112	28	109
$PM_{2.5}$ Emissions Per Volume Source (g/s)	**1.26E-03**	**3.09E-04**	**7.36E-06**	**8.17E-06**	**1.59E-05**
$PM_{2.5}$ Emissions Per Area Source (g/s/m^2)	**2.44E-06**	--	--	--	--

Annual VMT Calculations:	Total Feet Per Trip	Annual VMT
Two Way Traffic (Entrance and Scale Lanes)	749	13,576.19
One Way Traffic (Main Loop - Biomass Delivery)**	1490	12,904.94
One Way Traffic (Secondary Loop - Ash Loadout)	1010	515.71
One Way Traffic (Center Interior Road - To Etoh/Chemical Load	250	245.03
One Way Traffic (Tertiary Loop - Ash/Etoh/Chemical Loadout)	1000	1,490.72
	Facility-wide	**28,740.50**

Paved Haul Road Emissions - PM_{10}	**1.50 ton/yr**
Paved Haul Road Emissions - $PM_{2.5}$	**0.37 ton/yr**

	Annual VMT Per Volume or Area Group				
	Volume and Area Group 1	**Volume Group 2**	**Volume Group 3**	**Volume Group 4**	**Volume Group 5**
Total Annual VMT Per Volume Group	13,576.2	12,904.9	515.7	245.0	1,490.7
Percentage of Facility-wide VMT	47.24%	44.90%	1.79%	0.85%	5.19%
PM_{10} Emissions Per Volume Group (ton/yr)	0.71	0.67	0.03	0.01	0.08
No. of Sources Per Volume Group	9	34	112	28	109
PM_{10} Emissions Per Volume Source (g/s)	**4.53E-03**	**1.14E-03**	**1.38E-05**	**2.63E-05**	**4.11E-05**
PM_{10} Emissions Per Area Source (g/s/m^2)	**8.81E-06**	--	--	--	--
$PM_{2.5}$ Emissions Per Volume Group (ton/yr)	0.17	0.17	0.01	0.00	0.02
No. of Sources Per Volume Group	9	34	112	28	109
$PM_{2.5}$ Emissions Per Volume Source (g/s)	**1.11E-03**	**2.80E-04**	**3.40E-06**	**6.46E-06**	**1.01E-05**
$PM_{2.5}$ Emissions Per Area Source (g/s/m^2)	**2.16E-06**	--	--	--	--

Note 1: Emissions per volume group based on the following equations:
Emissions per Volume Group (lb/day or ton/yr) = [Total Haul Road Emissions (lb/day or ton/yr)] x [Percentage of Facility-wide VMT]
Emissions per Volume Source (g/s) = [Emissions per Volume Group] x [unit conversion factors for lb/day or ton/yr to g/s] / [No. of Volume Sources]
Note 2: Haul road length adjusted to avoid double counting of VMT. One Way Traffic (Main Loop - Biomass Delivery) includes travel miles from all onsite truck traffic.

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

Modeling Regulations Summary

Pollutant	Averaging Period	PSD Significant Emission Rates	Significant Impact Levels (SILs)	NAAQS Standards			Background Concentrations as Provided by KDHE	Notes
		(tons/yr)	($\mu g/m^3$)	($\mu g/m^3$)	(ppm)	Attained when…(40 CFR 50)	($\mu g/m^3$)	
PM_{10}	Annual	15	1	50	--	the 3-year average of the weighted annual mean PM_{10} concentrations at a single receptor does not exceed 50 $\mu g/m^3$	22	1, 2
	24-Hour		5	150	--	not to be exceeded more than once per year on average over 3 years	89	
$PM_{2.5}$	Annual	10	0.3	15	--	the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations at a single receptor does not exceed 15 $\mu g/m^3$	7	2, 3, 4
	24-Hour		1.2	35	--	the 3-year average of the 98th percentile of 24-hour concentrations at each receptor does not exceed 35 $\mu g/m^3$	17	
NO_2	Annual	40 (as NOx)	1	(100)	0.053	never exceeded	7.5	5
	1-Hour		7.53 (EPA) 10 (KDHE)	(188.7)	0.100	3-year average of the 98th percentile of the daily maximum 1-hour average at each receptor does not exceed 100 ppb	49	
SO_2	Annual	40	1	(80)	0.03	never exceeded	--	6
	24-Hour		5	(365)	0.14	not exceeded more than once per year	5.8	
	3-Hour		25	(1,300)	0.5	not exceeded more than once per year	6.8	
	1-Hour		7.86 (EPA) 10 (KDHE)	(196)	0.075	the 3-year average of the 99th percentile of the daily maximum 1-hour average at each receptor does not exceed 75 ppb	8.9	
CO	8-Hour	100	500	(10,000)	9	not exceeded more than once per year	--	--
	1-Hour		2000	(40,000)	35	not exceeded more than once per year	--	
Ozone	8-Hour	40 (as VOC)	NA	NA	--	--	NA	7
	1-Hour		NA	NA	--	--	NA	

Modeling Regulations Summary

Pollutant	Averaging Period	PSD Significant Emission Rates (tons/yr)	Significant Impact Levels (SILs) ($\mu g/m^3$)	PSD Class II Increment ($\mu g/m^3$)	PSD Class II Increment (ppm)	PSD Class II Increment Attained when…(40 CFR 52.21(c))	Notes
PM_{10}	Annual	15	1	17	--	never exceeded	1, 2
	24-Hour		5	30	--	not exceeded more than once per year	
$PM_{2.5}$	Annual	10	0.3	4	--	never exceeded	2, 3, 4
	24-Hour		1.2	9	--	not exceeded more than once per year	
NO_2	Annual	40 (as NOx)	1	25	--	never exceeded	5
	1-Hour		7.53 (EPA) 10 (KDHE)	None	--	--	
SO_2	Annual	40	1	20	--	never exceeded	6
	24-Hour		5	91	--	not exceeded more than once per year	
	3-Hour		25	512	--	not exceeded more than once per year	
	1-Hour		7.86 (EPA) 10 (KDHE)	None	--	--	
CO	8-Hour	100	500	None	--	--	--
	1-Hour		2000	None	--	--	
Ozone	8-Hour	40 (as VOC)	NA	None	--	--	7
	1-Hour		NA	None	--	--	

Modeling Regulations Summary

1. PM will not be modeled as PM_{10} is the regulated air pollutant indicator of PM emissions.

2. On July 18, 1997, EPA revised the NAAQS for particulate matter to add new annual and 24-hour standards for fine particles using $PM_{2.5}$ as the indicator. The 24-hour $PM_{2.5}$ standard was revised by EPA on September 21, 2006, reducing the standard from 65 $\mu g/m^3$ to 35 $\mu g/m^3$. EPA also retained the previous 1997 annual standard of 15 $\mu g/m^3$ while revoking the annual PM_{10} standard. On September 21, 2007 the EPA proposed a rule to establish PSD increments, SILs, and a Significant Monitoring Concentration (SMC) for $PM_{2.5}$. The U.S. EPA published the *Prevention of Significant Deterioration (PSD) for Particulate Matter Less Than 2.5 Micrometers ($PM_{2.5}$)—Increments, Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC)* final rule on October 20, 2010 (75 Federal Register 64864).

3. Significant impact levels (SILs) for $PM_{2.5}$ averaging periods based on the U.S. EPA final rule, *Prevention of Significant Deterioration (PSD) for Particulate Matter Less Than 2.5 Micrometers (PM2.5)—Increments, Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC),* published on October 20, 2010 (75 Federal Register 64864).

4. $PM_{2.5}$ PSD Class II Increment levels based on the the U.S. EPA final rule, Prevention of Significant Deterioration (PSD) for Particulate Matter Less Than 2.5 Micrometers (PM2.5)—Increments, Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC), published on October 20, 2010 (75 Federal Register 64864).

5. SIL for 1-hour NO_2 averaging period evaluated based on the EPA memorandum, *General Guidelines for Implementing the 1-Hour NO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1 Hour NO_2 Significant Impact Level* , published June 28, 2010; and the NESCAUM Guidance: *NESCAUM Recommendations on the Use of an Interim Significant Impact Level in Modeling the 1-Hour NO_2 NAAQS.*

Option 3 of the NESCAUM document details the calculation of the recommended interim 1-hour NO_2 SIL value. The value is based on the only criteria pollutant with an existing established SIL for carbon monoxide. The ratio calculation using the 1-hour CO SIL and the 1-hour CO NAAQS results in the following 1-hour NO_2 SIL:

(2000 ug/m^3 / 40,000 ug/m^3) x 188 ug/m^3 = 10 ug/m^3 (rounded up) This is consistent with the KDHE interim 1-hour NO_2 SIL.

6. SIL for 1-hour SO_2 averaging period evaluated based the EPA memorandum, *Guidance Concerning the Implementing the 1-Hour SO_2 NAAQS for the Prevention of Significant Deterioration Program* , published August 23, 2010; and on same methodology used to establish the 1-hour NO_2 SIL value recommended in the NESCAUM Guidance: *NESCAUM Recommendations on the Use of an Interim Significant Impact Level in Modeling the 1-Hour NO_2 NAAQS.*

Option 3 of the NESCAUM document details the calculation of the recommended interim 1-hour NO_2 SIL value. The value is based on the only criteria pollutant with an existing established SIL for carbon monoxide. The ratio calculation using the 1-hour CO SIL and the 1-hour CO NAAQS results in the following 1-hour SO_2 SIL:

(2000 ug/m^3 / 40,000 ug/m^3) x 188 ug/m^3 = 10 ug/m^3 (rounded up) This is consistent with the KDHE interim 1-hour SO_2 SIL.

7. There is currently no EPA approved methodology for evaluating the 8-hour ozone standard on a local scale, therefore no ambient air analysis for ozone will be performed. This determination is consistent with other nearby state agency modeling requirements, including Missouri Department of Natural Resources (MoDNR), Iowa Department of Natural Resources (IDNR) and Nebraska Department of Environmental Quality (NDEQ).

Facility: Abengoa Bioenergy
Project: 1890231

Flares Modeled as Modified Point Sources

(when emissions are, or can be approximated as, a single gas)

NOTES:
1) The effective stack height need not be used in the model as the conservative approach would be to ignore the increased stack height.
2) Enter all input values only in the yellow cells in one of the four columns. Values for model input are asterisked (**).

	known flow rate unknown molecular wgt		unknown flow rate[d] unknown molecular wgt		known flow rate known molecular wgt		unknown flow rate[d] known molecular wgt	
EP #			EP-09001				EP-09001	
Description			Flare				Flare - Pilot	
ambient temperature (°F)[a]	70		70		70		70	
ambient temperature (°K)	294		294		294		294	
stack temperature (°F)[b]		**	1832	**		**	1832	**
stack temperature (°K)			1273				1273	
volumetric flow rate (acfm)		**	193	**		**	193	**
volumetric flow rate (scfm)			45				45	
heating value (BTU/ft^3)							1020.00	
↑OR↓	↑OR↓		↑OR↓		↑OR↓		↑OR↓	
heat release rate (BTU/hr)			5.110E+07					
heat release rate (cal/sec)			3.577E+06				1.907E+05	
radiative heat loss (%)[c]			30					
net heat release rate (BTU/hr)			3.577E+07				2.155E+06	
net heat release rate (cal/sec)			2.504E+06				1.508E+05	
net heat release rate (J/sec)			1.048E+07				6.314E+05	
optional --> actual stack height (ft)			30.0				30.0	
effective stack height (ft)		**(opt.)	**47.1**	**(opt.)		**(opt.)	**34.5**	**(opt.)
actual stack diameter (ft)			0.25				0.25	
effective stack diameter (ft)		**	**5.13**	**		**	**1.26**	**
actual stack exit velocity (fps)			65.62				65.62	
actual stack exit velocity (m/sec)			20.00				20.00	
molecular weight							19	

** Values for model input
[a] Ambient temperature is set at the default value of 70°F
[b] Default stack temperature is 1273°K = 1832°F.
[c] Default value is 55% (SCREEN3). This is conservative.
[d] Flow rate set by the default exit velocity of 20 m/sec (SCREEN3).

1 BTU = 1055 Joule = 0.001055 MJ = 252 calories = 0.252 kcal

Typical Heating Values (also see table on "multigas" worksheet)

Gas	Operation	BTU/ft^3	
ethanol VOCs	ethanol plant	200 - 300[e]	
NH_3	nitrogen plant	359	
methane	landfill	450 - 550, 896[f]	
propane		2516, 2282[e]	
ethane		1594[e]	
biogas	lagoon	650	<--mostly methane

Radiation Heat Loss % from Literature

Gas	% Loss
natural gas	23
methane	16 - 26
propane	33
butane	30
ethylene	38
hydrogen	17
methane + LPG	30
gas, MW about 17	25
gas, MW about 40	40 (with steam)
gas, MW about 40	50 (without steam)

general equations: 32.1 - 0.0418v; v = exit vel, m/sec
[21exp(-0.00323v)] + 11; v = exit vel, m/sec

Molecular Weights[g]

Ammonia	17.0
Butane	58.1
Methane	16.0
Propane	44.1
Propylene	42.1
Ethane	30.1
Ethyl Alcohol (Ethanol)	46.1
Ethylene	28.1
Fluorine	38.0
Gasoline (approx.)	100 (approx.)
Hydrogen	2.0
Natural Gas	19.0
Carbon Monoxide	28.0
Hydrogen Sulfide	34.1

[e] Based on a permit limit to flare gas with minimum net heating value of 200 BTU/ft^3 (no assist), or 300 BTU/ft^3 (steam or air assist).
[f] Value from Fundamentals of Dispersion Modeling, Table 10-2 Trinity Consultants (2nd ed.)
[g] http://www.engineeringtoolbox.com/molecular-weight-gas-vapor-d_1156.htm

Appendix C

AERMOD Input/Output Files, Support Files and Readme File

readme.txt
Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

June 2011

Appendix C Read Me

C1. File Nomenclature

Each of the AERMOD input / output modeling files contained on the enclosed DVDs have been named using the following methodology:
FAC_POL-AMB_AVE_YEAR_RUN
Where:
FAC = Identifier for the proposed facility: ABBK (Abengoa Bioenergy Biomass of Kansas)
POL = Pollutant ID: PM10, PM2.5, NO2, SO2 or CO
AMB = Ambient concentrations evaluation: significant impact levels (SIL) or cumulative (CUM) for PSD increment and NAAQS [OR] variable such as EPA, Parallel or BRMS for the parallel demonstrations
AVE = Averaging period: 1-hour (1-HR), 3-hour (3-HR), 8-hour (8-HR), 24-hour (24-HR) or annual (ANN)
YEAR = Year of meteorological data used: 2006 to 2010
RUN = Run number: Run1 through Run4
Where:
Run1 = Base Runs (Haul Road Scenario 1)
Where for the SIL model runs:
1. The haul roads and shipping and receiving hours from 6:00 AM to 6:00 PM only (100%/0% haul road split).
2. AB-500 Scenario includes the Boiler at 500 MMBtu/hr, Flare Operational and No Firewater Pump for all averaging periods.
3. AB-471 Scenario includes the Boiler at 471 MMBtu/hr, Flare Operational and No Firewater Pump for all averaging periods.
4. AB-353 Scenario includes the Boiler at 353 MMBtu/hr, Flare Operational and No Firewater Pump for all averaging periods.
5. AB-236 Scenario includes the Boiler at 236 MMBtu/hr, Flare Operational and No Firewater Pump for short-term averaging periods only (24-hours or less).
6. AB-141 Scenario includes the Boiler at 141 MMBtu/hr, Flare Operational and No Firewater Pump for short-term averaging periods only (24-hours or less).
7. FWP-500 Scenario includes the Boiler at 500 MMBtu/hr, Flare Pilot Only and Firewater Pump Operational for all averaging periods.
8. FWP-471 Scenario includes the Boiler at 471 MMBtu/hr, Flare Pilot Only and Firewater Pump Operational for all averaging periods.
9. FWP-353 Scenario includes the Boiler at 353 MMBtu/hr, Flare Pilot Only and Firewater Pump Operational for all averaging periods.
10. FWP-236 Scenario includes the Boiler at 236 MMBtu/hr, Flare Pilot Only and Firewater Pump Operational for short-term averaging periods only (24-hours or less).
11. FWP-141 Scenario includes the Boiler at 141 MMBtu/hr, Flare Pilot Only and Firewater Pump Operational for short-term averaging periods only (24-hours or less).

Run2 = Haul Road Scenario 2
Where for the SIL model runs:
1. 90% of the truck traffic associated with shipping and receiving occurs from 6:00 AM to 6:00 PM and 10% of the truck traffic occurs from 6:00 PM to 6:00 AM.
2. All other scenarios are the same as in Run1.

Run3 = Haul Road Scenario 3
Where for the SIL model runs:
1. 80% of the truck traffic associated with shipping and receiving occurs from 6:00 AM to 6:00 PM and 20% of the truck traffic occurs from 6:00 PM to 6:00 AM.
2. All other scenarios are the same as in Run1.

Run4 = Haul Road Scenario 4
Where for the SIL model runs:
1. 70% of the truck traffic associated with shipping and receiving occurs from 6:00 AM to 6:00 PM and 30% of the truck traffic occurs from 6:00 PM to 6:00 AM.

2. All other scenarios are the same as in Run1.

For cumulative model runs, the ALL source group was used when the nearby source data was identical for both the NAAQS and PSD increment analysis. For PM10 and PM2.5, the source groups "NAQ" for NAAQS and "PSD" for PSD increment were used to differentiate between the two since the nearby source data was not identical. Also for the cumulative model runs, only the worst-case scenarios were evaluated.

C2. DVDs Table of Contents

There are three DVDs included with this report. The following details the Table of Contents for each disk.

DISK ONE

1. AB_AQIA_06-2011_DISK1
This folder contains the AERMOD input / output files for CO, SO2 and PM10; as well as the support files for these runs and the final AQIA report and appendices.
The Disk 1 subfolders are as follows:

1. MET DATA
Contained in this folder is the metrological files used for the model runs.
2. 1-HOUR_CO, 1-HOUR_SO2, 1-WEEK_CO, 3-HOUR_SO2, 8-HOUR_CO, 24-HOUR_PM10, 24-HOUR_SO2, ANNUAL_PM10, and ANNUAL_SO2
These folders contain the corresponding input / output files for the pollutant and averaging period indicated.
4. NED DATA
This folder contains the NED data files used to obtain boundary and receptor elevations.
5. NEARBY
This folder contains the nearby source data used in the PSD increment and NAAQS analyses.
6. AQIA Report Rev0
This folder contains the final AQIA report and appendices.

DISK TWO

1. AB_AQIA_06-2011_DISK2
This folder contains the AERMOD input / output files for PM2.5; as well as the support files for these runs.
The Disk 2 subfolders are as follows:

1. MET DATA
Contained in this folder is the metrological files used for the model runs.
2. 24-HOUR_PM25 and ANNUAL_PM25
These folders contain the corresponding input / output files for the pollutant and averaging period indicated.
3. NED DATA
This folder contains the NED data files used to obtain boundary and receptor elevations.
4. NEARBY
This folder contains the nearby source data used in the PSD increment and NAAQS analyses.

DISK THREE

1. AB_AQIA_06-2011_DISK3
This folder contains the AERMOD input / output files for NO2; as well as the support files for these runs.
The Disk 3 subfolders are as follows:

1. MET DATA
Contained in this folder is the metrological files used for the model runs.
2. 1-HOUR_NO2, 1-MONTH_NO2 and ANNUAL_NO2
These folders contain the corresponding input / output files for the pollutant and averaging period indicated.
3. NED DATA
This folder contains the NED data files used to obtain boundary and receptor elevations.
4. NEARBY
This folder contains the nearby source data used in the PSD increment and NAAQS analyses.

Abengoa Bioenergy Biomass of Kansas, LLC **Rev. 0**
Biorefinery Facility
Hugoton, Kansas

Model Runs List

	MODEL RUN NAME	POLLUTAN	RUN TYPE	AVERAGING	YEAR
1	ABBK_CO-SIL_1-HR_2006-2010_Run1	CO	SIL	1-Hour	2006-2010
2	ABBK_CO-SIL_8-HR_2006-2010_Run1	CO	SIL	8-Hour	2006-2010
3	ABBK_CO_1-WK_2006-2010_Run1	CO	PSD Add'l Impacts	1-Month	2006-2010
4	ABBK_NO2-PVMRM-SIL_1-HR_2006-2010_Run1	NO2	SIL	1-Hour	2006-2010
5	ABBK_NO2-PVMRM-NAAQS_1-HR_2006-2010_Run1-P1	NO2	NAAQS Partition 1	1-Hour	2006-2010
6	ABBK_NO2-PVMRM-NAAQS_1-HR_2006-2010_Run1-P2	NO2	NAAQS Partition 2	1-Hour	2006-2010
7	ABBK_NO2-PVMRM-NAAQS_1-HR_2006-2010_Run1-P3	NO2	NAAQS Partition 3	1-Hour	2006-2010
8	ABBK_NO2-PVMRM-NAAQS_1-HR_2006-2010_Run1-P4	NO2	NAAQS Partition 4	1-Hour	2006-2010
9	ABBK_NO2_1-MO_2006-2010_Run1	NO2	PSD Add'l Impacts	1-Month	2006-2010
10	ABBK_NO2-SIL_ANN_2006_Run1	NO2	SIL	Annual	2006
11	ABBK_NO2-SIL_ANN_2007_Run1	NO2	SIL	Annual	2007
12	ABBK_NO2-SIL_ANN_2008_Run1	NO2	SIL	Annual	2008
13	ABBK_NO2-SIL_ANN_2009_Run1	NO2	SIL	Annual	2009
14	ABBK_NO2-SIL_ANN_2010_Run1	NO2	SIL	Annual	2010
15	ABBK_NO2-CUM_ANN_2006_Run1	NO2	NAAQS & PSD	Annual	2006
16	ABBK_NO2-CUM_ANN_2007_Run1	NO2	NAAQS & PSD	Annual	2007
17	ABBK_NO2-CUM_ANN_2008_Run1	NO2	NAAQS & PSD	Annual	2008
18	ABBK_NO2-CUM_ANN_2009_Run1	NO2	NAAQS & PSD	Annual	2009
19	ABBK_NO2-CUM_ANN_2010_Run1	NO2	NAAQS & PSD	Annual	2010
20	ABBK_SO2-SIL_1-HR_2006-2010_Run1	SO2	SIL	1-Hour	2006-2010
21	ABBK_SO2-NAAQS_1-HR_2006-2010_Run1	SO2	NAAQS	1-Hour	2006-2010
22	ABBK_SO2-SIL_3-HR_2006-2010_Run1	SO2	SIL	3-Hour	2006-2010
23	ABBK_SO2-SIL_24-HR_2006-2010_Run1	SO2	SIL	24-Hour	2006-2010
24	ABBK_SO2-CUM_24-HR_2006-2010_Run1	SO2	NAAQS & PSD	24-Hour	2006-2010
25	ABBK_SO2-SIL_ANN_2006_Run1	SO2	SIL	Annual	2006
26	ABBK_SO2-SIL_ANN_2007_Run1	SO2	SIL	Annual	2007
27	ABBK_SO2-SIL_ANN_2008_Run1	SO2	SIL	Annual	2008
28	ABBK_SO2-SIL_ANN_2009_Run1	SO2	SIL	Annual	2009
29	ABBK_SO2-SIL_ANN_2010_Run1	SO2	SIL	Annual	2010
30	ABBK_SO2-CUM_ANN_2006_Run1	SO2	NAAQS & PSD	Annual	2006
31	ABBK_SO2-CUM_ANN_2007_Run1	SO2	NAAQS & PSD	Annual	2007
32	ABBK_SO2-CUM_ANN_2008_Run1	SO2	NAAQS & PSD	Annual	2008
33	ABBK_SO2-CUM_ANN_2009_Run1	SO2	NAAQS & PSD	Annual	2009
34	ABBK_SO2-CUM_ANN_2010_Run1	SO2	NAAQS & PSD	Annual	2010
35	ABBK_PM10-SIL_24-HR_2006-2010_Run1	PM10	SIL	24-Hour	2006-2010
36	ABBK_PM10-SIL_24-HR_2006-2010_Run2	PM10	SIL	24-Hour	2006-2010
37	ABBK_PM10-SIL_24-HR_2006-2010_Run3	PM10	SIL	24-Hour	2006-2010
38	ABBK_PM10-SIL_24-HR_2006-2010_Run4	PM10	SIL	24-Hour	2006-2010
39	ABBK_PM10-EPA_24-HR_2006-2010_Run1	PM10	Parallel Demonstratior	24-Hour	2006-2010
40	ABBK_PM10-BRMS_24-HR_2006-2010_Run1	PM10	Parallel Demonstratior	24-Hour	2006-2010
41	ABBK_PM10-CUM_24-HR_2006-2010_Run4	PM10	NAAQS & PSD	24-Hour	2006-2010
42	ABBK_PM10-SIL_ANN_2006_Run4	PM10	SIL	Annual	2006
43	ABBK_PM10-SIL_ANN_2007_Run4	PM10	SIL	Annual	2007
44	ABBK_PM10-SIL_ANN_2008_Run4	PM10	SIL	Annual	2008
45	ABBK_PM10-SIL_ANN_2009_Run4	PM10	SIL	Annual	2009
46	ABBK_PM10-SIL_ANN_2010_Run4	PM10	SIL	Annual	2010
47	ABBK_PM10-EPA_ANN_2006_Run4	PM10	Parallel Demonstratior	Annual	2006
48	ABBK_PM10-BRMS_ANN_2006_Run4	PM10	Parallel Demonstratior	Annual	2006
49	ABBK_PM10-CUM_ANN_2006_Run4	PM10	NAAQS & PSD	Annual	2006
50	ABBK_PM10-CUM_ANN_2007_Run4	PM10	NAAQS & PSD	Annual	2007
51	ABBK_PM10-CUM_ANN_2008_Run4	PM10	NAAQS & PSD	Annual	2008
52	ABBK_PM10-CUM_ANN_2009_Run4	PM10	NAAQS & PSD	Annual	2009
53	ABBK_PM10-CUM_ANN_2010_Run4	PM10	NAAQS & PSD	Annual	2010
54	ABBK_PM25-SIL_24-HR_2006_Run1	PM2.5	SIL	24-Hour	2006
55	ABBK_PM25-SIL_24-HR_2007_Run1	PM2.5	SIL	24-Hour	2007
56	ABBK_PM25-SIL_24-HR_2008_Run1	PM2.5	SIL	24-Hour	2008
57	ABBK_PM25-SIL_24-HR_2009_Run1	PM2.5	SIL	24-Hour	2009
58	ABBK_PM25-SIL_24-HR_2010_Run1	PM2.5	SIL	24-Hour	2010
59	ABBK_PM25-EPA_24-HR_2006-2010_Run1_Max Recepto	PM2.5	Parallel Confirmation	24-Hour	2006-2010

	MODEL RUN NAME	POLLUTAN	RUN TYPE	AVERAGING	YEAR
60	ABBK_PM25-SIL_24-HR_2006_Run2	PM2.5	SIL	24-Hour	2006
61	ABBK_PM25-SIL_24-HR_2007_Run2	PM2.5	SIL	24-Hour	2007
62	ABBK_PM25-SIL_24-HR_2008_Run2	PM2.5	SIL	24-Hour	2008
63	ABBK_PM25-SIL_24-HR_2009_Run2	PM2.5	SIL	24-Hour	2009
64	ABBK_PM25-SIL_24-HR_2010_Run2	PM2.5	SIL	24-Hour	2010
65	ABBK_PM25-EPA_24-HR_2006-2010_Run2_Max Recepto	PM2.5	Parallel Confirmation	24-Hour	2006-2010
66	ABBK_PM25-SIL_24-HR_2006_Run3	PM2.5	SIL	24-Hour	2006
67	ABBK_PM25-SIL_24-HR_2007_Run3	PM2.5	SIL	24-Hour	2007
68	ABBK_PM25-SIL_24-HR_2008_Run3	PM2.5	SIL	24-Hour	2008
69	ABBK_PM25-SIL_24-HR_2009_Run3	PM2.5	SIL	24-Hour	2009
70	ABBK_PM25-SIL_24-HR_2010_Run3	PM2.5	SIL	24-Hour	2010
71	ABBK_PM25-EPA_24-HR_2006-2010_Run3_Max Recepto	PM2.5	Parallel Confirmation	24-Hour	2006-2010
72	ABBK_PM25-SIL_24-HR_2006_Run4	PM2.5	SIL	24-Hour	2006
73	ABBK_PM25-SIL_24-HR_2007_Run4	PM2.5	SIL	24-Hour	2007
74	ABBK_PM25-SIL_24-HR_2008_Run4	PM2.5	SIL	24-Hour	2008
75	ABBK_PM25-SIL_24-HR_2009_Run4	PM2.5	SIL	24-Hour	2009
76	ABBK_PM25-SIL_24-HR_2010_Run4	PM2.5	SIL	24-Hour	2010
77	ABBK_PM25-EPA_24-HR_2006-2010_Run4_Max Recepto	PM2.5	Parallel Confirmation	24-Hour	2006-2010
78	ABBK_PM25-EPA_24-HR_2006-2010_Run1	PM2.5	Parallel Demonstration	24-Hour	2006-2010
79	ABBK_PM25-BRMS_24-HR_2006_Run1	PM2.5	Parallel Demonstration	24-Hour	2006
80	ABBK_PM25-BRMS_24-HR_2007_Run1	PM2.5	Parallel Demonstration	24-Hour	2007
81	ABBK_PM25-BRMS_24-HR_2008_Run1	PM2.5	Parallel Demonstration	24-Hour	2008
82	ABBK_PM25-BRMS_24-HR_2009_Run1	PM2.5	Parallel Demonstration	24-Hour	2009
83	ABBK_PM25-BRMS_24-HR_2010_Run1	PM2.5	Parallel Demonstration	24-Hour	2010
84	ABBK_PM25-CUM_24-HR_2006_Run4	PM2.5	NAAQS & PSD	24-Hour	2006
85	ABBK_PM25-CUM_24-HR_2007_Run4	PM2.5	NAAQS & PSD	24-Hour	2007
86	ABBK_PM25-CUM_24-HR_2008_Run4	PM2.5	NAAQS & PSD	24-Hour	2008
87	ABBK_PM25-CUM_24-HR_2009_Run4	PM2.5	NAAQS & PSD	24-Hour	2009
88	ABBK_PM25-CUM_24-HR_2010_Run4	PM2.5	NAAQS & PSD	24-Hour	2010
89	ABBK_PM25-CUM_24-HR_2006-2010_Run4_Contributio	PM2.5	Parallel Confirmation	24-Hour	2006-2010
90	ABBK_PM25-SIL_ANN_2006_Run4	PM2.5	SIL	Annual	2006
91	ABBK_PM25-SIL_ANN_2007_Run4	PM2.5	SIL	Annual	2007
92	ABBK_PM25-SIL_ANN_2008_Run4	PM2.5	SIL	Annual	2008
93	ABBK_PM25-SIL_ANN_2009_Run4	PM2.5	SIL	Annual	2009
94	ABBK_PM25-SIL_ANN_2010_Run4	PM2.5	SIL	Annual	2010
95	ABBK_PM25-EPA_ANN_2006_Run4	PM2.5	Parallel Demonstration	Annual	2006
96	ABBK_PM25-BRMS_ANN_2006_Run4	PM2.5	Parallel Demonstration	Annual	2006
97	ABBK_PM25-CUM_ANN_2006_Run4	PM2.5	NAAQS & PSD	Annual	2006
98	ABBK_PM25-CUM_ANN_2007_Run4	PM2.5	NAAQS & PSD	Annual	2007
99	ABBK_PM25-CUM_ANN_2008_Run4	PM2.5	NAAQS & PSD	Annual	2008
100	ABBK_PM25-CUM_ANN_2009_Run4	PM2.5	NAAQS & PSD	Annual	2009
101	ABBK_PM25-CUM_ANN_2010_Run4	PM2.5	NAAQS & PSD	Annual	2010

Modeling Results

Table 1. NO_2 1-Hour SIL Results (EPA AERMOD 11103)

		PVMRM			
NO2 1-HOUR SIL EPA AERMOD 11103	**Operating Scenarios**	**Predicted H1H Facility Impacts**	**Period**	**UTM Easting (m)**	**UTM Northing (m)**
AB500	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	19.33147	1st Highest Max Daily 1-Hr Over 5 Years	254557.00	4119082.00
AB471	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	**19.51292**	1st Highest Max Daily 1-Hr Over 5 Years	256557.00	4122082.00
AB353	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	16.55764	1st Highest Max Daily 1-Hr Over 5 Years	256557.00	4122082.00
AB236	Boiler at 236 MMBtu/hr Flare Operational No Firewater Pump	12.48227	1st Highest Max Daily 1-Hr Over 5 Years	257557.00	4122082.00
AB141	Boiler at 141 MMBtu/hr Flare Operational No Firewater Pump	15.03927	1st Highest Max Daily 1-Hr Over 5 Years	261557.00	4108082.00
FWP500	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	32.69810	1st Highest Max Daily 1-Hr Over 5 Years	288490.60	4117197.50
FWP471	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	**32.69809**	1st Highest Max Daily 1-Hr Over 5 Years	288490.60	4117197.50
FWP353	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	32.69807	1st Highest Max Daily 1-Hr Over 5 Years	288490.60	4117197.50
FWP236	Boiler at 236 MMBtu/hr Flare Pilot Only Firewater Pump Operational	32.69806	1st Highest Max Daily 1-Hr Over 5 Years	288490.60	4117197.50
FWP141	Boiler at 141 MMBtu/hr Flare Pilot Only Firewater Pump Operational	32.69806	1st Highest Max Daily 1-Hr Over 5 Years	288490.60	4117197.50

Table 2. NO_2 1-Hour NAAQS Results (Parallel AERMOD 11103) ** Additional Receptors Near Max Receptors

		PVMRM				
NO2 1-HOUR NAAQS AERMOD 11103	**Operating Scenarios**	**Predicted H8H ALL Impacts**	**Abengoa Contribution**	**Period**	**UTM Easting (m)**	**UTM Northing (m)**
NAQ500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	471.53816 520.53816	0.00007	1st Highest Max Daily 1-Hr Over 5	289557.00	4123082.00
NAQ471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	471.53816 520.53816	0.00007	1st Highest Max Daily 1-Hr Over 5	289557.00	4123082.00
NAQ353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	471.53816 520.53816	0.00008	1st Highest Max Daily 1-Hr Over 5	289557.00	4123082.00
NAQ236 Includes Nearby Sources	Boiler at 236 MMBtu/hr Flare Operational No Firewater Pump	471.53817 520.53817	0.00009	1st Highest Max Daily 1-Hr Over 5	289557.00	4123082.00
NAQ141 Includes Nearby Sources	Boiler at 141 MMBtu/hr Flare Operational No Firewater Pump	471.53830 520.53830	0.00022	1st Highest Max Daily 1-Hr Over 5	289557.00	4123082.00

Table 3. NO_2 Annual SIL Results (EPA AERMOD 11103)

NO2 ANNUAL SIL EPA AERMOD 11103	Operating Scenarios	2006 Predicted H1H Facility Impacts	UTM Easting (m)	UTM Northing (m)	2007 Predicted H1H Facility Impacts	UTM Easting (m)	UTM Northing (m)	2008 Predicted H1H Facility Impacts	UTM Easting (m)	UTM Northing (m)	2009 Predicted H1H Facility Impacts	UTM Easting (m)	UTM Northing (m)	2010 Predicted H1H Facility Impacts	UTM Easting (m)	UTM Northing (m)
AB500	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	1.88812	288207.00	4118382.00	2.18486	288157.00	4118382.00	2.05429	288157.00	4118382.00	1.31296	288057.00	4118432.00	2.17367	288157.00	4118382.00
AB471	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	**2.02117**	288207.00	4118382.00	**2.32645**	288157.00	4118382.00	**2.19472**	288157.00	4118382.00	**1.40777**	288107.00	4118382.00	**2.32619**	288157.00	4118382.00
AB353	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	1.83356	288207.00	4118332.00	2.11474	288157.00	4118332.00	1.99245	288157.00	4118332.00	1.28663	288107.00	4118332.00	2.11135	288157.00	4118332.00
FWP500	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	1.86424	288207.00	4118382.00	2.16074	288157.00	4118382.00	2.03148	288157.00	4118382.00	1.29901	288057.00	4118432.00	2.15285	288157.00	4118382.00
FWP471	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	1.99728	288207.00	4118382.00	2.30232	288157.00	4118382.00	2.17190	288157.00	4118382.00	1.39278	288107.00	4118382.00	2.30537	288157.00	4118382.00
FWP353	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	1.80855	288207.00	4118332.00	2.08967	288157.00	4118332.00	1.96889	288157.00	4118332.00	1.27082	288107.00	4118332.00	2.09001	288157.00	4118332.00

Table 4. NO_2 Annual NAAQS & PSD Results (EPA AERMOD 11103)

NO2 ANNUAL NAAQS & PSD EPA AERMOD 11103	Operating Scenarios	2006 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)	2007 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)	2008 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)	2009 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)	2010 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)
ALL-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	22.45504 29.95504	290357.00	4119182.00	24.84256 32.34256	290357.00	4119482.00	21.76681 29.26681	290357.00	4119482.00	22.80867 30.30867	290357.00	4119482.00	25.95087 33.45087	290357.00	4119182.00
ALL-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	**22.45701** 29.95701	290357.00	4119182.00	**24.84347** 32.34347	290357.00	4119482.00	**21.76771** 29.26771	290357.00	4119482.00	**22.81006** 30.31006	290357.00	4119482.00	**25.95271** 33.45271	290357.00	4119182.00
ALL-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	22.43702 29.93702	290357.00	4119182.00	24.82130 32.32130	290357.00	4119482.00	21.74715 29.24715	290357.00	4119482.00	22.78729 30.28729	290357.00	4119482.00	25.93359 33.43359	290357.00	4119182.00
NEARBY	Nearby Sources Only	22.33137	290357.00	4119182.00	24.71575	290357.00	4119482.00	21.64528	290357.00	4119482.00	22.67541	290357.00	4119482.00	25.83449	290357.00	4119182.00
ABBK Contribution	At Max Receptor	0.12564	290357.00	4119182.00	0.12772	290357.00	4119482.00	0.12243	290357.00	4119482.00	0.13465	290357.00	4119482.00	0.11822	290357.00	4119182.00

Table 5. SO_2 1-Hour SIL Results (EPA AERMOD 11103)

SO2 1-HOUR SIL EPA AERMOD 11103	Operating Scenarios	Predicted H1H Facility Impacts	Period	UTM Easting (m)	UTM Northing (m)
ALL-500	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	22.84659	1st Highest Max Daily 1-Hr Over 5 Years	287707.00	287707.00
ALL-471	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	**23.77301**	1st Highest Max Daily 1-Hr Over 5 Years	287707.00	287707.00
ALL-353	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	21.72473	1st Highest Max Daily 1-Hr Over 5 Years	287643.70	4118010.20
ALL-236	Boiler at 236 MMBtu/hr Flare Operational No Firewater Pump	19.84395	1st Highest Max Daily 1-Hr Over 5 Years	287657.00	4118182.00
ALL-141	Boiler at 141 MMBtu/hr Flare Operational No Firewater Pump	19.02721	1st Highest Max Daily 1-Hr Over 5 Years	287707.00	4118132.00
FWP-500	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	22.29689	1st Highest Max Daily 1-Hr Over 5 Years	288157.00	4118232.00
FWP-471	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	23.30873	1st Highest Max Daily 1-Hr Over 5 Years	288307.00	4118182.00
FWP-353	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	20.78807	1st Highest Max Daily 1-Hr Over 5 Years	288357.00	4118082.00
FWP-236	Boiler at 236 MMBtu/hr Flare Pilot Only Firewater Pump Operational	18.64642	1st Highest Max Daily 1-Hr Over 5 Years	288157.00	4118132.00
FWP-141	Boiler at 141 MMBtu/hr Flare Pilot Only Firewater Pump Operational	17.76793	1st Highest Max Daily 1-Hr Over 5 Years	287707.00	4118132.00

Table 6. SO_2 1-Hour NAAQS Results (EPA AERMOD 11103)

SO2 1-HOUR NAAQS EPA AERMOD 11103	Operating Scenarios	Predicted H4H ALL Impacts	Period	UTM Easting (m)	UTM Northing (m)
NAQ-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	51.22504 60.12504	1st Highest Max Daily 1-Hr Over 5 Years	251557.00	4163082.00
NAQ-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	**51.22548** 60.12548	1st Highest Max Daily 1-Hr Over 5 Years	251557.00	4163082.00
NAQ-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	51.22302 60.12302	1st Highest Max Daily 1-Hr Over 5 Years	251557.00	4163082.00
NAQ-236 Includes Nearby Sources	Boiler at 236 MMBtu/hr Flare Operational No Firewater Pump	51.21974 60.11974	1st Highest Max Daily 1-Hr Over 5 Years	251557.00	4163082.00
NAQ-141 Includes Nearby Sources	Boiler at 141 MMBtu/hr Flare Operational No Firewater Pump	51.21612 60.11612	1st Highest Max Daily 1-Hr Over 5 Years	251557.00	4163082.00

Table 7. SO_2 3-Hour SIL Results (EPA AERMOD 11103)

SO2 3-HOUR SIL EPA AERMOD 11103	Operating Scenarios	Predicted H1H Facility Impacts	Date/Hour	UTM Easting (m)	UTM Northing (m)
ALL-500	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	23.12224	08082212	288157.00	4118232.00
ALL-471	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	**24.15001**	08082212	288157.00	4118232.00
ALL-353	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	21.66342	08082212	288157.00	4118182.00
ALL-236	Boiler at 236 MMBtu/hr Flare Operational No Firewater Pump	19.28324	07073112	287757.00	4118032.00
ALL-141	Boiler at 141 MMBtu/hr Flare Operational No Firewater Pump	17.53637	09051012	287757.00	4118132.00
FWP-500	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	22.73810	08082212	288157.00	4118232.00
FWP-471	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	23.76586	08082212	288157.00	4118232.00
FWP-353	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	21.33999	08082212	288157.00	4118182.00
FWP-236	Boiler at 236 MMBtu/hr Flare Pilot Only Firewater Pump Operational	18.43280	08082212	288157.00	4118182.00
FWP-141	Boiler at 141 MMBtu/hr Flare Pilot Only Firewater Pump Operational	15.45781	09051012	287757.00	4118132.00

Table 8. SO_2 24-Hour SIL Results (EPA AERMOD 11103)

SO2 24-HOUR SIL EPA AERMOD 11103	Operating Scenarios	Predicted H1H Facility Impacts	Date/Hour	UTM Easting (m)	UTM Northing (m)
ALL-500	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	10.93139	10052224	288157.00	4118682.00
ALL-471	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	**11.69689**	10052224	288157.00	4118632.00
ALL-353	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	10.73393	10052224	288157.00	4118582.00
ALL-236	Boiler at 236 MMBtu/hr Flare Operational No Firewater Pump	9.45188	08102224	288557.00	4117082.00
ALL-141	Boiler at 141 MMBtu/hr Flare Operational No Firewater Pump	8.55177	06031824	287657.00	4118282.00
FWP-500	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	9.93227	10052224	288157.00	4118682.00
FWP-471	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	10.70314	10052224	288157.00	4118632.00
FWP-353	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	9.75473	10052224	288157.00	4118582.00
FWP-236	Boiler at 236 MMBtu/hr Flare Pilot Only Firewater Pump Operational	8.50799	10052224	288157.00	4118482.00
FWP-141	Boiler at 141 MMBtu/hr Flare Pilot Only Firewater Pump Operational	6.82180	10052224	288157.00	4118382.00

Table 9. SO_2 24-Hour NAAQS & PSD Results (EPA AERMOD 11103)

SO2 24-HOUR NAAQS & PSD EPA AERMOD 11103	Operating Scenarios	Predicted H1H ALL Impacts	H1H ALL Impacts Date/Hour	UTM Easting (m)	UTM Northing (m)	Maximum Year, H1H & H2H	Date/Hour	UTM Easting (m)	UTM Northing (m)
ALL-500	Boiler at 500 MMBtu/hr	18.61410	07042524	288407.00	4116682.00	2009			
Includes Nearby	Flare Operational					17.67859	9102224	288407.00	4116682.00
Sources	No Firewater Pump					15.66319	9102224	288457.00	4116682.00
ALL-471	Boiler at 471 MMBtu/hr	**18.86490**	07042524	288407.00	4116682.00	2007			
Includes Nearby	Flare Operational					18.8649	7042524	288407.00	4116682.00
Sources	No Firewater Pump					15.92035	7042524	288457.00	4116682.00
ALL-353	Boiler at 353 MMBtu/hr	17.79920	07042524	288407.00	4116682.00	2007			
Includes Nearby	Flare Operational					17.7992	7042524	288407.00	4116682.00
Sources	No Firewater Pump					15.97225	7102124	288407.00	4116632.00
ALL-236	Boiler at 236 MMBtu/hr	16.80904	09102224	288407.00	4116682.00	2007			
Includes Nearby	Flare Operational					16.4097	7042524	288407.00	4116682.00
Sources	No Firewater Pump					15.53946	7102124	288407.00	4116682.00
ALL-141	Boiler at 141 MMBtu/hr	15.45640	09102224	288407.00	4116682.00	2007			
Includes Nearby	Flare Operational					14.95308	7042524	288407.00	4116682.00
Sources	No Firewater Pump					14.77959	7102124	288407.00	4116682.00

Table 10. SO_2 Annual SIL Results (EPA AERMOD 11103)

SO2 ANNUAL SIL EPA AERMOD 11103	Operating Scenarios	2006 Predicted H1H Facility	UTM Easting (m)	UTM Northing (m)	2007 Predicted H1H Facility	UTM Easting (m)	UTM Northing (m)	2008 Predicted H1H Facility	UTM Easting (m)	UTM Northing (m)	2009 Predicted H1H Facility	UTM Easting (m)	UTM Northing (m)	2010 Predicted H1H Facility	UTM Easting (m)	UTM Northing (m)
ALL-500	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	1.02234	288207.00	4118382.00	1.17630	288157.00	4118382.00	1.10610	288157.00	4118382.00	0.70772	288107.00	4118382.00	1.16297	288157.00	4118382.00
ALL-471	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	**1.08366**	288207.00	4118382.00	**1.24310**	288157.00	4118332.00	**1.17061**	288157.00	4118382.00	**0.75221**	288107.00	4118382.00	**1.23322**	288157.00	4118382.00
ALL-353	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	0.99129	288207.00	4118332.00	1.13596	288157.00	4118332.00	1.06990	288157.00	4118332.00	0.69269	288107.00	4118332.00	1.12570	288157.00	4118332.00
FWP-500	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	0.94889	288207.00	4118382.00	1.09860	288157.00	4118382.00	1.03359	288157.00	4118382.00	0.65979	288057.00	4118432.00	1.09511	288157.00	4118382.00
FWP-471	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	1.01021	288207.00	4118382.00	1.16328	288157.00	4118382.00	1.09810	288157.00	4118382.00	0.70278	288107.00	4118382.00	1.16536	288157.00	4118382.00
FWP-353	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	0.91392	288207.00	4118332.00	1.05463	288157.00	4118332.00	0.99442	288157.00	4118332.00	0.64038	288107.00	4118332.00	1.05542	288157.00	4118332.00

Table 11. SO_2 Annual NAAQS & PSD Results (EPA AERMOD 11103)

SO2 ANNUAL NAAQS & PSD EPA AERMOD 11103	Operating Scenarios	2006 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)	2007 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)	2008 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)	2009 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)	2010 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)
ALL-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	1.55811	288207.00	4118332.00	1.69474	288157.00	4118332.00	1.60183	288157.00	4118332.00	N/A, ABBK < SIL			1.69000	288157.00	4118332.00
ALL-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	**1.62419**	288207.00	4118332.00	**1.76837**	288157.00	4118332.00	**1.67339**	288157.00	4118332.00				**1.76276**	288157.00	4118332.00
ALL-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	1.53765	288207.00	4118332.00	1.66807	288157.00	4118332.00	1.57693	288157.00	4118332.00				1.66240	288157.00	4118332.00

Table 12. CO 1-Hour SIL Results (EPA AERMOD 11103)

CO 1-HOUR SIL EPA AERMOD 11103	Operating Scenarios	Predicted H1H Facility Impacts	Date/Hour	UTM Easting (m)	UTM Northing (m)
ALL-500	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	36.66333	06112711	286357.00	4116982.00
ALL-471	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	**36.99621**	06112711	286357.00	4116982.00
ALL-353	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	31.77265	07010410	290857.00	4118282.00
ALL-236	Boiler at 236 MMBtu/hr Flare Operational No Firewater Pump	29.12992	06021222	288740.60	4117195.40
ALL-141	Boiler at 141 MMBtu/hr Flare Operational No Firewater Pump	29.12992	06021222	288740.60	4117195.40
FWP-500	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	31.85282	06112711	286257.00	4116982.00
FWP-471	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	32.17406	06112711	286557.00	4117082.00
FWP-353	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	26.74289	06112711	286557.00	4117082.00
FWP-236	Boiler at 236 MMBtu/hr Flare Pilot Only Firewater Pump Operational	22.29240	07010410	290257.00	4118182.00
FWP-141	Boiler at 141 MMBtu/hr Flare Pilot Only Firewater Pump Operational	19.84872	09071708	287707.00	4118082.00

Table 13. CO 8-Hour SIL Results (EPA AERMOD 11103)

CO 8-HOUR SIL EPA AERMOD 11103	Operating Scenarios	Predicted H1H Facility Impacts	Date/Hour	UTM Easting (m)	UTM Northing (m)
ALL-500	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	21.24783	06061316	287807.00	4118282.00
ALL-471	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	**22.33428**	06061316	287857.00	4118182.00
ALL-353	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	21.71532	09040508	288507.00	4117182.00
ALL-236	Boiler at 236 MMBtu/hr Flare Operational No Firewater Pump	20.91704	06111508	288490.60	4117197.50
ALL-141	Boiler at 141 MMBtu/hr Flare Operational No Firewater Pump	20.49552	06111508	288490.60	4117197.50
FWP-500	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	18.11717	06061316	287807.00	4118232.00
FWP-471	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	19.08894	06061316	287807.00	4118232.00
FWP-353	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	17.27895	09082216	287857.00	4118232.00
FWP-236	Boiler at 236 MMBtu/hr Flare Pilot Only Firewater Pump Operational	15.28102	06061316	287857.00	4118182.00
FWP-141	Boiler at 141 MMBtu/hr Flare Pilot Only Firewater Pump Operational	12.73308	06031916	287707.00	4118132.00

Table 14. $PM_{2.5}$ 24-Hour SIL Results (Parallel AERMOD 09292)

		Run 1 (Haul Roads 100%/0%)				Run 2 (Haul Roads 90%/10%)				Run 3 (Haul Roads 80%/20%)				Run 4 (Haul Roads 70%/30%)			
PM2.5 24-HOUR SIL AERMOD 09292	**Operating Scenarios**	**Predicted H1H Facility Impacts**	**Period**	**UTM Easting (m)**	**UTM Northing (m)**	**Predicted H1H Facility Impacts**	**Period**	**UTM Easting (m)**	**UTM Northing (m)**	**Predicted H1H Facility Impacts**	**Period**	**UTM Easting (m)**	**UTM Northing (m)**	**Predicted H1H Facility Impacts**	**Period**	**UTM Easting (m)**	**UTM Northing (m)**
AB500	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	8.19891	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.22462	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.25032	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.27603	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10
AB471	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	8.20527	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.23098	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.25668	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.28239	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10
AB353	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	8.20385	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.22956	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.25526	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.28097	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10
AB236	Boiler at 236 MMBtu/hr Flare Operational No Firewater Pump	8.21132	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.23703	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.26273	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.28844	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10
AB141	Boiler at 141 MMBtu/hr Flare Operational No Firewater Pump	8.22694	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.25265	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.27835	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.30406	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10
FWP500	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	8.20189	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.22760	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.25330	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.27901	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10
FWP471	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	8.20825	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.23396	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.25966	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.28537	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10
FWP353	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	8.20683	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.23254	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.25824	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.28395	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10
FWP236	Boiler at 236 MMBtu/hr Flare Pilot Only Firewater Pump Operational	8.21430	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.24001	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.26571	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	8.29142	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10
FWP141	Boiler at 141 MMBtu/hr Flare Pilot Only Firewater Pump Operational	**8.22992**	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	**8.25563**	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	**8.28133**	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10	**8.30704**	1st Highest Max Daily 24-Hr Over 5	287993.50	4117997.10

Table 15. $PM_{2.5}$ 24-Hour NAAQS & PSD Results (Run 4) (Parallel AERMOD 09292)

		PSD					NAAQS				
PM2.5 24-HOUR NAAQS & PSD AERMOD 09292	**RUN 4 Operating Scenarios**	**Predicted H1H ALL Impacts**	**Period**	**UTM Easting (m)**	**UTM Northing (m)**	**ABBK Contribution (AERMOD 11103)**	**Predicted H1H ALL Impacts**	**Period**	**UTM Easting (m)**	**UTM Northing (m)**	**ABBK Contribution (AERMOD 11103)**
NAQ-500 or PSD-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	22.87291	1st Highest Max Daily 24-Hr Over 5	293307.00	4115082.00	0.00907	22.87409 39.87409	1st Highest Max Daily 24-Hr Over 5	293307.00	4115082.00	0.00907
NAQ-471 or PSD-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	22.87308	1st Highest Max Daily 24-Hr Over 5	293307.00	4115082.00	0.00924	22.87426 39.87426	1st Highest Max Daily 24-Hr Over 5	293307.00	4115082.00	0.00924
NAQ-353 or PSD-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	22.87309	1st Highest Max Daily 24-Hr Over 5	293307.00	4115082.00	0.00925	22.87427 39.87427	1st Highest Max Daily 24-Hr Over 5	293307.00	4115082.00	0.00925
NAQ-236 or PSD-236 Includes Nearby Sources	Boiler at 236 MMBtu/hr Flare Pilot Only Firewater Pump Operational	22.87320	1st Highest Max Daily 24-Hr Over 5	293307.00	4115082.00	0.00936	22.87437 39.87437	1st Highest Max Daily 24-Hr Over 5	293307.00	4115082.00	0.00936
NAQ-141 or PSD-141 Includes Nearby Sources	Boiler at 141 MMBtu/hr Flare Pilot Only Firewater Pump Operational	**22.87380**	1st Highest Max Daily 24-Hr Over 5	293307.00	4115082.00	0.00996	**22.87498** 39.87498	1st Highest Max Daily 24-Hr Over 5	293307.00	4115082.00	0.00996

Table 16. $PM_{2.5}$ Annual SIL Results (Run 4) (Parallel AERMOD 09292)

PM2.5 ANNUAL SIL AERMOD 09292	RUN 4 Operating Scenarios	2006 Predicted H1H Facility Impacts	UTM Easting (m)	UTM Northing (m)	2007 Predicted H1H Facility Impacts	UTM Easting (m)	UTM Northing (m)	2008 Predicted H1H Facility Impacts	UTM Easting (m)	UTM Northing (m)	2009 Predicted H1H Facility Impacts	UTM Easting (m)	UTM Northing (m)	2010 Predicted H1H Facility Impacts	UTM Easting (m)	UTM Northing (m)
ALL-500	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	1.70352	288043.40	4117995.20	2.17989	288043.40	4117995.20	1.84591	288043.40	4117995.20	1.61454	288043.40	4117995.20	2.06592	288043.40	4117995.20
ALL-471	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	1.70603	288043.40	4117995.20	2.18327	288043.40	4117995.20	1.84899	288043.40	4117995.20	1.61690	288043.40	4117995.20	2.06857	288043.40	4117995.20
ALL-353	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	1.70562	288043.40	4117995.20	2.18185	288043.40	4117995.20	1.84844	288043.40	4117995.20	1.61666	288043.40	4117995.20	2.06755	288043.40	4117995.20
FWP-500	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	1.70383	288043.40	4117995.20	2.18024	288043.40	4117995.20	1.84620	288043.40	4117995.20	1.61483	288043.40	4117995.20	2.06628	288043.40	4117995.20
FWP-471	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	**1.70634**	288043.40	4117995.20	**2.18361**	288043.40	4117995.20	**1.84928**	288043.40	4117995.20	**1.61719**	288043.40	4117995.20	**2.06893**	288043.40	4117995.20
FWP-353	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	1.70593	288043.40	4117995.20	2.18220	288043.40	4117995.20	1.84872	288043.40	4117995.20	1.61695	288043.40	4117995.20	2.06790	288043.40	4117995.20

Table 17. $PM_{2.5}$ Annual NAAQS & PSD Results (Parallel AERMOD 09292)

PM2.5 ANNUAL NAAQS & PSD AERMOD 09292	RUN4 Operating Scenarios	2006 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)	2007 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)	2008 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)	2009 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)	2010 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)
NAQ-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	2.06795	288043.40	4117995.20	2.61694	288043.40	4117995.20	2.24935	288043.40	4117995.20	1.95123	288043.40	4117995.20	2.48772	288043.40	4117995.20
NAQ-500	3-Year Averages	2.31141														
					2.27251											
								2.22943								
NAQ-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	**2.07046**	288043.40	4117995.20	**2.62032**	288043.40	4117995.20	**2.25243**	288043.40	4117995.20	**1.95360**	288043.40	4117995.20	**2.49037**	288043.40	4117995.20
NAQ-471	3-Year Averages	2.31440														
					2.27545											
								2.23213								
NAQ-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	2.07005	288043.40	4117995.20	2.61891	288043.40	4117995.20	2.25187	288043.40	4117995.20	1.95335	288043.40	4117995.20	2.48935	288043.40	4117995.20
NAQ-353	3-Year Averages	2.31361														
					2.27471											
								2.23152								
PSD-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	1.82141	288043.40	4117995.20	2.29526	288043.40	4117995.20	1.96886	288043.40	4117995.20	1.74400	288043.40	4117995.20	2.17878	288043.40	4117995.20
PSD-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	**1.82391**	288043.40	4117995.20	**2.29864**	288043.40	4117995.20	**1.97194**	288043.40	4117995.20	**1.74637**	288043.40	4117995.20	**2.18144**	288043.40	4117995.20
PSD-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	1.82351	288043.40	4117995.20	2.29723	288043.40	4117995.20	1.97138	288043.40	4117995.20	1.74612	288043.40	4117995.20	2.18041	288043.40	4117995.20

Table 18. PM_{10} 24-Hour SIL Results (Parallel AERMOD 09292)

		Run 1 (Haul Roads 100%/0%)				Run 2 (Haul Roads 90%/10%)				Run 3 (Haul Roads 80%/20%)				Run 4 (Haul Roads 70%/30%)			
PM10 24-HOUR SIL AERMOD 09292	**Operating Scenarios**	**Predicted H1H Facility Impacts**	**Date**	**UTM Easting (m)**	**UTM Northing (m)**	**Predicted H1H Facility Impacts**	**Date**	**UTM Easting (m)**	**UTM Northing (m)**	**Predicted H1H Facility Impacts**	**Date**	**UTM Easting (m)**	**UTM Northing (m)**	**Predicted H1H Facility Impacts**	**Date**	**UTM Easting (m)**	**UTM Northing (m)**
AB500	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	28.11598	09110524	288243.30	4117987.70	29.23845m	07010224	288107.00	4117082.00	30.90599m	07010224	288107.00	4117082.00	32.57354m	07010224	288107.00	4117082.00
AB471	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	28.12666	09110524	288243.30	4117987.70	29.27515m	07010224	288107.00	4117082.00	30.94270m	07010224	288107.00	4117082.00	32.61024m	07010224	288107.00	4117082.00
AB353	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	28.13753	09110524	288243.30	4117987.70	29.25813m	07010224	288107.00	4117082.00	30.92567m	07010224	288107.00	4117082.00	32.59322m	07010224	288107.00	4117082.00
AB236	Boiler at 236 MMBtu/hr Flare Operational No Firewater Pump	28.15236	09110524	288243.30	4117987.70	29.23077m	07010224	288107.00	4117082.00	30.89832m	07010224	288107.00	4117082.00	32.56587m	07010224	288107.00	4117082.00
AB141	Boiler at 141 MMBtu/hr Flare Operational No Firewater Pump	28.16368	09110524	288243.30	4117987.70	29.17655m	07010224	288107.00	4117082.00	30.84410m	07010224	288107.00	4117082.00	32.51165m	07010224	288107.00	4117082.00
FWP500	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	28.11792	09110524	288243.30	4117987.70	29.24222m	07010224	288107.00	4117082.00	30.90977m	07010224	288107.00	4117082.00	32.57732m	07010224	288107.00	4117082.00
FWP471	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	28.12860	09110524	288243.30	4117987.70	**29.27892m**	07010224	288107.00	4117082.00	**30.94647m**	07010224	288107.00	4117082.00	**32.61402m**	07010224	288107.00	4117082.00
FWP353	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	28.13947	09110524	288243.30	4117987.70	29.26190m	07010224	288107.00	4117082.00	30.92945m	07010224	288107.00	4117082.00	32.59700m	07010224	288107.00	4117082.00
FWP236	Boiler at 236 MMBtu/hr Flare Pilot Only Firewater Pump Operational	28.15431	09110524	288243.30	4117987.70	29.23455m	07010224	288107.00	4117082.00	30.90209m	07010224	288107.00	4117082.00	32.56964m	07010224	288107.00	4117082.00
FWP141	Boiler at 141 MMBtu/hr Flare Pilot Only Firewater Pump Operational	**28.16562**	09110524	288243.30	4117987.70	29.18033m	07010224	288107.00	4117082.00	30.84787m	07010224	288107.00	4117082.00	32.51542m	07010224	288107.00	4117082.00

Table 19. PM_{10} 24-Hour NAAQS & PSD Results (Run 4) (Parallel AERMOD 09292)

		PSD				NAAQS			
PM10 24-HOUR NAAQS & PSD AERMOD 09292	**RUN 4 Operating Scenarios**	**Predicted H1H & H2H ALL Impacts**	**Date**	**UTM Easting (m)**	**UTM Northing (m)**	**Predicted H6H ALL Impacts**	**Date**	**UTM Easting (m)**	**UTM Northing (m)**
NAQ-500 or PSD-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	29.38639 27.49997	10021724 10013124	288343.20 288043.40	4117984.00 4117995.20	31.43884	07072624	288043.40	4117995.20
NAQ-471 or PSD-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	29.40727 27.50282	10021724 10013124	288343.20 288043.40	4117984.00 4117995.20	31.44555	07072624	288043.40	4117995.20
NAQ-353 or PSD-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	29.37966 27.50589	10021724 10013124	288343.20 288043.40	4117984.00 4117995.20	31.44623	07062524	288043.40	4117995.20
NAQ-236 or PSD-236 Includes Nearby Sources	Boiler at 236 MMBtu/hr Flare Pilot Only Firewater Pump Operational	29.35052 27.51268	10021724 10013124	288343.20 288043.40	4117984.00 4117995.20	31.46634	07062524	288043.40	4117995.20
NAQ-141 or PSD-141 Includes Nearby Sources	Boiler at 141 MMBtu/hr Flare Pilot Only Firewater Pump Operational	29.33442 27.52180	10021724 10013124	288343.20 288043.40	4117984.00 4117995.20	31.47343	07062524	288043.40	4117995.20

Table 20. PM_{10} Annual SIL Results (Run 4) (Parallel AERMOD 09292)

PM10 ANNUAL SIL AERMOD 09292	RUN 4 Operating Scenarios	2006 Predicted H1H Facility Impacts	UTM Easting (m)	UTM Northing (m)	2007 Predicted H1H Facility Impacts	UTM Easting (m)	UTM Northing (m)	2008 Predicted H1H Facility Impacts	UTM Easting (m)	UTM Northing (m)	2009 Predicted H1H Facility Impacts	UTM Easting (m)	UTM Northing (m)	2010 Predicted H1H Facility Impacts	UTM Easting (m)	UTM Northing (m)
ALL-500	Boiler at 500 MMBtu/hr Flare Operational No Firewater Pump	5.59762	288043.40	4117995.20	7.04511	288043.40	4117995.20	5.89297	288043.40	4117995.20	5.36480	288043.40	4117995.20	6.82307	288043.40	4117995.20
ALL-471	Boiler at 471 MMBtu/hr Flare Operational No Firewater Pump	5.60025	288043.40	4117995.20	7.04864	288043.40	4117995.20	5.89619	288043.40	4117995.20	5.36728	288043.40	4117995.20	6.82584	288043.40	4117995.20
ALL-353	Boiler at 353 MMBtu/hr Flare Operational No Firewater Pump	5.59977	288043.40	4117995.20	7.04706	288043.40	4117995.20	5.89554	288043.40	4117995.20	5.36698	288043.40	4117995.20	6.82470	288043.40	4117995.20
FWP-500	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	5.59793	288043.40	4117995.20	7.04545	288043.40	4117995.20	5.89325	288043.40	4117995.20	5.36509	288043.40	4117995.20	6.82342	288043.40	4117995.20
FWP-471	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	**5.60056**	288043.40	4117995.20	**7.04899**	288043.40	4117995.20	**5.89648**	288043.40	4117995.20	**5.36757**	288043.40	4117995.20	**6.82620**	288043.40	4117995.20
FWP-353	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	5.60008	288043.40	4117995.20	7.04741	288043.40	4117995.20	5.89583	288043.40	4117995.20	5.36727	288043.40	4117995.20	6.82505	288043.40	4117995.20

Table 21. PM_{10} Annual NAAQS & PSD Results (Parallel AERMOD 09292)

PM10 ANNUAL NAAQS & PSD AERMOD 09292	RUN4 Operating Scenarios	2006 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)	2007 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)	2008 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)	2009 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)	2010 Predicted H1H ALL Impacts	UTM Easting (m)	UTM Northing (m)
NAQ-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	6.80506	288043.40	4117995.20	8.56401	288043.40	4117995.20	7.26383	288043.40	4117995.20	6.39917	288043.40	4117995.20	8.28807	288043.40	4117995.20
NAQ-500	3-Year Averages	7.54430														
					7.40900											
								7.31702								
NAQ-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	**6.80769**	288043.40	4117995.20	**8.56754**	288043.40	4117995.20	**7.26706**	288043.40	4117995.20	**6.40165**	288043.40	4117995.20	**8.29084**	288043.40	4117995.20
NAQ-471	3-Year Averages	7.54743														
					7.41208											
								7.31985								
NAQ-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	6.80721	288043.40	4117995.20	8.56596	288043.40	4117995.20	7.26640	288043.40	4117995.20	6.40134	288043.40	4117995.20	8.28969	288043.40	4117995.20
NAQ-353	3-Year Averages	7.54652														
					7.41123											
								7.31914								
PSD-500 Includes Nearby Sources	Boiler at 500 MMBtu/hr Flare Pilot Only Firewater Pump Operational	5.71551	288043.40	4117995.20	7.16048	288043.40	4117995.20	6.01591	288043.40	4117995.20	5.49427	288043.40	4117995.20	6.93593	288043.40	4117995.20
PSD-471 Includes Nearby Sources	Boiler at 471 MMBtu/hr Flare Pilot Only Firewater Pump Operational	**5.71814**	288043.40	4117995.20	**7.16401**	288043.40	4117995.20	**6.01914**	288043.40	4117995.20	**5.49675**	288043.40	4117995.20	**6.93871**	288043.40	4117995.20
PSD-353 Includes Nearby Sources	Boiler at 353 MMBtu/hr Flare Pilot Only Firewater Pump Operational	5.71766	288043.40	4117995.20	7.16244	288043.40	4117995.20	6.01849	288043.40	4117995.20	5.49644	288043.40	4117995.20	6.93756	288043.40	4117995.20

Appendix D

Nearby Source Data From Kansas Department of Health and Environment, Oklahoma Department of Environmental Quality, Colorado Department of Health and Environment, and Texas Commission of Environmental Quality; and Recommended Background Concentrations

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

$PM_{2.5}$ Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Diameter (ft)	Stack Exit Velocity (ft/s)	Stack Gas Temp. (°F)	PM_{10} Emissions PTE (lbs/hr)
KSPM001	0670007	COLUMBIAN CHEMICALS COMPANY	14	306549	4156832	923.39	43.22	83.54	1.38	36.84	195	2.00
KSPM002	0670007	COLUMBIAN CHEMICALS COMPANY	14	306549	4156832	923.39	43.22	83.54	1.38	36.84	195	2.00
KSPM003	0670007	COLUMBIAN CHEMICALS COMPANY	14	306549	4156832	923.39	43.22	77	2	40	450	2.05
KSPM004	0670007	COLUMBIAN CHEMICALS COMPANY	14	306549	4156832	923.39	43.22	79	2	41	280	7.50
KSPM005	0670007	COLUMBIAN CHEMICALS COMPANY	14	306549	4156832	923.39	43.22	85.41	3.61	32.69	381.39	0.16
KSPM006	1890009	WTG HUGOTON, LP	14	293270	4120091	949.39	5.61	23	1.33	77.2	800	0.54
KSPM007	1890009	WTG HUGOTON, LP	14	293270	4120091	949.39	5.61	23	1.33	66.8	800	0.54
KSPM008	1890009	WTG HUGOTON, LP	14	293270	4120091	949.39	5.61	25	1.16	112.4	800	0.59
KSPM009	1890009	WTG HUGOTON, LP	14	293270	4120091	949.39	5.61	17	0.66	116.9	800	0.21
KSPM010	1890009	WTG HUGOTON, LP	14	293270	4120091	949.39	5.61	17	0.66	118.3	800	0.21
KSPM011	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	12	0.5	484	1100	0.38
KSPM012	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	35	0.83	149	660	0.45
KSPM013	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	35	0.83	149	660	0.45
KSPM014	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	35	0.83	149	660	0.45
KSPM015	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	45	3	80	660	3.13
KSPM016	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	35	0.83	149	660	0.45
KSPM017	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	35	0.83	149	660	0.45
KSPM018	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	32	0.83	149	660	0.45
KSPM019	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	32	0.83	150	660	0.45
KSPM020	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	35	0.83	149	660	0.45
KSPM021	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	32	0.83	149	660	0.45
KSPM022	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	35	0.83	149	660	0.45
KSPM023	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	20	0.5	240	1100	0.20
KSPM024	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	20	0.5	240	1100	0.20
KSPM025	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	45	2	94	660	1.64
KSPM026	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	45	2	94	660	1.64
KSPM027	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	45	2	94	660	1.64
KSPM028	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	20	1	39	1000	0.13
KSPM029	1890021	HUGOTON MUNICIPAL POWER PLANT (#	14	292326	4115396	947.24	4.73	33	2.5	106.4	505	11.49
KSPM030	1890054	WTG HUGOTON, LP	14	290087	4121793	961.44	4.51	21	1	64.3	650	0.37
KSPM031	1890054	WTG HUGOTON, LP	14	290087	4121793	961.44	4.51	21	1	64.1	650	0.37
KSPM032	1890054	WTG HUGOTON, LP	14	290087	4121793	961.44	4.51	21	1	64.1	650	0.37
KSPM033	1890054	WTG HUGOTON, LP	14	290087	4121793	961.44	4.51	21	1	64.1	650	0.37
KSPM034	1890185	ONEOK FIELD SERVICES COMPANY, LLC	14	288524	4123448	959.77	5.76	24.51	1.09	53.83	814.31	0.40
KSPM035	1890103	SEABOARD FOODS, LP	14	288373	4116999	953.17	0.72	73.61	3.78	29.33	416.37	0.50
KSPM036	1890103	SEABOARD FOODS, LP	14	288373	4116999	953.17	0.72	108.52	6.55	36.63	387.19	0.16
KSPM037	1890103	SEABOARD FOODS, LP	14	288373	4116999	953.17	0.72	58.05	1.45	29.72	73.19	0.20
KSPM038	1890103	SEABOARD FOODS, LP	14	288373	4116999	953.17	0.72	34.19	1.21	13.48	75.24	0.06
KSPM039	1890103	SEABOARD FOODS, LP	14	288373	4116999	953.17	0.72	71	1.59	62.1	74	1.52
KSPM040	1890103	SEABOARD FOODS, LP	14	288373	4116999	953.17	0.72	56.47	2.60	54.83	114.52	1.28
KSPM041	1890189	ANADARKO GATHERING COMPANY LLC	14	286971	4125107	962.83	7.51	16	0.83	111	1105	0.38

$PM_{2.5}$ Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Diameter (ft)	Stack Exit Velocity (ft/s)	Stack Gas Temp. (°F)	PM_{10} Emissions PTE (lbs/hr)
KSPM042	1890189	ANADARKO GATHERING COMPANY LLC	14	286971	4125107	962.83	7.51	16	0.83	111	1105	0.38
KSPM043	1890136	ANADARKO GATHERING COMPANY LLC	14	286857	4120265	960.1	2.90	20	0.67	198	1105	0.38
KSPM044	1890144	ANADARKO GATHERING COMPANY LLC	14	286624	4110597	965.09	7.28	16	0.83	148	1100	0.38
KSPM045	1890144	ANADARKO GATHERING COMPANY LLC	14	286624	4110597	965.09	7.28	16	0.83	148	1100	0.38
KSPM046	1890143	ANADARKO GATHERING COMPANY LLC	14	285140	4115457	963.53	3.79	16	0.83	157	1175	0.38
KSPM047	1890143	ANADARKO GATHERING COMPANY LLC	14	285140	4115457	963.53	3.79	16	0.83	157	1175	0.38
KSPM048	1890143	ANADARKO GATHERING COMPANY LLC	14	285140	4115457	963.53	3.79	16	0.83	161	1175	0.38
KSPM049	1890137	ANADARKO GATHERING COMPANY LLC	14	282035	4120385	967.86	6.72	15	0.5	160	970	0.18
KSPM050	1890137	ANADARKO GATHERING COMPANY LLC	14	282035	4120385	967.86	6.72	15	0.5	160	970	0.18
KSPM051	1890137	ANADARKO GATHERING COMPANY LLC	14	282035	4120385	967.86	6.72	24.51	1.09	53.83	814.31	0.16
KSPM052	1890137	ANADARKO GATHERING COMPANY LLC	14	282035	4120385	967.86	6.72	15	0.5	110	1144	0.10
KSPM053	1890137	ANADARKO GATHERING COMPANY LLC	14	282035	4120385	967.86	6.72	24.51	1.09	53.83	814.31	0.10
KSPM054	1890044	ANADARKO GATHERING COMPANY LLC	14	281998	4118768	965.22	6.29	24.51	1.09	53.83	814.31	0.16
KSPM055	1890044	ANADARKO GATHERING COMPANY LLC	14	281998	4118768	965.22	6.29	24.51	1.09	53.83	814.31	0.10
KSPM056	1890044	ANADARKO GATHERING COMPANY LLC	14	281998	4118768	965.22	6.29	20	1	230	1103	0.29
KSPM057	1890044	ANADARKO GATHERING COMPANY LLC	14	281998	4118768	965.22	6.29	24.51	1.09	53.83	814.31	0.10
KSPM058	0670007	COLUMBIAN CHEMICALS COMPANY	14	306549	4156832	923.39	43.91	150.00	2.50	74.00	400.00	0.25
KSPM059	0670007	COLUMBIAN CHEMICALS COMPANY	14	306549	4156832	923.39	43.91	195.00	6.00	40.00	450.00	18.00

**As a preliminary estimate, ABBK used the NAAQS inventories for the increment analysis; however, impacts from the Seaboard Foods, LLC feed mill located immediately adjacent to and south of the ABBK facility resulted in a PSD increment violation when included in the increment analysis for the 24-hour PM_{10} averaging period. Per an email dated December 12, 2009, KDHE reviewed the Seaboard Foods, LLC facility files and indicated that the facility was not a PM_{10} increment consuming source and that it could be excluded from the increment analysis for the 24-hour PM_{10} averaging period. No other nearby

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

PM_{10} Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Diameter (ft)	Stack Exit Velocity (ft/s)	Stack Gas Temp. (°F)	PM_{10} Emissions PTE (lbs/hr)
KSPM001	0670007	COLUMBIAN CHEMICALS COMPANY	14	306549	4156832	923.39	43.22	83.54	1.38	36.84	195	2.00
KSPM002	0670007	COLUMBIAN CHEMICALS COMPANY	14	306549	4156832	923.39	43.22	83.54	1.38	36.84	195	2.00
KSPM003	0670007	COLUMBIAN CHEMICALS COMPANY	14	306549	4156832	923.39	43.22	77	2	40	450	2.05
KSPM004	0670007	COLUMBIAN CHEMICALS COMPANY	14	306549	4156832	923.39	43.22	79	2	41	280	7.50
KSPM005	0670007	COLUMBIAN CHEMICALS COMPANY	14	306549	4156832	923.39	43.22	85.41	3.61	32.69	381.39	0.16
KSPM006	1890009	WTG HUGOTON, LP	14	293270	4120091	949.39	5.61	23	1.33	77.2	800	0.54
KSPM007	1890009	WTG HUGOTON, LP	14	293270	4120091	949.39	5.61	23	1.33	66.8	800	0.54
KSPM008	1890009	WTG HUGOTON, LP	14	293270	4120091	949.39	5.61	25	1.16	112.4	800	0.59
KSPM009	1890009	WTG HUGOTON, LP	14	293270	4120091	949.39	5.61	17	0.66	116.9	800	0.21
KSPM010	1890009	WTG HUGOTON, LP	14	293270	4120091	949.39	5.61	17	0.66	118.3	800	0.21
KSPM011	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	12	0.5	484	1100	0.38
KSPM012	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	35	0.83	149	660	0.45
KSPM013	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	35	0.83	149	660	0.45
KSPM014	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	35	0.83	149	660	0.45
KSPM015	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	45	3	80	660	3.13
KSPM016	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	35	0.83	149	660	0.45
KSPM017	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	35	0.83	149	660	0.45
KSPM018	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	32	0.83	149	660	0.45
KSPM019	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	32	0.83	150	660	0.45
KSPM020	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	35	0.83	149	660	0.45
KSPM021	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	32	0.83	149	660	0.45
KSPM022	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	35	0.83	149	660	0.45
KSPM023	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	20	0.5	240	1100	0.20
KSPM024	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	20	0.5	240	1100	0.20
KSPM025	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	45	2	94	660	1.64
KSPM026	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	45	2	94	660	1.64
KSPM027	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	45	2	94	660	1.64
KSPM028	1890015	ANADARKO GATHERING COMPANY LLC	14	293191	4115298	947.66	5.54	20	1	39	1000	0.13
KSPM029	1890021	HUGOTON MUNICIPAL POWER PLANT (#	14	292326	4115396	947.24	4.73	33	2.5	106.4	505	11.49
KSPM030	1890054	WTG HUGOTON, LP	14	290087	4121793	961.44	4.51	21	1	64.3	650	0.37
KSPM031	1890054	WTG HUGOTON, LP	14	290087	4121793	961.44	4.51	21	1	64.1	650	0.37
KSPM032	1890054	WTG HUGOTON, LP	14	290087	4121793	961.44	4.51	21	1	64.1	650	0.37
KSPM033	1890054	WTG HUGOTON, LP	14	290087	4121793	961.44	4.51	21	1	64.1	650	0.37
KSPM034	1890185	ONEOK FIELD SERVICES COMPANY, LLC	14	288524	4123448	959.77	5.76	24.51	1.09	53.83	814.31	0.40
KSPM035	1890103	SEABOARD FOODS, LP	14	288373	4116999	953.17	0.72	73.61	3.78	29.33	416.37	0.50
KSPM036	1890103	SEABOARD FOODS, LP	14	288373	4116999	953.17	0.72	108.52	6.55	36.63	387.19	0.16
KSPM037	1890103	SEABOARD FOODS, LP	14	288373	4116999	953.17	0.72	58.05	1.45	29.72	73.19	0.20
KSPM038	1890103	SEABOARD FOODS, LP	14	288373	4116999	953.17	0.72	34.19	1.21	13.48	75.24	0.06
KSPM039	1890103	SEABOARD FOODS, LP	14	288373	4116999	953.17	0.72	71	1.59	62.1	74	1.52
KSPM040	1890103	SEABOARD FOODS, LP	14	288373	4116999	953.17	0.72	56.47	2.60	54.83	114.52	14.40
KSPM041	1890189	ANADARKO GATHERING COMPANY LLC	14	286971	4125107	962.83	7.51	16	0.83	111	1105	0.38

PM_{10} Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Diameter (ft)	Stack Exit Velocity (ft/s)	Stack Gas Temp. (°F)	PM_{10} Emissions PTE (lbs/hr)
KSPM042	1890189	ANADARKO GATHERING COMPANY LLC	14	286971	4125107	962.83	7.51	16	0.83	111	1105	0.38
KSPM043	1890136	ANADARKO GATHERING COMPANY LLC	14	286857	4120265	960.1	2.90	20	0.67	198	1105	0.38
KSPM044	1890144	ANADARKO GATHERING COMPANY LLC	14	286624	4110597	965.09	7.28	16	0.83	148	1100	0.38
KSPM045	1890144	ANADARKO GATHERING COMPANY LLC	14	286624	4110597	965.09	7.28	16	0.83	148	1100	0.38
KSPM046	1890143	ANADARKO GATHERING COMPANY LLC	14	285140	4115457	963.53	3.79	16	0.83	157	1175	0.38
KSPM047	1890143	ANADARKO GATHERING COMPANY LLC	14	285140	4115457	963.53	3.79	16	0.83	157	1175	0.38
KSPM048	1890143	ANADARKO GATHERING COMPANY LLC	14	285140	4115457	963.53	3.79	16	0.83	161	1175	0.38
KSPM049	1890137	ANADARKO GATHERING COMPANY LLC	14	282035	4120385	967.86	6.72	15	0.5	160	970	0.18
KSPM050	1890137	ANADARKO GATHERING COMPANY LLC	14	282035	4120385	967.86	6.72	15	0.5	160	970	0.18
KSPM051	1890137	ANADARKO GATHERING COMPANY LLC	14	282035	4120385	967.86	6.72	24.51	1.09	53.83	814.31	0.16
KSPM052	1890137	ANADARKO GATHERING COMPANY LLC	14	282035	4120385	967.86	6.72	15	0.5	110	1144	0.10
KSPM053	1890137	ANADARKO GATHERING COMPANY LLC	14	282035	4120385	967.86	6.72	24.51	1.09	53.83	814.31	0.10
KSPM054	1890044	ANADARKO GATHERING COMPANY LLC	14	281998	4118768	965.22	6.29	24.51	1.09	53.83	814.31	0.16
KSPM055	1890044	ANADARKO GATHERING COMPANY LLC	14	281998	4118768	965.22	6.29	24.51	1.09	53.83	814.31	0.10
KSPM056	1890044	ANADARKO GATHERING COMPANY LLC	14	281998	4118768	965.22	6.29	20	1	230	1103	0.29
KSPM057	1890044	ANADARKO GATHERING COMPANY LLC	14	281998	4118768	965.22	6.29	24.51	1.09	53.83	814.31	0.10
KSPM058	0670007	COLUMBIAN CHEMICALS COMPANY	14	306549	4156832	923.39	43.91	150.00	2.50	74.00	400.00	0.25
KSPM059	0670007	COLUMBIAN CHEMICALS COMPANY	14	306549	4156832	923.39	43.91	195.00	6.00	40.00	450.00	18.00

**As a preliminary estimate, ABBK used the NAAQS inventories for the increment analysis; however, impacts from the Seaboard Foods, LLC feed mill located immediately adjacent to and south of the ABBK facility resulted in a PSD increment violation when included in the increment analysis for the 24-hour PM_{10} averaging period. Per an email dated December 12, 2009, KDHE reviewed the Seaboard Foods, LLC facility files and indicated that the facility was not a PM_{10} increment consuming source and that it could be excluded from the increment analysis for the 24-hour PM_{10} averaging period. No other nearby

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO418	1890103	SEABOARD FOODS, LP 001	External Combustion Boilers, Grades 1 and 2 Oil	14	288569.00	4116475.00	952.47	0.41	73.607	416.636	29.334	3.781	2.057	0.05
KSNO436	1890203	CITY OF HUGOTON	NG Engine	14	290764.00	4116301.00	950.32	2.42	28.761	704.857	55.021	1.618	7.815	0.10
KSNO423	1890143	ANADARKO GATHERING COMPANY LLC 1	NG Engine	14	285864.00	4115896.00	961.66	2.72	16.000	1175.270	157.000	0.830	3.965	0.10
KSNO424	1890143	ANADARKO GATHERING COMPANY LLC 1	NG Engine	14	285864.00	4115896.00	961.66	2.72	16.000	1175.270	157.000	0.830	47.180	0.10
KSNO421	1890136	ANADARKO GATHERING COMPANY LLC 4	NG Engine	14	287584.00	4119492.00	958.41	2.77	20.000	1105.270	198.000	0.670	4.097	0.10
KSNO375	1890020	HUGOTON MUNICIPAL POWER PLANT (#1)	Dual Fuel Engine	14	291552.00	4117045.00	948.18	3.15	28.761	704.857	55.021	1.618	16.785	0.29
KSNO435	1890202	CITY OF HUGOTON	NG Engine	14	291578.00	4116896.00	947.94	3.17	28.761	704.857	55.021	1.618	3.294	0.10
KSNO434	1890201	ONEOK FIELD SERVICES COMPANY, L.L.C.	NG Engine	14	286706.00	4113812.00	961.92	3.48	28.761	704.857	55.021	1.618	2.551	0.10
KSNO420	1890126	ANADARKO GATHERING COMPANY LLC	NG Engine	14	291615.00	4118513.00	947.75	3.61	28.761	704.857	55.021	1.618	4.002	0.10
KSNO437	1890208	ONEOK FIELD SERVICES COMPANY, L.L.C.	NG Engine	14	290045.00	4120184.00	953.82	3.71	28.761	704.857	55.021	1.618	5.103	0.10
KSNO376	1890021	HUGOTON MUNICIPAL POWER PLANT (#2) 1	Internal Combustion Engines, Dual Fuel (Oil/Gas)	14	292326.00	4115396.00	947.24	4.18	33.000	505.270	106.400	2.500	474.504	0.21
KSNO438	1890209	ONEOK FIELD SERVICES COMPANY, L.L.C.	NG Engine	14	288265.00	4112165.00	963.19	4.69	28.761	704.857	55.021	1.618	3.894	0.10
KSNO357	1890015	ANADARKO GATHERING COMPANY LLC 1	NG Engine	14	293191.00	4115298.00	947.66	5.03	32.000	660.270	149.000	0.830	29.543	0.10
KSNO358	1890015	ANADARKO GATHERING COMPANY LLC 10	NG Engine	14	293191.00	4115298.00	947.66	5.03	35.000	660.270	149.000	0.830	29.543	0.10
KSNO359	1890015	ANADARKO GATHERING COMPANY LLC 11	NG Engine	14	293191.00	4115298.00	947.66	5.03	45.000	660.270	94.000	2.000	138.269	0.10
KSNO360	1890015	ANADARKO GATHERING COMPANY LLC 12	NG Engine	14	293191.00	4115298.00	947.66	5.03	45.000	660.270	94.000	2.000	138.269	0.10
KSNO361	1890015	ANADARKO GATHERING COMPANY LLC 13	NG Engine	14	293191.00	4115298.00	947.66	5.03	45.000	660.270	94.000	2.000	138.269	0.10
KSNO362	1890015	ANADARKO GATHERING COMPANY LLC 14	NG Engine	14	293191.00	4115298.00	947.66	5.03	45.000	660.270	80.000	3.000	205.460	0.10
KSNO363	1890015	ANADARKO GATHERING COMPANY LLC 15	NG Engine	14	293191.00	4115298.00	947.66	5.03	20.000	1100.270	240.000	0.500	9.362	0.10
KSNO364	1890015	ANADARKO GATHERING COMPANY LLC 16	NG Engine	14	293191.00	4115298.00	947.66	5.03	20.000	1100.270	240.000	0.500	9.362	0.10
KSNO365	1890015	ANADARKO GATHERING COMPANY LLC 17	Diesel Engine	14	293191.00	4115298.00	947.66	5.03	12.000	1100.270	39.000	0.500	28.866	0.10
KSNO366	1890015	ANADARKO GATHERING COMPANY LLC 18	4.00 GLYCOL REBOILER	14	293191.00	4115298.00	947.66	5.03	20.000	1000.270	484.000	1.000	0.107	0.05
KSNO367	1890015	ANADARKO GATHERING COMPANY LLC 2	NG Engine	14	293191.00	4115298.00	947.66	5.03	32.000	660.270	150.000	0.830	29.543	0.10
KSNO368	1890015	ANADARKO GATHERING COMPANY LLC 3	NG Engine	14	293191.00	4115298.00	947.66	5.03	32.000	660.270	149.000	0.830	29.543	0.10
KSNO369	1890015	ANADARKO GATHERING COMPANY LLC 4	NG Engine	14	293191.00	4115298.00	947.66	5.03	35.000	660.270	149.000	0.830	29.543	0.10
KSNO370	1890015	ANADARKO GATHERING COMPANY LLC 5	NG Engine	14	293191.00	4115298.00	947.66	5.03	35.000	660.270	149.000	0.830	29.543	0.10
KSNO371	1890015	ANADARKO GATHERING COMPANY LLC 6	NG Engine	14	293191.00	4115298.00	947.66	5.03	35.000	660.270	149.000	0.830	29.543	0.10
KSNO372	1890015	ANADARKO GATHERING COMPANY LLC 7	NG Engine	14	293191.00	4115298.00	947.66	5.03	35.000	660.270	149.000	0.830	29.543	0.10
KSNO373	1890015	ANADARKO GATHERING COMPANY LLC 8	NG Engine	14	293191.00	4115298.00	947.66	5.03	35.000	660.270	149.000	0.830	29.543	0.10
KSNO374	1890015	ANADARKO GATHERING COMPANY LLC 9	NG Engine	14	293191.00	4115298.00	947.66	5.03	35.000	660.270	149.000	0.830	29.543	0.10
KSNO412	1890054	WTG HUGOTON, LP 1	NG Engine	14	290087.00	4121793.00	961.44	5.22	21.000	650.270	64.300	1.000	31.111	0.10
KSNO413	1890054	WTG HUGOTON, LP 2	NG Engine	14	290087.00	4121793.00	961.44	5.22	21.000	650.270	64.100	1.000	31.111	0.10
KSNO414	1890054	WTG HUGOTON, LP 3	NG Engine	14	290087.00	4121793.00	961.44	5.22	21.000	650.270	64.100	1.000	31.111	0.10
KSNO415	1890054	WTG HUGOTON, LP 4	NG Engine	14	290087.00	4121793.00	961.44	5.22	21.000	650.270	64.100	1.000	31.111	0.10
KSNO345	1890008	WTG HUGOTON, LP	NG Engine	14	293270.00	4120091.00	949.39	5.61	17.000	800.000	116.900	0.660	0.039	0.10
KSNO351	1890008	WTG HUGOTON, LP	NG Engine	14	293270.00	4120091.00	949.39	5.61	17.000	800.000	118.300	0.660	0.029	0.10
KSNO352	1890008	WTG HUGOTON, LP	NG Engine	14	293270.00	4120091.00	949.39	5.61	23.000	800.000	66.800	1.330	129.059	0.10
KSNO353	1890008	WTG HUGOTON, LP	NG Engine	14	293270.00	4120091.00	949.39	5.61	25.000	800.000	112.400	1.160	3.295	0.10
KSNO354	1890008	WTG HUGOTON, LP	NG Engine	14	293270.00	4120091.00	949.39	5.61	23.000	800.000	77.200	1.330	132.694	0.10
KSNO430	1890183	ONEOK FIELD SERVICES COMPANY, L.L.C.	NG Engine	14	283492.00	4113897.00	969.29	5.74	28.761	704.857	55.021	1.618	15.386	0.10
KSNO346	1890009	WTG HUGOTON, LP 1	NG Engine	14	293270.00	4120091.00	949.39	5.84	17.000	800.270	116.900	0.660	9.793	0.10
KSNO347	1890009	WTG HUGOTON, LP 2	NG Engine	14	293270.00	4120091.00	949.39	5.84	17.000	800.270	118.300	0.660	9.793	0.10
KSNO348	1890009	WTG HUGOTON, LP 4	COOPER-BESSEMER GMVA-10	14	293270.00	4120091.00	949.39	5.84	23.000	800.270	66.800	1.330	35.559	0.10
KSNO349	1890009	WTG HUGOTON, LP 5	NG Engine	14	293270.00	4120091.00	949.39	5.84	25.000	800.270	112.400	1.160	26.775	0.10
KSNO350	1890009	WTG HUGOTON, LP 6	COOPER-BESSEMER GMVA-10	14	293270.00	4120091.00	949.39	5.84	23.000	800.270	77.200	1.330	35.559	0.10
KSNO001	0550009	WTG HUGOTON, LP	NG Engine	14	327158.00	4194163.00	893.37	6.12	13.000	800.000	121.700	1.000	5.441	0.10
KSNO002	0550009	WTG HUGOTON, LP	NG Engine	14	327158.00	4194163.00	893.37	6.12	18.000	950.000	73.100	1.000	3.452	0.10
KSNO003	0550009	WTG HUGOTON, LP	NG Engine	14	327158.00	4194163.00	893.37	6.12	24.000	998.000	112.300	1.160	39.731	0.10
KSNO004	0550009	WTG HUGOTON, LP	NG Engine	14	327158.00	4194163.00	893.37	6.12	29.000	998.000	112.300	1.160	6.517	0.10

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO005	0550009	WTG HUGOTON, LP	NG Engine	14	327158.00	4194163.00	893.37	6.12	27.150	509.748	18.245	1.607	0.049	0.10
KSNO431	1890185	ONEOK FIELD SERVICES COMPANY, LLC 001	NG Engine	14	288858.00	4123068.00	965.41	6.23	24.512	814.583	53.826	1.087	10.720	0.10
KSNO425	1890144	ANADARKO GATHERING COMPANY LLC 1	NG Engine	14	287384.00	4110614.00	963.31	6.32	16.000	1100.270	148.000	0.830	49.162	0.10
KSNO396	1890044	ANADARKO GATHERING COMPANY LLC	NG Engine	14	282561.00	4114129.00	971.19	6.45	24.512	814.583	53.826	1.087	4.438	0.10
KSNO397	1890044	ANADARKO GATHERING COMPANY LLC	NG Engine	14	282561.00	4114129.00	971.19	6.45	24.512	814.583	53.826	1.087	7.490	0.10
KSNO398	1890044	ANADARKO GATHERING COMPANY LLC	NG Engine	14	282561.00	4114129.00	971.19	6.45	24.512	814.583	53.826	1.087	4.438	0.10
KSNO399	1890044	ANADARKO GATHERING COMPANY LLC 4	NG Engine	14	282561.00	4114129.00	971.19	6.45	20.000	1103.270	230.000	1.000	13.107	0.10
KSNO422	1890137	ANADARKO GATHERING COMPANY LLC	NG Engine	14	282035.00	4120385.00	967.86	7.29	28.761	704.857	55.021	1.618	21.409	0.10
KSNO432	1890189	ANADARKO GATHERING COMPANY LLC 1	NG Engine	14	287016.00	4124348.00	962.65	7.63	16.000	1105.270	111.000	0.830	38.590	0.10
KSNO440	1890220	ANADARKO GATHERING COMPANY LLC	NG Engine	14	281622.00	4113136.00	973.81	7.74	28.761	704.857	55.021	1.618	2.551	0.10
KSNO386	1890025	WTG HUGOTON, LP	NG Engine	14	293047.00	4110431.00	950.08	7.92	24.512	814.583	53.826	1.087	7.003	0.10
KSNO387	1890025	WTG HUGOTON, LP 1	NG Engine	14	293047.00	4110431.00	950.08	7.92	17.000	800.270	64.700	1.330	35.559	0.10
KSNO388	1890025	WTG HUGOTON, LP 2	NG Engine	14	293047.00	4110431.00	950.08	7.92	16.000	800.270	109.800	1.000	23.105	0.10
KSNO389	1890025	WTG HUGOTON, LP 3	NG Engine	14	293047.00	4110431.00	950.08	7.92	15.000	800.270	69.300	0.830	10.972	0.10
KSNO390	1890025	WTG HUGOTON, LP 5	NG Engine	14	293047.00	4110431.00	950.08	7.92	19.000	800.270	71.300	0.660	14.305	0.10
KSNO391	1890025	WTG HUGOTON, LP 6	NG Engine	14	293047.00	4110431.00	950.08	7.92	19.000	800.270	71.300	0.660	7.003	0.10
KSNO392	1890025	WTG HUGOTON, LP 7	NG Engine	14	293047.00	4110431.00	950.08	7.92	19.000	800.270	71.300	0.660	7.003	0.10
KSNO393	1890032	WTG HUGOTON, LP 1	NG Engine	14	283401.00	4110674.00	977.16	7.95	17.000	800.270	171.100	0.830	19.922	0.10
KSNO394	1890032	WTG HUGOTON, LP 2	NG Engine	14	283401.00	4110674.00	977.16	7.95	23.000	800.270	87.100	1.160	29.543	0.10
KSNO395	1890032	WTG HUGOTON, LP 3	NG Engine	14	283401.00	4110674.00	977.16	7.95	18.000	800.270	131.700	1.160	55.308	0.10
KSNO419	1890115	EXXONMOBIL PRODUCTION COMPANY	NG Engine	14	280359.00	4117196.00	968.32	8.06	28.761	704.857	55.021	1.618	1.209	0.10
KSNO429	1890182	ONEOK FIELD SERVICES COMPANY, LLC	NG Engine	14	286578.00	4108981.00	967.51	8.08	28.761	704.857	55.021	1.618	30.237	0.10
KSNO014	0550024	WTG HUGOTON, LP	NG Engine	14	320748.00	4194270.00	902.34	8.21	16.000	800.000	89.700	1.000	17.901	0.10
KSNO015	0550024	WTG HUGOTON, LP	NG Engine	14	320748.00	4194270.00	902.34	8.21	16.000	800.000	98.200	1.000	34.358	0.10
KSNO016	0550024	WTG HUGOTON, LP	NG Engine	14	320748.00	4194270.00	902.34	8.21	15.000	957.000	145.000	0.660	7.695	0.10
KSNO017	0550024	WTG HUGOTON, LP	NG Engine	14	320748.00	4194270.00	902.34	8.21	17.000	800.000	91.900	1.000	34.358	0.10
KSNO018	0550024	WTG HUGOTON, LP	NG Engine	14	320748.00	4194270.00	902.34	8.21	16.000	800.000	89.900	1.000	33.433	0.10
KSNO019	0550024	WTG HUGOTON, LP	NG Engine	14	320748.00	4194270.00	902.34	8.21	21.000	584.000	84.100	0.830	12.160	0.10
KSNO020	0550024	WTG HUGOTON, LP	NG Engine	14	320748.00	4194270.00	902.34	8.21	21.000	584.000	84.100	0.830	12.160	0.10
KSNO021	0550024	WTG HUGOTON, LP	NG Engine	14	320748.00	4194270.00	902.34	8.21	21.000	584.000	84.100	0.830	12.160	0.10
KSNO022	0550024	WTG HUGOTON, LP	GLYCOL REBOILER	14	320748.00	4194270.00	902.34	8.21	27.150	509.748	18.245	1.607	0.109	0.05
KSNO030	0550043	TYSON FRESH MEATS, INC.	NG Boiler	14	322114.00	4207381.00	883.79	8.33	43.000	150.000	80.000	3.000	2.941	0.05
KSNO031	0550043	TYSON FRESH MEATS, INC.	NG Boiler	14	322114.00	4207381.00	883.79	8.33	58.213	436.409	27.610	3.403	21.569	0.05
KSNO032	0550043	TYSON FRESH MEATS, INC.	NG Engine	14	322114.00	4207381.00	883.79	8.33	24.512	814.313	53.826	1.087	2.811	0.10
KSNO033	0550043	TYSON FRESH MEATS, INC.	NG Boiler	14	322114.00	4207381.00	883.79	8.33	36.662	429.809	20.609	1.850	8.627	0.05
KSNO034	0550043	TYSON FRESH MEATS, INC.	NG Engine	14	322114.00	4207381.00	883.79	8.33	24.512	814.313	53.826	1.087	2.343	0.10
KSNO035	0550043	TYSON FRESH MEATS, INC.	Animal/Poultry Rendering, Cooking	14	322114.00	4207381.00	883.79	8.33	46.039	169.632	49.713	2.329	0.168	0.05
KSNO036	0550043	TYSON FRESH MEATS, INC.	NG Boiler	14	322114.00	4207381.00	883.79	8.33	36.662	429.809	20.609	1.850	0.167	0.05
KSNO427	1890176	ONEOK FIELD SERVICES COMPANY, L.L.C.	NG Engine	14	293903.00	4109558.00	949.42	9.13	24.512	814.583	53.826	1.087	1.429	0.10
KSNO428	1890180	ONEOK FIELD SERVICES COMPANY, L.L.C.	NG Engine	14	294956.00	4123273.00	952.70	9.17	28.761	704.857	55.021	1.618	16.822	0.10
KSNO439	1890213	ONEOK FIELD SERVICES COMPANY, L.L.C.	NG Engine	14	280465.00	4122038.00	971.83	9.49	28.761	704.857	55.021	1.618	5.612	0.10
KSNO426	1890166	ONEOK FIELD SERVICES COMPANY, L.L.C.	NG Engine	14	288600.00	4126680.00	960.68	9.83	28.761	704.857	55.021	1.618	8.729	0.10
KSNO355	1890014	ANADARKO GATHERING COMPANY LLC 001	NG Engine	14	284905.00	4105801.00	972.43	11.59	35.000	660.270	43.000	3.000	85.944	0.10
KSNO356	1890014	ANADARKO GATHERING COMPANY LLC 002	GLYCOL REBOILER	14	284905.00	4105801.00	972.43	11.59	20.000	600.270	26.000	0.830	0.196	0.05
KSNO403	1890051	ANADARKO GATHERING COMPANY LLC	GLYCOL DEHY REBOILER	14	275641.00	4120558.00	980.02	13.30	27.150	510.018	18.245	1.607	0.196	0.05
KSNO404	1890051	ANADARKO GATHERING COMPANY LLC 1	NG Engine	14	275641.00	4120558.00	980.02	13.30	42.000	805.270	183.700	1.330	91.603	0.10
KSNO405	1890051	ANADARKO GATHERING COMPANY LLC 2	NG Engine	14	275641.00	4120558.00	980.02	13.30	42.000	805.270	183.000	1.330	91.603	0.10
KSNO406	1890051	ANADARKO GATHERING COMPANY LLC 3	NG Engine	14	275641.00	4120558.00	980.02	13.30	42.000	805.270	183.700	1.330	91.603	0.10
KSNO407	1890051	ANADARKO GATHERING COMPANY LLC 4	NG Engine	14	275641.00	4120558.00	980.02	13.30	42.000	805.270	183.000	1.330	91.603	0.10
KSNO408	1890051	ANADARKO GATHERING COMPANY LLC 5	NG Engine	14	275641.00	4120558.00	980.02	13.30	42.000	805.270	183.000	1.330	91.603	0.10
KSNO409	1890051	ANADARKO GATHERING COMPANY LLC 6	NG Engine	14	275641.00	4120558.00	980.02	13.30	42.000	805.270	183.000	1.330	91.603	0.10
KSNO410	1890051	ANADARKO GATHERING COMPANY LLC 7	NG Engine	14	275641.00	4120558.00	980.02	13.30	14.000	1100.270	383.000	0.500	4.106	0.10
KSNO411	1890051	ANADARKO GATHERING COMPANY LLC 8	CATERPILLAR D349, 1100HP	14	275641.00	4120558.00	980.02	13.30	16.000	1100.270	168.000	0.830	29.543	0.10

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO400	1890046	WTG HUGOTON, LP 1	NG Engine	14	306223.00	4124605.00	930.30	19.43	18.000	800.270	65.100	1.160	38.024	0.10
KSNO401	1890046	WTG HUGOTON, LP 2	NG Engine	14	306223.00	4124605.00	930.30	19.43	18.000	800.270	65.000	1.160	38.024	0.10
KSNO402	1890046	WTG HUGOTON, LP 3	NG Engine	14	306223.00	4124605.00	930.30	19.43	23.000	850.270	104.600	0.830	15.447	0.10
KSNO318	1890008	WTG HUGOTON, LP	DEHY VRU VENT PILOT	14	307729.00	4119753.00	911.72	19.54	20.740	553.249	11.501	1.087	0.764	0.50
KSNO319	1890008	WTG HUGOTON, LP	BOILER FOR TANK 7	14	307729.00	4119753.00	911.72	19.54	27.150	510.018	18.245	1.607	0.024	0.05
KSNO320	1890008	WTG HUGOTON, LP 1	NG Engine	14	307729.00	4119753.00	911.72	19.54	27.000	765.270	30.900	1.830	23.105	0.10
KSNO321	1890008	WTG HUGOTON, LP 10	NG Engine	14	307729.00	4119753.00	911.72	19.54	27.000	765.270	31.800	1.830	23.105	0.10
KSNO322	1890008	WTG HUGOTON, LP 11	NG Engine	14	307729.00	4119753.00	911.72	19.54	27.000	765.270	31.800	1.830	23.105	0.10
KSNO323	1890008	WTG HUGOTON, LP 12	SOLAR T1001S332	14	307729.00	4119753.00	911.72	19.54	22.000	850.270	55.600	1.500	2.928	0.25
KSNO324	1890008	WTG HUGOTON, LP 13	SOLAR T1001S332	14	307729.00	4119753.00	911.72	19.54	22.000	850.270	55.600	1.500	2.928	0.25
KSNO325	1890008	WTG HUGOTON, LP 14	SOLAR T1001S332	14	307729.00	4119753.00	911.72	19.54	22.000	850.270	55.600	1.500	2.928	0.25
KSNO326	1890008	WTG HUGOTON, LP 15	NG Engine	14	307729.00	4119753.00	911.72	19.54	29.000	650.270	45.800	1.660	48.343	0.10
KSNO327	1890008	WTG HUGOTON, LP 16	NG Engine	14	307729.00	4119753.00	911.72	19.54	27.000	650.270	31.600	2.000	48.343	0.10
KSNO328	1890008	WTG HUGOTON, LP 17	NG Engine	14	307729.00	4119753.00	911.72	19.54	27.000	650.270	31.600	2.000	48.343	0.10
KSNO329	1890008	WTG HUGOTON, LP 18	NG Engine	14	307729.00	4119753.00	911.72	19.54	21.000	500.270	83.000	1.000	37.506	0.10
KSNO330	1890008	WTG HUGOTON, LP 19	NG Engine	14	307729.00	4119753.00	911.72	19.54	21.000	500.270	83.000	1.000	37.506	0.10
KSNO331	1890008	WTG HUGOTON, LP 2	NG Engine	14	307729.00	4119753.00	911.72	19.54	27.000	765.270	31.200	1.830	23.105	0.10
KSNO332	1890008	WTG HUGOTON, LP 20	NG Engine	14	307729.00	4119753.00	911.72	19.54	21.000	500.270	83.000	1.000	37.506	0.10
KSNO333	1890008	WTG HUGOTON, LP 21	NG Engine	14	307729.00	4119753.00	911.72	19.54	14.000	500.270	66.500	0.660	7.639	0.10
KSNO334	1890008	WTG HUGOTON, LP 22	NG Engine	14	307729.00	4119753.00	911.72	19.54	14.000	500.270	66.500	0.660	7.639	0.10
KSNO335	1890008	WTG HUGOTON, LP 23	NG Engine	14	307729.00	4119753.00	911.72	19.54	14.000	500.270	66.500	0.660	7.639	0.10
KSNO336	1890008	WTG HUGOTON, LP 24	NG Engine	14	307729.00	4119753.00	911.72	19.54	13.000	800.270	79.500	0.660	7.021	0.10
KSNO337	1890008	WTG HUGOTON, LP 25	NG Engine	14	307729.00	4119753.00	911.72	19.54	13.000	800.270	79.500	0.660	7.021	0.10
KSNO338	1890008	WTG HUGOTON, LP 3	NG Engine	14	307729.00	4119753.00	911.72	19.54	27.000	765.270	31.200	1.830	23.105	0.10
KSNO339	1890008	WTG HUGOTON, LP 4	NG Engine	14	307729.00	4119753.00	911.72	19.54	27.000	765.270	31.200	1.830	23.105	0.10
KSNO340	1890008	WTG HUGOTON, LP 5	NG Engine	14	307729.00	4119753.00	911.72	19.54	27.000	765.270	31.800	1.830	23.105	0.10
KSNO341	1890008	WTG HUGOTON, LP 6	NG Engine	14	307729.00	4119753.00	911.72	19.54	27.000	765.270	31.800	1.830	23.105	0.10
KSNO342	1890008	WTG HUGOTON, LP 7	NG Engine	14	307729.00	4119753.00	911.72	19.54	27.000	765.270	31.800	1.830	23.105	0.10
KSNO343	1890008	WTG HUGOTON, LP 8	NG Engine	14	307729.00	4119753.00	911.72	19.54	27.000	765.270	31.800	1.830	23.105	0.10
KSNO344	1890008	WTG HUGOTON, LP 9	NG Engine	14	307729.00	4119753.00	911.72	19.54	27.000	765.270	31.800	1.830	23.105	0.10
KSNO433	1890198	ANADARKO GATHERING COMPANY LLC	NG Engine	14	281491.00	4097826.00	982.06	20.98	18.000	1055.000	94.000	1.000	141.869	0.10
KSNO313	1890002	WTG HUGOTON, LP	GLYCOL REBOILER	14	305799.00	4103709.00	922.62	21.80	27.150	510.018	18.245	1.607	0.196	0.05
KSNO314	1890002	WTG HUGOTON, LP 1	NG Engine	14	305799.00	4103709.00	922.62	21.80	18.000	800.270	69.000	1.330	36.258	0.10
KSNO315	1890002	WTG HUGOTON, LP 2	NG Engine	14	305799.00	4103709.00	922.62	21.80	28.000	800.270	69.000	1.330	36.258	0.10
KSNO316	1890002	WTG HUGOTON, LP 3	NG Engine	14	305799.00	4103709.00	922.62	21.80	27.000	800.270	101.500	1.000	20.971	0.10
KSNO317	1890002	WTG HUGOTON, LP 4	NG Engine	14	305799.00	4103709.00	922.62	21.80	18.000	800.270	93.400	0.830	13.200	0.10
KSNO416	1890058	ANADARKO GATHERING COMPANY LLC	NG Engine	14	292098.00	4139492.00	942.07	22.82	16.000	1175.000	155.000	0.830	68.220	0.10
KSNO417	1890058	ANADARKO GATHERING COMPANY LLC	NG Engine	14	292098.00	4139492.00	942.07	22.82	16.000	1175.000	155.000	0.830	65.190	0.10
KSNO377	1890023	EXXONMOBIL PRODUCTION COMPANY 1	NG Engine	14	306460.00	4135892.00	923.56	26.24	28.000	650.270	140.200	0.830	8.863	0.10
KSNO378	1890023	EXXONMOBIL PRODUCTION COMPANY 2	NG Engine	14	306460.00	4135892.00	923.56	26.24	25.000	650.270	158.600	0.830	11.817	0.10
KSNO379	1890023	EXXONMOBIL PRODUCTION COMPANY 3	NG Engine	14	306460.00	4135892.00	923.56	26.24	25.000	650.270	193.700	1.330	23.635	0.10
KSNO380	1890023	EXXONMOBIL PRODUCTION COMPANY 4	NG Engine	14	306460.00	4135892.00	923.56	26.24	25.000	650.270	111.000	1.330	17.726	0.10
KSNO257	1290012	ANADARKO GATHERING COMPANY LLC 001	NG Engine	14	267105.00	4101492.00	1,019.85	26.26	28.000	660.270	94.000	1.330	29.543	0.10
KSNO258	1290012	ANADARKO GATHERING COMPANY LLC 002	NG Engine	14	267105.00	4101492.00	1,019.85	26.26	28.000	660.270	94.000	1.330	29.543	0.10
KSNO259	1290012	ANADARKO GATHERING COMPANY LLC 003	NG Engine	14	267105.00	4101492.00	1,019.85	26.26	16.000	900.270	97.000	0.830	15.859	0.10
KSNO260	1290012	ANADARKO GATHERING COMPANY LLC 004	NG Engine	14	267105.00	4101492.00	1,019.85	26.26	16.000	1100.270	103.000	0.830	15.859	0.10
KSNO261	1290012	ANADARKO GATHERING COMPANY LLC 005	NG Engine	14	267105.00	4101492.00	1,019.85	26.26	16.000	900.270	97.000	0.830	15.859	0.10
KSNO262	1290012	ANADARKO GATHERING COMPANY LLC 006	GLYCOL REBOILER	14	267105.00	4101492.00	1,019.85	26.26	30.000	600.270	11.000	1.330	0.196	0.05
KSNO381	1890024	EXXONMOBIL PRODUCTION COMPANY 1	NG Engine	14	304910.00	4139164.00	920.27	27.75	25.000	650.270	130.900	1.000	10.743	0.10
KSNO382	1890024	EXXONMOBIL PRODUCTION COMPANY 2	NG Engine	14	304910.00	4139164.00	920.27	27.75	25.000	650.270	158.600	1.000	13.429	0.10
KSNO383	1890024	EXXONMOBIL PRODUCTION COMPANY 3	NG Engine	14	304910.00	4139164.00	920.27	27.75	24.000	650.270	111.000	1.000	17.726	0.10
KSNO384	1890024	EXXONMOBIL PRODUCTION COMPANY 4	NG Engine	14	304910.00	4139164.00	920.27	27.75	24.000	650.270	193.700	1.160	23.635	0.10
KSNO385	1890024	EXXONMOBIL PRODUCTION COMPANY 5	NG Engine	14	304910.00	4139164.00	920.27	27.75	24.000	650.270	193.700	1.160	23.635	0.10

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO099	0670030	BP AMERICA PRODUCTION COMPANY	NG Engine	14	282898.00	4147063.00	957.27	30.71	27.786	743.760	63.070	1.480	22.019	0.10
KSNO100	0670030	BP AMERICA PRODUCTION COMPANY	180HP GASOLINE AIR COMP.	14	282898.00	4147063.00	957.27	30.71	18.954	392.195	32.792	0.832	4.834	0.29
KSNO101	0670030	BP AMERICA PRODUCTION COMPANY	NG Engine	14	282898.00	4147063.00	957.27	30.71	27.786	743.760	63.070	1.480	22.019	0.10
KSNO102	0670030	BP AMERICA PRODUCTION COMPANY 1	NG Engine	14	282898.00	4147063.00	957.27	30.71	32.000	650.270	201.000	1.300	60.429	0.10
KSNO103	0670030	BP AMERICA PRODUCTION COMPANY 2	NG Engine	14	282898.00	4147063.00	957.27	30.71	32.000	650.270	201.000	1.300	60.429	0.10
KSNO119	0670035	ONEOK FIELD SERVICES COMPANY, LLC	NG Engine	14	292000.00	4147800.00	944.53	31.16	28.761	704.857	55.021	1.618	36.258	0.10
KSNO120	0670035	ONEOK FIELD SERVICES COMPANY, LLC	NG Engine	14	292000.00	4147800.00	944.53	31.16	28.761	704.857	55.021	1.618	36.258	0.10
KSNO121	0670035	ONEOK FIELD SERVICES COMPANY, LLC 1	NG Engine	14	292000.00	4147800.00	944.53	31.16	31.000	880.270	12.600	4.500	241.717	0.10
KSNO122	0670035	ONEOK FIELD SERVICES COMPANY, LLC 2	NG Engine	14	292000.00	4147800.00	944.53	31.16	31.000	880.270	12.600	4.500	241.717	0.10
KSNO183	0930008	WTG HUGOTON, LP	NG Engine	14	299055.00	4179591.00	942.62	34.25	29.000	800.000	23.400	1.330	7.440	0.10
KSNO184	0930008	WTG HUGOTON, LP	NG Engine	14	299055.00	4179591.00	942.62	34.25	29.000	800.000	23.400	1.330	7.440	0.10
KSNO185	0930008	WTG HUGOTON, LP	NG Engine	14	299055.00	4179591.00	942.62	34.25	29.000	800.000	20.600	1.330	7.440	0.10
KSNO186	0930008	WTG HUGOTON, LP	NG Engine	14	299055.00	4179591.00	942.62	34.25	13.000	800.000	86.000	0.830	10.672	0.10
KSNO187	0930008	WTG HUGOTON, LP	NG Engine	14	299055.00	4179591.00	942.62	34.25	12.000	800.000	75.200	0.830	13.441	0.10
KSNO188	0930008	WTG HUGOTON, LP	NG Engine	14	299055.00	4179591.00	942.62	34.25	12.000	800.000	118.900	0.660	13.441	0.10
KSNO189	0930008	WTG HUGOTON, LP	NG Engine	14	299055.00	4179591.00	942.62	34.25	18.000	800.000	110.900	0.660	9.764	0.10
KSNO190	0930008	WTG HUGOTON, LP	NG Engine	14	299055.00	4179591.00	942.62	34.25	16.000	957.000	95.200	0.830	10.776	0.10
KSNO191	0930008	WTG HUGOTON, LP	NG Engine	14	299055.00	4179591.00	942.62	34.25	14.000	800.000	100.100	0.830	13.175	0.10
KSNO192	0930008	WTG HUGOTON, LP	NG Engine	14	299055.00	4179591.00	942.62	34.25	15.000	800.000	149.600	0.830	19.697	0.10
KSNO193	0930008	WTG HUGOTON, LP	NG Engine	14	299055.00	4179591.00	942.62	34.25	15.000	800.000	149.600	0.830	19.697	0.10
KSNO194	0930008	WTG HUGOTON, LP	NG Engine	14	299055.00	4179591.00	942.62	34.25	19.000	800.000	120.200	0.830	3.571	0.10
KSNO195	0930008	WTG HUGOTON, LP	NG Engine	14	299055.00	4179591.00	942.62	34.25	19.000	800.000	120.200	0.830	3.571	0.10
KSNO128	0670049	PIONEER NATURAL RESOURCES USA, INC.	TEG REBOILER	14	308100.00	4147800.00	907.02	36.68	27.150	510.018	18.245	1.607	0.274	0.05
KSNO129	0670049	PIONEER NATURAL RESOURCES USA, INC.	REGEN HEATER	14	308100.00	4147800.00	907.02	36.68	27.150	510.018	18.245	1.607	0.274	0.05
KSNO130	0670049	PIONEER NATURAL RESOURCES USA, INC.	AMINE REBOILER	14	308100.00	4147800.00	907.02	36.68	27.150	510.018	18.245	1.607	0.247	0.05
KSNO131	0670049	PIONEER NATURAL RESOURCES USA, INC.	AMINE FLARE	14	308100.00	4147800.00	907.02	36.68	103.029	623.836	21.713	4.610	5.703	0.50
KSNO132	0670049	PIONEER NATURAL RESOURCES USA, INC.	NG Engine	14	308100.00	4147800.00	907.02	36.68	24.512	814.583	53.826	1.087	3.315	0.10
KSNO133	0670049	PIONEER NATURAL RESOURCES USA, INC.	NG Engine	14	308100.00	4147800.00	907.02	36.68	24.512	814.583	53.826	1.087	3.315	0.10
KSNO134	0670049	PIONEER NATURAL RESOURCES USA, INC. 1	Turbine	14	308100.00	4147800.00	907.02	36.68	60.000	1400.270	56.800	3.500	13.827	0.25
KSNO135	0670049	PIONEER NATURAL RESOURCES USA, INC. 10	NG Engine	14	308100.00	4147800.00	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO136	0670049	PIONEER NATURAL RESOURCES USA, INC. 11	NG Engine	14	308100.00	4147800.00	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO137	0670049	PIONEER NATURAL RESOURCES USA, INC. 12	NG Engine	14	308100.00	4147800.00	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO138	0670049	PIONEER NATURAL RESOURCES USA, INC. 13	NG Engine	14	308100.00	4147800.00	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO139	0670049	PIONEER NATURAL RESOURCES USA, INC. 14	NG Engine	14	308100.00	4147800.00	907.02	36.68	60.000	1000.270	116.900	1.500	11.430	0.10
KSNO140	0670049	PIONEER NATURAL RESOURCES USA, INC. 17	NG Engine	14	308100.00	4147800.00	907.02	36.68	60.000	1000.270	88.300	1.500	0.879	0.10
KSNO141	0670049	PIONEER NATURAL RESOURCES USA, INC. 18	NG Engine	14	308100.00	4147800.00	907.02	36.68	60.000	1000.270	88.300	1.500	0.879	0.10
KSNO142	0670049	PIONEER NATURAL RESOURCES USA, INC. 19	NG Engine	14	308100.00	4147800.00	907.02	36.68	60.000	1000.270	88.200	1.500	8.792	0.10
KSNO143	0670049	PIONEER NATURAL RESOURCES USA, INC. 2	Turbine	14	308100.00	4147800.00	907.02	36.68	60.000	1400.270	56.800	3.500	13.827	0.25
KSNO144	0670049	PIONEER NATURAL RESOURCES USA, INC. 21	NG Engine	14	308100.00	4147800.00	907.02	36.68	60.000	1000.270	128.000	0.830	2.291	0.10
KSNO145	0670049	PIONEER NATURAL RESOURCES USA, INC. 22	NG Engine	14	308100.00	4147800.00	907.02	36.68	60.000	1000.270	127.900	0.830	2.291	0.10
KSNO146	0670049	PIONEER NATURAL RESOURCES USA, INC. 23	NG Engine	14	308100.00	4147800.00	907.02	36.68	50.000	1000.270	157.300	0.830	23.293	0.10
KSNO147	0670049	PIONEER NATURAL RESOURCES USA, INC. 3	NG Engine	14	308100.00	4147800.00	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO148	0670049	PIONEER NATURAL RESOURCES USA, INC. 4	NG Engine	14	308100.00	4147800.00	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO149	0670049	PIONEER NATURAL RESOURCES USA, INC. 5	NG Engine	14	308100.00	4147800.00	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO150	0670049	PIONEER NATURAL RESOURCES USA, INC. 6	NG Engine	14	308100.00	4147800.00	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO151	0670049	PIONEER NATURAL RESOURCES USA, INC. 7	NG Engine	14	308100.00	4147800.00	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO152	0670049	PIONEER NATURAL RESOURCES USA, INC. 8	NG Engine	14	308100.00	4147800.00	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO153	0670049	PIONEER NATURAL RESOURCES USA, INC. 9	NG Engine	14	308100.00	4147800.00	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO170	0810015	DCP MIDSTREAM, LP	REBOILER FOR GLYCOL	14	320719.00	4140430.00	863.64	40.00	20.740	553.249	11.501	1.087	0.196	0.05
KSNO171	0810015	DCP MIDSTREAM, LP	REBOILER FOR GLYCOL	14	320719.00	4140430.00	863.64	40.00	20.740	553.249	11.501	1.087	0.196	0.05
KSNO172	0810015	DCP MIDSTREAM, LP 1	NG Engine	14	320719.00	4140430.00	863.64	40.00	24.000	750.270	191.000	1.000	26.857	0.10
KSNO173	0810015	DCP MIDSTREAM, LP 10	NG Engine	14	320719.00	4140430.00	863.64	40.00	15.000	1007.270	159.800	0.670	13.818	0.10
KSNO174	0810015	DCP MIDSTREAM, LP 11	NG Engine	14	320719.00	4140430.00	863.64	40.00	12.000	990.270	112.500	0.500	5.299	0.10

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO175	0810015	DCP MIDSTREAM, LP 2	NG Engine	14	320719.00	4140430.00	863.64	40.00	24.000	750.270	191.000	1.000	26.857	0.10
KSNO176	0810015	DCP MIDSTREAM, LP 3	NG Engine	14	320719.00	4140430.00	863.64	40.00	24.000	750.270	191.000	1.000	26.857	0.10
KSNO177	0810015	DCP MIDSTREAM, LP 4	NG Engine	14	320719.00	4140430.00	863.64	40.00	24.000	750.270	191.000	1.000	26.857	0.10
KSNO178	0810015	DCP MIDSTREAM, LP 5	NG Engine	14	320719.00	4140430.00	863.64	40.00	24.000	950.270	112.500	1.000	15.728	0.10
KSNO179	0810015	DCP MIDSTREAM, LP 6	NG Engine	14	320719.00	4140430.00	863.64	40.00	24.000	950.270	112.500	1.000	15.728	0.10
KSNO180	0810015	DCP MIDSTREAM, LP 7	NG Engine	14	320719.00	4140430.00	863.64	40.00	24.000	950.270	112.500	1.000	15.728	0.10
KSNO181	0810015	DCP MIDSTREAM, LP 8	NG Engine	14	320719.00	4140430.00	863.64	40.00	15.000	1304.270	198.600	0.670	14.979	0.10
KSNO182	0810015	DCP MIDSTREAM, LP 9	NG Engine	14	320719.00	4140430.00	863.64	40.00	15.000	1304.270	198.600	0.670	14.979	0.10
KSNO081	0670026	DCP MIDSTREAM, LP 1	NG Engine	14	305613.00	4154276.00	922.63	41.19	20.000	700.270	120.000	1.300	29.543	0.10
KSNO082	0670026	DCP MIDSTREAM, LP 2	NG Engine	14	305613.00	4154276.00	922.63	41.19	20.000	700.270	120.000	1.300	29.543	0.10
KSNO083	0670026	DCP MIDSTREAM, LP 3	NG Engine	14	305613.00	4154276.00	922.63	41.19	20.000	700.270	120.000	1.300	29.543	0.10
KSNO084	0670026	DCP MIDSTREAM, LP 4	NG Engine	14	305613.00	4154276.00	922.63	41.19	18.000	1125.270	120.000	1.000	19.847	0.10
KSNO085	0670026	DCP MIDSTREAM, LP 5	NG Engine	14	305613.00	4154276.00	922.63	41.19	18.000	1300.270	135.000	0.830	14.979	0.10
KSNO086	0670026	DCP MIDSTREAM, LP 6	NG Engine	14	305613.00	4154276.00	922.63	41.19	18.000	1300.270	135.000	0.830	14.979	0.10
KSNO087	0670026	DCP MIDSTREAM, LP 7	NG Engine	14	305613.00	4154276.00	922.63	41.19	18.000	1100.270	120.000	0.830	14.979	0.10
KSNO069	0670017	PIONEER NATURAL RESOURCES USA, INC.	NG Engine	14	312116.00	4151844.00	921.37	42.27	24.512	814.583	53.826	1.087	16.721	0.10
KSNO070	0670017	PIONEER NATURAL RESOURCES USA, INC.	NG Engine	14	312116.00	4151844.00	921.37	42.27	24.512	814.583	53.826	1.087	16.721	0.10
KSNO071	0670017	PIONEER NATURAL RESOURCES USA, INC. 1	NG Engine	14	312116.00	4151844.00	921.37	42.27	22.000	1000.270	128.000	0.830	14.979	0.10
KSNO072	0670017	PIONEER NATURAL RESOURCES USA, INC. 2	NG Engine	14	312116.00	4151844.00	921.37	42.27	22.000	1000.270	128.000	0.830	14.979	0.10
KSNO073	0670017	PIONEER NATURAL RESOURCES USA, INC. 3	NG Engine	14	312116.00	4151844.00	921.37	42.27	17.000	1000.270	49.700	2.000	69.135	0.10
KSNO048	0670007	COLUMBIAN CHEMICALS COMPANY	NAT GAS COMBUSTION	14	306549.00	4156832.00	923.39	43.90	85.409	381.656	32.688	3.610	9.462	0.05
KSNO049	0670007	COLUMBIAN CHEMICALS COMPANY 11	DRYER VAPOR BAG COLLECTOR	14	306549.00	4156832.00	923.39	43.90	79.000	280.270	41.000	2.000	5.987	0.50
KSNO050	0670007	COLUMBIAN CHEMICALS COMPANY 12	DRYER VAPOR BAG COLLECTOR	14	306549.00	4156832.00	923.39	43.90	77.000	320.270	26.000	2.000	5.987	0.50
KSNO051	0670007	COLUMBIAN CHEMICALS COMPANY 47	MAIN PROCESS VENTS CO BOI	14	306549.00	4156832.00	923.39	43.90	195.000	450.270	40.000	6.000	123.096	0.50
KSNO052	0670007	COLUMBIAN CHEMICALS COMPANY 48	MAIN PROCESS VENTS CO BOI	14	306549.00	4156832.00	923.39	43.90	150.000	400.270	74.000	2.500	123.096	0.50
KSNO108	0670032	BP AMERICA PRODUCTION COMPANY	174 HP INGERSOL AIR COMP	14	280989.00	4162335.00	949.16	46.09	26.488	490.199	60.212	1.418	5.389	0.10
KSNO109	0670032	BP AMERICA PRODUCTION COMPANY	DETROIT DIESEL 765HP	14	280989.00	4162335.00	949.16	46.09	26.488	490.199	60.212	1.418	23.694	0.10
KSNO110	0670032	BP AMERICA PRODUCTION COMPANY	NG Engine	14	280989.00	4162335.00	949.16	46.09	28.761	704.857	55.021	1.618	36.258	0.10
KSNO111	0670032	BP AMERICA PRODUCTION COMPANY	NG Engine	14	280989.00	4162335.00	949.16	46.09	27.786	743.760	63.070	1.480	57.555	0.10
KSNO112	0670032	BP AMERICA PRODUCTION COMPANY	NG Engine	14	280989.00	4162335.00	949.16	46.09	27.786	743.760	63.070	1.480	57.555	0.10
KSNO113	0670032	BP AMERICA PRODUCTION COMPANY	NG Engine	14	280989.00	4162335.00	949.16	46.09	27.786	743.760	63.070	1.480	22.019	0.10
KSNO114	0670032	BP AMERICA PRODUCTION COMPANY	NG Engine	14	280989.00	4162335.00	949.16	46.09	27.786	743.760	63.070	1.480	22.019	0.10
KSNO115	0670032	BP AMERICA PRODUCTION COMPANY 4	NG Engine	14	280989.00	4162335.00	949.16	46.09	32.000	650.270	161.000	1.300	48.343	0.10
KSNO116	0670032	BP AMERICA PRODUCTION COMPANY 5	NG Engine	14	280989.00	4162335.00	949.16	46.09	32.000	650.270	201.000	1.300	53.715	0.10
KSNO117	0670032	BP AMERICA PRODUCTION COMPANY 6	NG Engine	14	280989.00	4162335.00	949.16	46.09	32.000	650.270	201.000	1.300	60.429	0.10
KSNO118	0670032	BP AMERICA PRODUCTION COMPANY 7	NG Engine	14	280989.00	4162335.00	949.16	46.09	32.000	650.270	201.000	1.300	60.429	0.10
KSNO053	0670008	EXXONMOBIL PRODUCTION COMPANY 1	NG Engine	14	306595.00	4160063.00	932.74	46.88	24.000	650.270	196.000	1.160	29.543	0.10
KSNO054	0670008	EXXONMOBIL PRODUCTION COMPANY 10	NG Engine	14	306595.00	4160063.00	932.74	46.88	20.000	750.270	140.000	0.490	6.478	0.10
KSNO055	0670008	EXXONMOBIL PRODUCTION COMPANY 11	NG Engine	14	306595.00	4160063.00	932.74	46.88	20.000	750.270	140.000	0.490	6.478	0.10
KSNO056	0670008	EXXONMOBIL PRODUCTION COMPANY 12	NG Engine	14	306595.00	4160063.00	932.74	46.88	20.000	750.270	140.000	0.360	3.426	0.10
KSNO057	0670008	EXXONMOBIL PRODUCTION COMPANY 13	NG Engine	14	306595.00	4160063.00	932.74	46.88	20.000	750.270	140.000	0.280	2.060	0.10
KSNO058	0670008	EXXONMOBIL PRODUCTION COMPANY 14	NG Engine	14	306595.00	4160063.00	932.74	46.88	20.000	750.270	140.000	0.310	2.621	0.10
KSNO059	0670008	EXXONMOBIL PRODUCTION COMPANY 15	NG Engine	14	306595.00	4160063.00	932.74	46.88	20.000	750.270	140.000	0.310	2.621	0.10
KSNO060	0670008	EXXONMOBIL PRODUCTION COMPANY 15	NG Engine	14	306595.00	4160063.00	932.74	46.88	20.000	750.270	140.000	0.310	18.724	0.10
KSNO061	0670008	EXXONMOBIL PRODUCTION COMPANY 2	NG Engine	14	306595.00	4160063.00	932.74	46.88	24.000	650.270	196.000	1.160	53.715	0.10
KSNO062	0670008	EXXONMOBIL PRODUCTION COMPANY 3	NG Engine	14	306595.00	4160063.00	932.74	46.88	30.000	675.270	145.600	1.500	29.543	0.10
KSNO063	0670008	EXXONMOBIL PRODUCTION COMPANY 4	NG Engine	14	306595.00	4160063.00	932.74	46.88	30.000	675.270	145.600	1.500	38.675	0.10
KSNO064	0670008	EXXONMOBIL PRODUCTION COMPANY 5	NG Engine	14	306595.00	4160063.00	932.74	46.88	30.000	675.270	111.300	2.000	38.675	0.10
KSNO065	0670008	EXXONMOBIL PRODUCTION COMPANY 5	NG Engine	14	306595.00	4160063.00	932.74	46.88	30.000	675.270	111.300	2.000	53.715	0.10
KSNO066	0670008	EXXONMOBIL PRODUCTION COMPANY 7	NG Engine	14	306595.00	4160063.00	932.74	46.88	30.000	675.270	111.300	2.000	53.715	0.10
KSNO067	0670008	EXXONMOBIL PRODUCTION COMPANY 8	NG Engine	14	306595.00	4160063.00	932.74	46.88	20.000	750.270	140.000	0.490	6.478	0.10
KSNO068	0670008	EXXONMOBIL PRODUCTION COMPANY 9	NG Engine	14	306595.00	4160063.00	932.74	46.88	20.000	750.270	140.000	0.490	6.478	0.10
KSNO088	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC.	.375 MMBTU/HR 600-N	14	311387.00	4158344.00	924.98	47.43	41.366	424.948	20.936	1.938	0.037	0.05

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO089	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 1	NG Engine	14	311387.00	4158344.00	924.98	47.43	36.000	730.270	40.000	2.000	64.458	0.10
KSNO090	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 10	3.75 MMBTU/HR BOILER	14	311387.00	4158344.00	924.98	47.43	9.000	350.270	5.100	1.670	0.367	0.05
KSNO091	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 2	NG Engine	14	311387.00	4158344.00	924.98	47.43	36.000	730.270	40.000	2.000	64.458	0.10
KSNO092	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 3	NG Engine	14	311387.00	4158344.00	924.98	47.43	36.000	730.270	40.000	2.000	64.458	0.10
KSNO093	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 4	3889HP ENGINE 20 SOLAR	14	311387.00	4158344.00	924.98	47.43	27.000	850.270	38.000	4.000	10.544	0.25
KSNO094	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 5	3889HP ENGINE 21 SOLAR	14	311387.00	4158344.00	924.98	47.43	27.000	850.270	38.000	4.000	10.544	0.25
KSNO095	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 6	4511HP ENGINE 22 SOLAR	14	311387.00	4158344.00	924.98	47.43	27.000	850.270	32.100	4.000	12.230	0.25
KSNO096	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 7	1100HP SOLAR TURBINE	14	311387.00	4158344.00	924.98	47.43	18.000	850.270	81.700	2.000	2.982	0.25
KSNO097	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 8	1100HP SOLAR TURBINE	14	311387.00	4158344.00	924.98	47.43	18.000	800.270	81.700	2.000	2.982	0.25
KSNO098	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 9	1100HP SOLAR TURBINE	14	311387.00	4158344.00	924.98	47.43	18.000	800.270	81.700	2.000	2.982	0.25
KSNO104	0670031	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 1	NG Engine	14	311387.00	4158344.00	924.98	47.43	28.000	725.270	52.000	1.670	38.675	0.10
KSNO105	0670031	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 2	NG Engine	14	311387.00	4158344.00	924.98	47.43	28.000	750.270	72.000	1.670	53.715	0.10
KSNO106	0670031	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 3	NG Engine	14	311387.00	4158344.00	924.98	47.43	28.000	750.270	72.000	1.670	53.715	0.10
KSNO107	0670031	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 4	NG Engine	14	311387.00	4158344.00	924.98	47.43	28.000	750.270	72.000	1.670	53.715	0.10
KSNO292	1750046	NORTHERN NATURAL GAS COMPANY	2.0 MMBTU/HR REBOILER	14	335180.00	4128840.00	873.50	48.28	27.150	510.018	18.245	1.607	0.196	0.05
KSNO293	1750046	NORTHERN NATURAL GAS COMPANY 1	NG Engine	14	335180.00	4128840.00	873.50	48.28	22.000	700.270	49.600	1.660	52.533	0.10
KSNO294	1750046	NORTHERN NATURAL GAS COMPANY 10	SOLAR TAURUS 60-T7000S	14	335180.00	4128840.00	873.50	48.28	54.000	700.270	83.800	3.000	16.579	0.25
KSNO295	1750046	NORTHERN NATURAL GAS COMPANY 11	SOLAR TAURUS 60-T7000S	14	335180.00	4128840.00	873.50	48.28	54.000	700.270	83.600	3.000	16.579	0.25
KSNO296	1750046	NORTHERN NATURAL GAS COMPANY 12	NG Engine	14	335180.00	4128840.00	873.50	48.28	13.000	700.270	47.000	0.710	4.831	0.10
KSNO297	1750046	NORTHERN NATURAL GAS COMPANY 13	NG Engine	14	335180.00	4128840.00	873.50	48.28	13.000	700.270	47.000	0.710	4.962	0.10
KSNO298	1750046	NORTHERN NATURAL GAS COMPANY 14	NG Engine	14	335180.00	4128840.00	873.50	48.28	13.000	700.270	69.800	0.710	7.639	0.10
KSNO299	1750046	NORTHERN NATURAL GAS COMPANY 15	NG Engine	14	335180.00	4128840.00	873.50	48.28	13.000	700.270	65.000	0.710	7.115	0.10
KSNO300	1750046	NORTHERN NATURAL GAS COMPANY 16	NG Engine	14	335180.00	4128840.00	873.50	48.28	13.000	700.270	65.000	0.710	12.920	0.10
KSNO301	1750046	NORTHERN NATURAL GAS COMPANY 2	NG Engine	14	335180.00	4128840.00	873.50	48.28	22.000	700.270	50.100	1.660	52.533	0.10
KSNO302	1750046	NORTHERN NATURAL GAS COMPANY 3	NG Engine	14	335180.00	4128840.00	873.50	48.28	28.761	704.857	55.021	1.618	55.595	0.10
KSNO303	1750046	NORTHERN NATURAL GAS COMPANY 4	NG Engine	14	335180.00	4128840.00	873.50	48.28	28.761	704.857	55.021	1.618	55.595	0.10
KSNO304	1750046	NORTHERN NATURAL GAS COMPANY 5	NG Engine	14	335180.00	4128840.00	873.50	48.28	28.761	704.857	55.021	1.618	55.595	0.10
KSNO305	1750046	NORTHERN NATURAL GAS COMPANY 6	NG Engine	14	335180.00	4128840.00	873.50	48.28	28.761	704.857	55.021	1.618	55.595	0.10
KSNO306	1750046	NORTHERN NATURAL GAS COMPANY 7	NG Engine	14	335180.00	4128840.00	873.50	48.28	25.000	700.270	84.700	1.160	8.813	0.10
KSNO307	1750046	NORTHERN NATURAL GAS COMPANY 8	NG Engine	14	335180.00	4128840.00	873.50	48.28	25.000	700.270	86.200	1.160	8.813	0.10
KSNO308	1750046	NORTHERN NATURAL GAS COMPANY 9	NG Engine	14	335180.00	4128840.00	873.50	48.28	25.000	700.270	84.100	1.160	8.813	0.10
KSNO309	1750116	WTG HUGOTON, LP 3	NG Engine	14	335180.00	4128840.00	873.50	48.28	24.000	700.270	36.700	2.000	55.595	0.10
KSNO310	1750116	WTG HUGOTON, LP 4	NG Engine	14	335180.00	4128840.00	873.50	48.28	24.000	700.270	36.700	2.000	55.595	0.10
KSNO311	1750116	WTG HUGOTON, LP 5	NG Engine	14	335180.00	4128840.00	873.50	48.28	24.000	700.270	36.700	2.000	55.595	0.10
KSNO312	1750116	WTG HUGOTON, LP 6	NG Engine	14	335180.00	4128840.00	873.50	48.28	24.000	700.270	36.700	2.000	55.595	0.10
KSNO123	0670048	OXY USA, INC.	NG Engine	14	308909.00	4160892.00	930.62	48.58	24.512	814.583	53.826	1.087	0.562	0.10
KSNO124	0670048	OXY USA, INC.	NG Engine	14	308909.00	4160892.00	930.62	48.58	24.512	814.583	53.826	1.087	11.890	0.10
KSNO125	0670048	OXY USA, INC. 1	NG Engine	14	308909.00	4160892.00	930.62	48.58	24.000	1100.270	98.500	1.160	41.481	0.10
KSNO126	0670048	OXY USA, INC. 2	NG Engine	14	308909.00	4160892.00	930.62	48.58	24.000	1100.270	99.000	1.160	41.481	0.10
KSNO127	0670048	OXY USA, INC. 3	NG Engine	14	308909.00	4160892.00	930.62	48.58	24.000	1100.270	99.000	1.160	41.481	0.10
KSNO250	1290011	DCP MIDSTREAM, LP 001	NG Engine	14	239687.00	4100651.00	1,094.81	51.35	28.000	750.270	120.000	1.300	29.543	0.10
KSNO251	1290011	DCP MIDSTREAM, LP 002	NG Engine	14	239687.00	4100651.00	1,094.81	51.35	28.000	750.270	120.000	1.300	29.543	0.10
KSNO252	1290011	DCP MIDSTREAM, LP 003	NG Engine	14	239687.00	4100651.00	1,094.81	51.35	28.000	750.270	120.000	1.300	29.543	0.10
KSNO253	1290011	DCP MIDSTREAM, LP 004	NG Engine	14	239687.00	4100651.00	1,094.81	51.35	28.000	750.270	120.000	1.300	29.543	0.10
KSNO254	1290011	DCP MIDSTREAM, LP 005	NG Engine	14	239687.00	4100651.00	1,094.81	51.35	28.000	750.270	120.000	1.300	29.543	0.10
KSNO255	1290011	DCP MIDSTREAM, LP 006	NG Engine	14	239687.00	4100651.00	1,094.81	51.35	30.000	750.270	120.000	1.300	29.543	0.10
KSNO256	1290011	DCP MIDSTREAM, LP 008	REBOILER FOR DEHY	14	239687.00	4100651.00	1,094.81	51.35	20.740	553.249	11.501	1.087	0.196	0.05
KSNO074	0670023	BP AMERICA PRODUCTION COMPANY	NG Engine	14	280181.00	4167956.00	949.05	51.76	27.786	743.760	63.070	1.480	22.019	0.10
KSNO075	0670023	BP AMERICA PRODUCTION COMPANY	NG Engine	14	280181.00	4167956.00	949.05	51.76	27.786	743.760	63.070	1.480	22.019	0.10
KSNO076	0670023	BP AMERICA PRODUCTION COMPANY	NG Engine	14	280181.00	4167956.00	949.05	51.76	27.786	743.760	63.070	1.480	38.024	0.10
KSNO077	0670023	BP AMERICA PRODUCTION COMPANY 2	NG Engine	14	280181.00	4167956.00	949.05	51.76	15.000	1400.270	118.000	0.830	38.024	0.10
KSNO271	1750001	MID-KANSAS ELECTRIC COMPANY LLC - CIMARR 1	UNIT 1 BOILER	14	343489.00	4113766.00	787.99	55.17	93.000	955.270	54.500	8.000	68.860	0.05
KSNO272	1750001	MID-KANSAS ELECTRIC COMPANY LLC - CIMARR 2	UNIT #2 TURBINE	14	343489.00	4113766.00	787.99	55.17	53.000	750.270	200.000	8.870	175.842	0.25

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO273	1750001	MID-KANSAS ELECTRIC COMPANY LLC - CIMARR 3	PROCESS BOILER	14	343489.00	4113766.00	787.99	55.17	74.000	350.270	35.000	3.870	7.836	0.05
KSNO274	1750001	MID-KANSAS ELECTRIC COMPANY LLC - CIMARR 4	DIESEL BLACKSTART ENGINE	14	343489.00	4113766.00	787.99	55.17	13.000	429.270	63.100	0.330	11.209	0.25
KSNO275	1750001	MID-KANSAS ELECTRIC COMPANY LLC - CIMARR 5	DIESEL PUMP ENGINE	14	343489.00	4113766.00	787.99	55.17	8.000	840.270	168.400	0.420	4.436	0.25
KSNO276	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 10	NG Engine	14	344522.00	4112510.00	774.35	56.28	22.000	685.270	20.000	2.000	21.486	0.10
KSNO277	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 11	NG Engine	14	344522.00	4112510.00	774.35	56.28	22.000	685.270	20.000	2.000	26.857	0.10
KSNO278	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 12	NG Engine	14	344522.00	4112510.00	774.35	56.28	22.000	720.270	25.000	2.000	26.857	0.10
KSNO279	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 13	NG Engine	14	344522.00	4112510.00	774.35	56.28	22.000	720.270	25.000	2.000	26.857	0.10
KSNO280	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 17	SOLAR TAURUS 70 TURBINE	14	344522.00	4112510.00	774.35	56.28	50.000	920.270	66.000	6.300	27.952	0.25
KSNO281	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 17	STARTUPS SHUTDOWNS	14	344522.00	4112510.00	774.35	56.28	50.000	920.270	66.000	6.300	10.930	0.25
KSNO282	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 18	SOLAR TAURUS 70 TURBINE	14	344522.00	4112510.00	774.35	56.28	50.000	920.270	66.000	6.300	27.952	0.25
KSNO283	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 18	STARTUPS SHUTDOWNS	14	344522.00	4112510.00	774.35	56.28	50.000	920.270	66.000	6.300	10.930	0.25
KSNO284	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 19	NG Engine	14	344522.00	4112510.00	774.35	56.28	31.000	700.270	147.000	0.670	22.019	0.10
KSNO285	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 2	NG Engine	14	344522.00	4112510.00	774.35	56.28	27.000	760.270	37.500	2.000	64.458	0.10
KSNO286	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 20	NG Engine	14	344522.00	4112510.00	774.35	56.28	31.000	700.270	147.000	0.670	22.019	0.10
KSNO287	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 3	NG Engine	14	344522.00	4112510.00	774.35	56.28	27.000	760.270	37.500	2.000	64.458	0.10
KSNO288	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 4	NG Engine	14	344522.00	4112510.00	774.35	56.28	27.000	770.270	60.000	2.000	64.458	0.10
KSNO289	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 5	NG Engine	14	344522.00	4112510.00	774.35	56.28	37.000	770.270	38.400	2.500	91.315	0.10
KSNO290	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 6	NG Engine	14	344522.00	4112510.00	774.35	56.28	37.000	770.270	38.400	2.500	91.315	0.10
KSNO291	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 9	NG Engine	14	344522.00	4112510.00	774.35	56.28	22.000	650.270	85.000	2.000	21.486	0.10
KSNO263	1297127	COLORADO INTERSTATE GAS COMPANY	NG Engine	13	763677.00	4119181.00	941.08	57.00	36.000	650.000	125.100	0.850	16.129	0.10
KSNO264	1297127	COLORADO INTERSTATE GAS COMPANY	NG Engine	13	763677.00	4119181.00	941.08	57.00	36.000	650.000	125.100	0.850	16.129	0.10
KSNO265	1297127	COLORADO INTERSTATE GAS COMPANY	NG Engine	13	763677.00	4119181.00	941.08	57.00	36.000	650.000	125.100	0.850	16.129	0.10
KSNO266	1297127	COLORADO INTERSTATE GAS COMPANY	NG Engine	13	763677.00	4119181.00	897.24	57.00	35.000	800.000	31.700	1.800	64.007	0.10
KSNO267	1297127	COLORADO INTERSTATE GAS COMPANY	NG Engine	13	763677.00	4119181.00	897.24	57.00	35.000	800.000	31.700	1.800	64.007	0.10
KSNO268	1297127	COLORADO INTERSTATE GAS COMPANY	NG Engine	13	763677.00	4119181.00	897.24	57.00	35.000	800.000	31.700	1.800	64.007	0.10
KSNO269	1297127	COLORADO INTERSTATE GAS COMPANY	NG Engine	13	763677.00	4119181.00	897.24	57.00	35.000	800.000	31.700	1.800	64.007	0.10
KSNO270	1297127	COLORADO INTERSTATE GAS COMPANY	NG Engine	13	763677.00	4119181.00	897.24	57.00	23.000	886.000	34.300	1.300	1.495	0.10
KSNO078	0670025	DCP MIDSTREAM, LP	REBOILER FOR DEHY	14	305389.00	4174597.00	941.08	60.19	20.740	553.249	11.501	1.087	0.196	0.05
KSNO079	0670025	DCP MIDSTREAM, LP 1	NG Engine	14	305389.00	4174597.00	941.08	60.19	30.000	700.270	160.000	2.000	107.430	0.10
KSNO080	0670025	DCP MIDSTREAM, LP 2	NG Engine	14	305389.00	4174597.00	941.08	60.19	30.000	700.270	160.000	2.000	107.430	0.10
KSNO163	0810012	BP AMERICA PRODUCTION COMPANY	NG Engine	14	333083.00	4158521.00	897.24	61.09	27.786	743.760	63.070	1.480	57.555	0.10
KSNO164	0810012	BP AMERICA PRODUCTION COMPANY	NG Engine	14	333083.00	4158521.00	897.24	61.09	27.786	743.760	63.070	1.480	57.555	0.10
KSNO165	0810012	BP AMERICA PRODUCTION COMPANY	DIESEL AIR COMPRESSOR	14	333083.00	4158521.00	897.24	61.09	26.488	490.199	60.212	1.418	8.417	0.10
KSNO166	0810012	BP AMERICA PRODUCTION COMPANY	EMERGENCY DIESEL	14	333083.00	4158521.00	897.24	61.09	26.488	490.199	60.212	1.418	7.583	0.10
KSNO167	0810012	BP AMERICA PRODUCTION COMPANY 1	NG Engine	14	333083.00	4158521.00	897.24	61.09	35.000	650.270	121.000	1.300	48.343	0.10
KSNO168	0810012	BP AMERICA PRODUCTION COMPANY 2	NG Engine	14	333083.00	4158521.00	897.24	61.09	35.000	650.270	201.000	1.300	36.258	0.10
KSNO169	0810012	BP AMERICA PRODUCTION COMPANY 3	NG Engine	14	333083.00	4158521.00	897.24	61.09	35.000	650.270	201.000	1.300	60.429	0.10
KSNO154	0810004	REGENCY FIELD SERVICES, LLC 1	NG Engine	14	320600.00	4170345.00	929.77	62.43	16.000	900.270	92.000	0.810	10.673	0.10
KSNO155	0810004	REGENCY FIELD SERVICES, LLC 2	NG Engine	14	320600.00	4170345.00	929.77	62.43	16.000	900.270	92.000	0.810	10.673	0.10
KSNO156	0810004	REGENCY FIELD SERVICES, LLC 3	NG Engine	14	320600.00	4170345.00	929.77	62.43	16.000	900.270	92.000	0.810	10.673	0.10
KSNO157	0810004	REGENCY FIELD SERVICES, LLC 4	NG Engine	14	320600.00	4170345.00	929.77	62.43	16.000	900.270	92.000	0.810	12.208	0.10
KSNO158	0810004	REGENCY FIELD SERVICES, LLC 5	NG Engine	14	320600.00	4170345.00	929.77	62.43	16.000	900.270	92.000	0.810	14.043	0.10
KSNO159	0810004	REGENCY FIELD SERVICES, LLC 6	NG Engine	14	320600.00	4170345.00	929.77	62.43	17.000	800.270	95.300	0.830	14.979	0.10
KSNO160	0810004	REGENCY FIELD SERVICES, LLC 7	NG Engine	14	320600.00	4170345.00	929.77	62.43	17.000	800.270	95.300	0.830	14.979	0.10
KSNO161	0810004	REGENCY FIELD SERVICES, LLC 8	NG Engine	14	320600.00	4170345.00	929.77	62.43	21.000	1200.270	133.500	1.000	44.305	0.10
KSNO162	0810004	REGENCY FIELD SERVICES, LLC 9	NG Engine	14	320600.00	4170345.00	929.77	62.43	21.000	1200.270	133.500	1.000	44.305	0.10
KSNO196	0930010	BP AMERICA PRODUCTION COMPANY	NG Engine	14	281545.00	4185039.00	993.60	68.53	27.786	743.760	63.070	1.480	57.555	0.10
KSNO197	0930010	BP AMERICA PRODUCTION COMPANY	NG Engine	14	281545.00	4185039.00	993.60	68.53	27.786	743.760	63.070	1.480	49.258	0.10
KSNO198	0930010	BP AMERICA PRODUCTION COMPANY	NG Engine	14	281545.00	4185039.00	993.60	68.53	27.786	743.760	63.070	1.480	49.258	0.10
KSNO199	0930010	BP AMERICA PRODUCTION COMPANY	NG Engine	14	281545.00	4185039.00	993.60	68.53	27.786	743.760	63.070	1.480	22.019	0.10
KSNO200	0930010	BP AMERICA PRODUCTION COMPANY	NG Engine	14	281545.00	4185039.00	993.60	68.53	27.786	743.760	63.070	1.480	22.019	0.10
KSNO201	0930010	BP AMERICA PRODUCTION COMPANY	NG Engine	14	281545.00	4185039.00	993.60	68.53	27.786	743.760	63.070	1.480	22.019	0.10
KSNO202	0930010	BP AMERICA PRODUCTION COMPANY	NG Engine	14	281545.00	4185039.00	993.60	68.53	27.786	743.760	63.070	1.480	22.019	0.10

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO203	0930010	BP AMERICA PRODUCTION COMPANY 2	NG Engine	14	281545.00	4185039.00	993.60	68.53	32.000	650.270	201.000	1.300	60.429	0.10
KSNO204	0930010	BP AMERICA PRODUCTION COMPANY 3	NG Engine	14	281545.00	4185039.00	993.60	68.53	32.000	650.270	201.000	1.300	60.429	0.10
KSNO205	0930010	BP AMERICA PRODUCTION COMPANY 4	NG Engine	14	281545.00	4185039.00	993.60	68.53	32.000	650.270	201.000	1.300	60.429	0.10
KSNO226	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511.00	4104069.00	761.95	81.46	24.000	975.000	25.000	2.000	45.670	0.10
KSNO227	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511.00	4104069.00	761.95	81.46	24.000	975.000	25.000	2.000	45.670	0.10
KSNO228	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511.00	4104069.00	761.95	81.46	24.000	975.000	25.000	2.000	45.670	0.10
KSNO229	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511.00	4104069.00	761.95	81.46	24.000	975.000	25.000	2.000	45.670	0.10
KSNO230	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511.00	4104069.00	761.95	81.46	24.000	975.000	25.000	2.000	45.670	0.10
KSNO231	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511.00	4104069.00	761.95	81.46	24.000	975.000	25.000	2.000	45.670	0.10
KSNO232	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511.00	4104069.00	761.95	81.46	26.000	950.000	154.000	1.000	45.670	0.10
KSNO233	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511.00	4104069.00	761.95	81.46	24.000	740.000	95.000	1.670	69.197	0.10
KSNO234	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511.00	4104069.00	761.95	81.46	24.000	740.000	95.000	1.670	69.197	0.10
KSNO235	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511.00	4104069.00	761.95	81.46	24.512	814.313	53.826	1.087	12.801	0.10
KSNO236	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511.00	4104069.00	761.95	81.46	24.512	814.313	53.826	1.087	12.801	0.10
KSNO237	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511.00	4104069.00	761.95	81.46	58.213	436.409	27.610	3.403	0.378	0.10
KSNO206	0930012	KINDER MORGAN INTERSTATE GAS TRANS 1	NG Engine	14	307937.00	4199290.00	905.25	84.72	24.512	814.583	53.826	1.087	14.417	0.10
KSNO207	0930012	KINDER MORGAN INTERSTATE GAS TRANS 2	NG Engine	14	307937.00	4199290.00	905.25	84.72	20.000	729.270	128.100	1.700	91.315	0.10
KSNO208	0930012	KINDER MORGAN INTERSTATE GAS TRANS 3	NG Engine	14	307937.00	4199290.00	905.25	84.72	16.000	841.270	30.300	3.400	99.373	0.10
KSNO209	0930012	KINDER MORGAN INTERSTATE GAS TRANS 4	3500HP ALL/DEL 350 TURBO	14	307937.00	4199290.00	905.25	84.72	22.000	790.270	64.100	1.580	9.489	0.25
KSNO210	0930012	KINDER MORGAN INTERSTATE GAS TRANS 5	NG Engine	14	307937.00	4199290.00	905.25	84.72	10.000	790.270	193.600	1.580	33.572	0.10
KSNO211	0937055	COLORADO INTERSTATE GAS COMPANY	NG Engine	14	298339.00	4201095.00	935.52	84.83	24.512	814.583	53.826	1.087	44.801	0.10
KSNO212	0937055	COLORADO INTERSTATE GAS COMPANY	NG Engine	14	298339.00	4201095.00	935.52	84.83	24.512	814.583	53.826	1.087	44.801	0.10
KSNO213	0937055	COLORADO INTERSTATE GAS COMPANY 1	NG Engine	14	298339.00	4201095.00	935.52	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO214	0937055	COLORADO INTERSTATE GAS COMPANY 10	NG Engine	14	298339.00	4201095.00	935.52	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO215	0937055	COLORADO INTERSTATE GAS COMPANY 11	NG Engine	14	298339.00	4201095.00	935.52	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO216	0937055	COLORADO INTERSTATE GAS COMPANY 12	NG Engine	14	298339.00	4201095.00	935.52	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO217	0937055	COLORADO INTERSTATE GAS COMPANY 2	NG Engine	14	298339.00	4201095.00	935.52	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO218	0937055	COLORADO INTERSTATE GAS COMPANY 3	NG Engine	14	298339.00	4201095.00	935.52	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO219	0937055	COLORADO INTERSTATE GAS COMPANY 4	NG Engine	14	298339.00	4201095.00	935.52	84.83	60.000	650.270	94.900	1.800	30.027	0.10
KSNO220	0937055	COLORADO INTERSTATE GAS COMPANY 5	NG Engine	14	298339.00	4201095.00	935.52	84.83	60.000	650.270	94.900	1.800	30.027	0.10
KSNO221	0937055	COLORADO INTERSTATE GAS COMPANY 6	NG Engine	14	298339.00	4201095.00	935.52	84.83	60.000	650.270	95.000	1.800	30.027	0.10
KSNO222	0937055	COLORADO INTERSTATE GAS COMPANY 7	NG Engine	14	298339.00	4201095.00	935.52	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO223	0937055	COLORADO INTERSTATE GAS COMPANY 8	NG Engine	14	298339.00	4201095.00	935.52	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO224	0937055	COLORADO INTERSTATE GAS COMPANY 9	NG Engine	14	298339.00	4201095.00	935.52	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO006	0550023	SUNFLOWER ELECTRIC POWER CORPORATION H2GE	Generator	14	326772.78	4199407.54	886.98	91.04	15.000	915.270	288.031	0.943	13.552	0.25
KSNO007	0550023	SUNFLOWER ELECTRIC POWER CORPORATION H1FIF	Fire Pump Engine	14	326527.01	4199544.30	888.93	91.06	26.000	1083.270	45.789	0.943	1.735	0.32
KSNO008	0550023	SUNFLOWER ELECTRIC POWER CORPORATION H2FIF	Fire Pump Engine	14	326577.40	4199549.95	888.35	91.08	15.000	1083.270	45.789	0.943	1.735	0.32
KSNO009	0550023	SUNFLOWER ELECTRIC POWER CORPORATION H1AU	Auxiliary Boiler	14	326659.16	4199565.10	887.79	91.13	67.500	425.270	13.612	4.500	6.061	0.05
KSNO010	0550023	SUNFLOWER ELECTRIC POWER CORPORATION H1GE	Generator	14	326715.42	4199541.60	887.60	91.13	27.000	490.270	174.179	0.833	14.387	0.20
KSNO011	0550023	SUNFLOWER ELECTRIC POWER CORPORATION H2AU	Auxiliary Boiler	14	326861.01	4199527.54	889.90	91.18	30.000	299.270	43.293	6.000	5.395	0.05
KSNO012	0550023	SUNFLOWER ELECTRIC POWER CORPORATION H1	Coal Fired Boiler	14	326683.00	4199766.00	889.87	91.32	475.000	180.270	102.202	16.333	1359.669	0.05
KSNO013	0550023	SUNFLOWER ELECTRIC POWER CORPORATION H2_1	Coal Fired Boiler	14	326798.44	4199760.40	889.79	91.37	620.000	165.270	91.072	23.000	1303.828	0.05
KSNO238	1190025	PANHANDLE EASTERN PIPE LINE COMPANY	11.25 MMBTU/HR HEATER	14	379932.00	4118337.00	769.01	91.53	27.150	510.018	18.245	1.607	1.102	0.05
KSNO239	1190025	PANHANDLE EASTERN PIPE LINE COMPANY	DEHYDRATION UNIT	14	379932.00	4118337.00	769.01	91.53	27.150	510.018	18.245	1.607	1.102	0.05
KSNO240	1190025	PANHANDLE EASTERN PIPE LINE COMPANY	11.25 MMBTU/HR HEATER	14	379932.00	4118337.00	769.01	91.53	27.150	510.018	18.245	1.607	1.102	0.05
KSNO241	1190025	PANHANDLE EASTERN PIPE LINE COMPANY	11.25 MMBTU/HR HEATER	14	379932.00	4118337.00	769.01	91.53	27.150	510.018	18.245	1.607	1.102	0.05
KSNO242	1190025	PANHANDLE EASTERN PIPE LINE COMPANY	NG Engine	14	379932.00	4118337.00	769.01	91.53	24.512	814.583	53.826	1.087	18.724	0.10
KSNO243	1190025	PANHANDLE EASTERN PIPE LINE COMPANY	1.0 MMBTU/HR HEATER	14	379932.00	4118337.00	769.01	91.53	27.150	510.018	18.245	1.607	0.098	0.05
KSNO244	1190025	PANHANDLE EASTERN PIPE LINE COMPANY	2.0 MMBTU/HR HEATER	14	379932.00	4118337.00	769.01	91.53	27.150	510.018	18.245	1.607	0.196	0.05
KSNO245	1190025	PANHANDLE EASTERN PIPE LINE COMPANY 1	NG Engine	14	379932.00	4118337.00	769.01	91.53	40.000	100.270	0.500	3.300	87.018	0.10
KSNO246	1190025	PANHANDLE EASTERN PIPE LINE COMPANY 2	NG Engine	14	379932.00	4118337.00	769.01	91.53	40.000	100.270	0.500	3.300	87.018	0.10
KSNO247	1190025	PANHANDLE EASTERN PIPE LINE COMPANY 3	NG Engine	14	379932.00	4118337.00	769.01	91.53	40.000	100.270	0.500	3.300	87.018	0.10
KSNO248	1190025	PANHANDLE EASTERN PIPE LINE COMPANY 4	NG Engine	14	379932.00	4118337.00	769.01	91.53	40.000	100.270	0.500	3.300	87.018	0.10

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO249	1190025	PANHANDLE EASTERN PIPE LINE COMPANY 5	NG Engine	14	379932.00	4118337.00	769.01	91.53	40.000	100.270	0.500	3.300	87.018	0.10
KSNO225	1190013	MEADE MUNICIPAL POWER PLANT	Large Bore Engine (Dual Fuel, Oil/Gas)	14	381944.00	4127135.00	744.03	94.22	29.000	750.000	421.000	4.100	257.078	0.20
KSNO037	0550085	KINDER MORGAN INTERSTATE GAS TRANS	NG Engine	14	320099.00	4207857.00	896.56	96.37	24.512	814.583	53.826	1.087	7.490	0.10
KSNO038	0550085	KINDER MORGAN INTERSTATE GAS TRANS	TEG DEHY REBOILER	14	320099.00	4207857.00	896.56	96.37	36.662	430.079	20.609	1.850	0.109	0.05
KSNO039	0550085	KINDER MORGAN INTERSTATE GAS TRANS 1	NG Engine	14	320099.00	4207857.00	896.56	96.37	23.000	590.270	55.021	1.000	13.429	0.10
KSNO040	0550085	KINDER MORGAN INTERSTATE GAS TRANS 2	NG Engine	14	320099.00	4207857.00	896.56	96.37	16.000	650.270	168.900	1.000	13.429	0.10
KSNO041	0550085	KINDER MORGAN INTERSTATE GAS TRANS 3	NG Engine	14	320099.00	4207857.00	896.56	96.37	16.000	650.270	168.900	1.000	13.429	0.10
KSNO042	0550085	KINDER MORGAN INTERSTATE GAS TRANS 4	NG Engine	14	320099.00	4207857.00	896.56	96.37	27.000	590.270	55.021	1.000	13.429	0.10
KSNO043	0550085	KINDER MORGAN INTERSTATE GAS TRANS 5	NG Engine	14	320099.00	4207857.00	896.56	96.37	19.000	750.270	53.826	1.000	17.788	0.10
KSNO044	0550085	KINDER MORGAN INTERSTATE GAS TRANS 6	NG Engine	14	320099.00	4207857.00	896.56	96.37	33.000	650.270	42.200	2.000	67.144	0.10
KSNO045	0550085	KINDER MORGAN INTERSTATE GAS TRANS 7	NG Engine	14	320099.00	4207857.00	896.56	96.37	23.000	710.270	27.000	2.500	79.901	0.10
KSNO046	0550085	KINDER MORGAN INTERSTATE GAS TRANS 8	NG Engine	14	320099.00	4207857.00	896.56	96.37	13.000	720.270	36.200	2.160	44.718	0.10
KSNO047	0550085	KINDER MORGAN INTERSTATE GAS TRANS 9	NG Engine	14	320099.00	4207857.00	896.56	96.37	13.000	720.270	36.200	2.160	25.515	0.10
KSNO023	0550026	SUNFLOWER ELECTRIC POWER CORPORATION	EMER. DIESEL GENERATOR	14	333600.00	4203900.00	867.15	98.08	38.510	617.364	72.933	2.923	21.990	0.20
KSNO024	0550026	SUNFLOWER ELECTRIC POWER CORPORATION 2	S-2 STEAM GENERATOR	14	333600.00	4203900.00	867.15	98.08	124.000	253.270	57.000	10.000	68.367	0.05
KSNO025	0550026	SUNFLOWER ELECTRIC POWER CORPORATION 3	NAT GAS TURBINE	14	333600.00	4203900.00	867.15	98.08	32.000	985.270	28.800	10.330	224.111	0.25
KSNO026	0550026	SUNFLOWER ELECTRIC POWER CORPORATION 4	S-4 NAT GAS TURBINE	14	333600.00	4203900.00	867.15	98.08	42.000	1035.270	31.900	17.170	635.669	0.25
KSNO027	0550026	SUNFLOWER ELECTRIC POWER CORPORATION 5	S-5 NAT GAS TURBINE	14	333600.00	4203900.00	867.15	98.08	42.000	1046.270	32.100	17.170	633.207	0.25
KSNO028	0550026	SUNFLOWER ELECTRIC POWER CORPORATION 6	GC-3 160MMBTU/HR	14	333600.00	4203900.00	867.15	98.08	60.000	337.270	26.000	5.670	12.746	0.05
KSNO029	0550026	SUNFLOWER ELECTRIC POWER CORPORATION 7	NAT GAS BOILER	14	333600.00	4203900.00	867.15	98.08	60.000	410.270	27.000	1.330	1.210	0.05

OKLAHOMA NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
OKNO034	4567	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #1 - Worthington LTC-6, 800 hp	14	314096.00	4096421.00	901.71	33.32	28.000	380.000	51.927	1.000	32.200	0.10
OKNO035	4568	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #2 - Worthington LTC-6, 800 hp	14	314096.00	4096412.00	901.76	33.32	28.000	380.000	51.927	1.000	32.200	0.10
OKNO036	4569	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #3 - Worthington LTC-6, 800 hp	14	314096.00	4096403.00	901.81	33.32	28.000	380.000	51.927	1.000	32.200	0.10
OKNO037	4570	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #5 - Worthington SUTC-8, 2000 hp	14	314081.00	4096432.00	901.64	33.32	37.000	320.000	83.704	1.200	80.500	0.10
OKNO038	4571	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #6 - Worthington LTC-8, 1000 hp	14	314096.00	4096381.00	901.93	33.32	35.000	410.000	34.300	1.400	40.200	0.10
OKNO039	4572	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #7 - Worthington LTC-8, 1000 hp	14	314096.00	4096370.00	901.98	33.32	35.000	410.000	34.300	1.400	40.200	0.10
OKNO040	4573	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #8 - Worthington LTC-8, 1000 hp	14	314096.00	4096359.00	902.03	33.32	35.000	410.000	34.300	1.400	40.200	0.10
OKNO041	4574	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #9 - Worthington LTC-8, 1000 hp	14	314081.00	4096443.00	901.57	33.32	35.000	410.000	34.300	1.400	40.200	0.10
OKNO042	4575	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #10 - Worthington LTC-8, 1000 hp	14	314096.00	4096421.00	901.71	33.32	35.000	410.000	34.300	1.400	40.200	0.10
OKNO043	4576	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine REV #11 - Waukesha 7042GL, 1075 h	14	314096.00	4096421.00	901.71	33.32	16.000	535.000	53.700	1.200	3.600	0.10
OKNO044	4577	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #12 - Waukesha L7042GSI, 1075 hp	14	314085.00	4096341.00	902.12	33.32	30.000	1055.000	114.082	1.000	3.000	0.10
OKNO045	4578	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #13 - Waukesha L7042GSI, 1075 hp	14	314085.00	4096330.00	902.16	33.32	30.000	1055.000	114.082	1.000	3.000	0.10
OKNO046	4579	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #14 - Waukesha L7042GSI, 1075 hp	14	314085.00	4096319.00	902.21	33.32	30.000	1055.000	114.082	1.000	3.000	0.10
OKNO047	4580	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine REF #4 - Cooper GMX-6, 330 hp	14	314103.00	4096433.00	901.65	33.32	16.000	410.000	55.306	0.800	10.300	0.10
OKNO048	4581	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine GEN #1 - Cooper JS-6, 540 hp	14	314105.00	4096434.00	901.65	33.32	16.000	425.000	55.306	0.800	10.400	0.10
OKNO049	4582	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine GEN #2 - Cooper JS-6, 540 hp	14	314111.00	4096434.00	901.65	33.32	16.000	425.000	55.306	0.800	10.400	0.10
OKNO050	4583	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine GEN #3 - Cooper JS-6, 540 hp	14	314116.00	4096434.00	901.64	33.32	16.000	425.000	55.306	0.800	10.400	0.10
OKNO051	13723	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #15 Stack	14	314252.00	4096325.00	902.18	33.32	35.000	800.000	103.156	1.200	5.100	0.10
OKNO007	4246	DCP MIDSTREAM LP	U-183 - Recip Eng., 500 hp Stack	14	283113.00	4083310.00	953.19	34.34	17.000	1020.000	86.615	0.700	12.100	0.10
OKNO008	4247	DCP MIDSTREAM LP	U-184 - Recip Eng., 500 hp Stack	14	283113.00	4083340.00	953.57	34.34	17.000	1020.000	86.615	0.700	12.100	0.10
OKNO009	4248	DCP MIDSTREAM LP	U-49 - Recip Eng., 800 hp Stack	14	283113.00	4083370.00	953.97	34.34	17.000	700.000	90.201	0.900	19.400	0.10
OKNO010	4249	DCP MIDSTREAM LP	U-169 - Recip Eng., 896 hp Stack	14	283113.00	4083400.00	954.27	34.34	18.000	1033.000	137.768	0.800	21.700	0.10
OKNO011	4250	DCP MIDSTREAM LP	U-304 - Recip Eng., 896 hp Stack	14	283143.00	4083461.00	954.59	34.34	18.000	1033.000	137.768	0.800	21.700	0.10
OKNO012	4251	DCP MIDSTREAM LP	U-301 - Recip Eng., 896 hp Stack	14	283143.00	4083445.00	954.58	34.34	18.000	1033.000	137.768	0.800	21.700	0.10
OKNO013	4252	DCP MIDSTREAM LP	U-303 - Recip Eng., 896 hp Stack	14	283143.00	4083430.00	954.53	34.34	18.000	1033.000	137.768	0.800	21.700	0.10
OKNO014	7007	DCP MIDSTREAM LP	Compressor Engine # 2 - Cooper Bessemer, 1000 hp	14	281698.00	4083421.00	954.83	34.62	39.000	739.000	199.404	1.100	15.900	0.10

NOx Nearby Source Parameters and Emissions

OKLAHOMA NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
OKNO015	7008	DCP MIDSTREAM LP	Compressor Engine # 3 - Cooper Bessemer, 1000 hp	14	281698.00	4083412.00	954.8	34.62	39.000	750.000	9.560	2.000	15.900	0.10
OKNO016	7009	DCP MIDSTREAM LP	Compressor Engine # 4 - Cooper Bessemer, 1000 hp	14	281698.00	4083403.00	954.76	34.62	39.000	739.000	199.404	1.100	15.900	0.10
OKNO017	7010	DCP MIDSTREAM LP	Compressor Engine # 5 - Cooper Bessemer, 1000 hp	14	281698.00	4083393.00	954.73	34.62	39.000	750.000	9.560	2.000	15.900	0.10
OKNO018	7011	DCP MIDSTREAM LP	Compressor Engine # 6 - Cooper Bessemer, 1000 hp	14	281698.00	4083385.00	954.71	34.62	39.000	739.000	199.404	1.100	15.900	0.10
OKNO019	7015	DCP MIDSTREAM LP	Compressor Engine #10 - Cooper Bessemer, 1000 hp	14	281698.00	4083342.00	954.63	34.62	39.000	739.000	199.404	1.100	15.900	0.10
OKNO020	7016	DCP MIDSTREAM LP	Compressor Engine #11 - Cooper Bessemer, 1000 hp	14	281698.00	4083333.00	954.61	34.62	39.000	739.000	199.404	1.100	15.900	0.10
OKNO021	7017	DCP MIDSTREAM LP	Compressor Engine #12 - Cooper Bessemer, 1000 hp	14	281698.00	4083323.00	954.59	34.62	39.000	739.000	199.404	1.100	15.900	0.10
OKNO022	7018	DCP MIDSTREAM LP	Compressor Engine #13 - Cooper Bessemer, 1000 hp	14	281698.00	4083314.00	954.57	34.62	39.000	739.000	199.404	1.100	15.900	0.10
OKNO023	7019	DCP MIDSTREAM LP	Compressor Engine #14 - Cooper Bessemer, 1000 hp	14	281698.00	4083305.00	954.55	34.62	39.000	739.000	199.404	1.100	15.900	0.10
OKNO024	7021	DCP MIDSTREAM LP	Compressor Engine #16 - Cooper Bessemer, 2000 hp Sta	14	281707.00	4083262.00	954.36	34.62	39.000	680.000	19.125	2.000	13.200	0.10
OKNO025	7022	DCP MIDSTREAM LP	Compressor Engine #17 - Cooper Bessemer, 2000 hp Sta	14	281707.00	4083253.00	954.3	34.62	39.000	680.000	19.125	2.000	13.200	0.10
OKNO026	7023	DCP MIDSTREAM LP	Compressor Engine #18 - Cooper Bessemer, 2000 hp Sta	14	281707.00	4083239.00	954.21	34.62	39.000	680.000	19.125	2.000	13.200	0.10
OKNO027	4255	ANADARKO GATHERING CO LLC	U-265 - Fairbanks-Morse MEP-8, 1800 hp	14	252995.00	4091251.00	1064.64	43.87	20.000	700.000	80.352	2.000	59.500	0.10
OKNO028	4256	ANADARKO GATHERING CO LLC	U-266 - Fairbanks-Morse MEP-8, 1800 hp	14	252983.00	4091251.00	1064.66	43.87	20.000	700.000	80.352	2.000	59.500	0.10
OKNO029	4257	ANADARKO GATHERING CO LLC	U-178 - Cat. G399TALC, 730 hp	14	252893.00	4091281.00	1064.89	43.87	18.000	1000.000	146.509	0.700	30.600	0.10
OKNO030	4258	ANADARKO GATHERING CO LLC	U-179 - Cat. G399TALC, 730 hp	14	252908.00	4091281.00	1064.88	43.87	18.000	1000.000	146.509	0.700	30.600	0.10
OKNO031	4259	ANADARKO GATHERING CO LLC	U-152 - Superior 8G825, 800 hp	14	252923.00	4091281.00	1064.85	43.87	14.000	1300.000	220.435	0.700	26.500	0.10
OKNO032	4260	ANADARKO GATHERING CO LLC	U-153 - Superior 8G825, 800 hp	14	252938.00	4091281.00	1064.78	43.87	14.000	1300.000	220.435	0.700	26.500	0.10
OKNO033	4261	ANADARKO GATHERING CO LLC	U-158 - Superior 8G825, 800 hp	14	252953.00	4091281.00	1064.74	43.87	14.000	1300.000	220.435	0.700	26.500	0.10
OKNO001	3967	WTG HUGOTON LP	Compressor #1 - Cooper Bessemer GMXD-8, 503 hp	14	264638.00	4068496.00	980.49	54.27	12.000	600.000	138.042	0.820	12.100	0.10
OKNO002	3968	WTG HUGOTON LP	Compressor #2 - Cooper Bessemer GMXD-8, 503 hp	14	264644.00	4068496.00	980.49	54.27	12.000	600.000	138.042	0.820	12.100	0.10
OKNO003	3969	WTG HUGOTON LP	Compressor #3 - Waukesha L7042GSIU, 1068 hp	14	264632.00	4068496.00	980.49	54.27	14.000	850.000	110.920	0.980	23.500	0.10
OKNO004	3970	WTG HUGOTON LP	Compressor #4 - Waukesha L7042GU, 706 hp	14	264695.00	4068502.00	980.11	54.27	17.000	750.000	64.784	0.980	15.500	0.10
OKNO005	3971	WTG HUGOTON LP	Compressor #5 - Waukesha L7042GU, 706 hp	14	264650.00	4068496.00	980.46	54.27	20.000	760.000	64.784	0.980	15.500	0.10
OKNO006	3972	WTG HUGOTON LP	Compressor #6 - White Superior 12GTL825, 1605 hp	14	264701.00	4068502.00	979.96	54.27	20.000	870.000	158.082	1.080	41.700	0.10
OKNO052	3448	NATURAL GAS PIPELINE CO OF AMERICA	Compressor Engine #15 - Cooper 12W330C2,6900 hp	14	331424.00	4047733.00	869.4	82.04	29.000	530.000	115.535	3.000	30.200	0.10
OKNO053	3441	NATURAL GAS PIPELINE CO OF AMERICA	Compressor Engine #8 - Clark TCV-10, 3400 hp	14	331424.00	4047714.00	868.68	82.06	29.000	700.000	123.664	2.500	89.950	0.10
OKNO054	3442	NATURAL GAS PIPELINE CO OF AMERICA	Compressor Engine #9 - Clark TCV-12, 4000 hp	14	331424.00	4047701.00	868.2	82.07	29.000	700.000	101.034	3.000	136.680	0.10

COLORADO NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
CONO001	001	COLORADO INTERSTATE GAS CO FLANK STA	3 NATURAL GAS ENGINES RATED AT 1475 HP		217225.77	4112369.01	1162.85	71.00	30.000	1200.000	137.500	1.200	34.114	0.10
CONO002	008	COLORADO INTERSTATE GAS CO FLANK STA	NAT GAS FIRED SUPERIOR ICE		217225.77	4112369.01	1162.85	71.00	25.000	800.000	10.000	1.200	4.954	0.10
CONO003	009	COLORADO INTERSTATE GAS CO FLANK STA	NAT GAS FIRED SUPERIOR ICE		217225.77	4112369.01	1162.85	71.00	16.000	1080.000	27.800	0.400	3.630	0.10
CONO004	014	COLORADO INTERSTATE GAS CO FLANK STA	OLMAN HEATH TEG GLYCOL DEHY		217225.77	4112369.01	1162.85	71.00	25.000	600.000	10.200	1.330	0.600	0.05
CONO005	001	CRUSADER ENERGY GROUP INC - STONINGTON	NAT GAS FIRED CATERPILLAR ICE		218239.90	4131075.39	1159.01	71.00	10.000	1039.000	47.700	0.400	5.826	0.10
CONO006	002	CRUSADER ENERGY GROUP, INC	NAT GAS FIRED CATERPILLAR ICE		205183.38	4138394.97	1221.09	85.30	9.000	1134.000	131.000	0.350	5.205	0.10
CONO007	001	CRUSADER ENERGY GROUP	NAT GAS FIRED CATERPILLAR ICE		198064.95	4135337.93	1249.99	91.60	9.000	1134.000	130.700	0.360	4.568	0.10
CONO008	001	MIDSTREAM ENERGY - SPELUNKER CS	WAUKESHA, H24GL NAT GAS ENG RATED AT 517 HP		208806.97	4117287.60	1210.3	79.20	14.000	850.000	153.000	0.660	2.283	0.10
CONO009	009	NORTHEAST KANSAS BIOENERGY, LLC	NAT GAS FIRED BOILERS		206700.24	4142477.61	1216.93	85.00	10.000	400.000	999.000	2.000	3.285	0.05
CONO010	001	CRUSADER ENERGY GROUP	NAT GAS FIRED FORD RICE		224979.96	4137768.66	1138.56	66.20	10.000	800.000	20.000	0.300	0.753	0.10
CONO011	001	CRUSADER ENERGY GROUP	NAT GAS FIRED FORD RICE		210498.89	4133688.45	1195.96	79.10	10.000	800.000	20.000	0.300	0.765	0.10
CONO012	001	CRUSADER ENERGY GROUP	NAT GAS FIRED CHEVROLET 8.1L/496 RICE		199784.23	4138498.28	1243.37	90.60	5.000	1360.000	97.400	0.250	0.185	0.10
CONO013	001	CRUSADER ENERGY GROUP	NAT GAS FIRED CHEVROLET 8.1L/496 RICE		206847.25	4125429.08	1203.2	81.50	5.000	1360.000	97.300	0.250	0.185	0.10
CONO014	001	CRUSADER ENERGY GROUP	NAT GAS FIRED CHEVROLET 8.1L/496 RICE		199555.60	4138256.10	1244.01	90.80	5.000	1360.000	97.300	0.250	0.183	0.10

NOx Nearby Source Parameters and Emissions

TEXAS NEARBY POINT SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (m)	Stack Gas Temp. (degK)	Stack Exit Velocity (m/s)	Stack Diameter (m)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
TXNO270	HD0014P	DUKE ENERGY FIELD SERVICES	STK38	14	279062.00	4041233.00	966.84	77.01	3.960	699.660	16.580	0.250	2.557	0.10
TXNO280	HD0014P	DUKE ENERGY FIELD SERVICES	STK39	14	279197.00	4041338.00	966.79	76.89	3.960	699.660	18.280	0.250	2.557	0.10
TXNO300	HD0014P	DUKE ENERGY FIELD SERVICES	STK40	14	279203.00	4041338.00	966.77	76.89	3.960	699.660	18.280	0.250	2.557	0.10

TEXAS NEARBY AREA SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (m)	Rotation (deg)	Width (m)	Length (m)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
TXNOD1	SJ0006J	TEXHOMA WHEAT GROWERS INC	5803	14	248140	4042884	1058.40	84.87	9.140	0.000	30.480	30.480	0.091	0.50
TXNOD2	SJ0006J	TEXHOMA WHEAT GROWERS INC	5803	14	248140	4042884	1058.40	84.87	9.140	0.000	30.480	30.480	0.091	0.50

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO418	1890103	SEABOARD FOODS, LP 001	External Combustion Boilers, Grades 1 and 2 Oil	14	288569	4116475	952.47	0.41	73.607	416.636	29.334	3.781	2.057	0.05
KSNO436	1890203	CITY OF HUGOTON	NG Engine	14	290764	4116301	950.32	2.42	28.761	704.857	55.021	1.618	7.815	0.10
KSNO423	1890143	ANADARKO GATHERING COMPANY LLC 1	NG Engine	14	285864	4115896	961.66	2.72	16.000	1175.270	157.000	0.830	3.965	0.10
KSNO424	1890143	ANADARKO GATHERING COMPANY LLC 1	NG Engine	14	285864	4115896	961.66	2.72	16.000	1175.270	157.000	0.830	47.180	0.10
KSNO421	1890136	ANADARKO GATHERING COMPANY LLC 4	NG Engine	14	287584	4119492	958.41	2.77	20.000	1105.270	198.000	0.670	4.097	0.10
KSNO375	1890020	HUGOTON MUNICIPAL POWER PLANT (#1)	Dual Fuel Engine	14	291552	4117045	948.18	3.15	28.761	704.857	55.021	1.618	16.785	0.29
KSNO435	1890202	CITY OF HUGOTON	NG Engine	14	291578	4116896	947.94	3.17	28.761	704.857	55.021	1.618	3.294	0.10
KSNO434	1890201	ONEOK FIELD SERVICES COMPANY, L.L.C.	NG Engine	14	286706	4113812	961.92	3.48	28.761	704.857	55.021	1.618	2.551	0.10
KSNO420	1890126	ANADARKO GATHERING COMPANY LLC	NG Engine	14	291615	4118513	947.75	3.61	28.761	704.857	55.021	1.618	4.002	0.10
KSNO437	1890208	ONEOK FIELD SERVICES COMPANY, L.L.C.	NG Engine	14	290045	4120184	953.82	3.71	28.761	704.857	55.021	1.618	5.103	0.10
KSNO376	1890021	HUGOTON MUNICIPAL POWER PLANT (#2) 1	Internal Combustion Engines, Dual Fuel (Oil/Gas)	14	292326	4115396	947.24	4.18	33.000	505.270	106.400	2.500	474.504	0.21
KSNO438	1890209	ONEOK FIELD SERVICES COMPANY, L.L.C.	NG Engine	14	288265	4112165	963.19	4.69	28.761	704.857	55.021	1.618	3.894	0.10
KSNO357	1890015	ANADARKO GATHERING COMPANY LLC 1	NG Engine	14	293191	4115298	947.66	5.03	32.000	660.270	149.000	0.830	29.543	0.10
KSNO358	1890015	ANADARKO GATHERING COMPANY LLC 10	NG Engine	14	293191	4115298	947.66	5.03	35.000	660.270	149.000	0.830	29.543	0.10
KSNO359	1890015	ANADARKO GATHERING COMPANY LLC 11	NG Engine	14	293191	4115298	947.66	5.03	45.000	660.270	94.000	2.000	138.269	0.10
KSNO360	1890015	ANADARKO GATHERING COMPANY LLC 12	NG Engine	14	293191	4115298	947.66	5.03	45.000	660.270	94.000	2.000	138.269	0.10
KSNO361	1890015	ANADARKO GATHERING COMPANY LLC 13	NG Engine	14	293191	4115298	947.66	5.03	45.000	660.270	94.000	2.000	138.269	0.10
KSNO362	1890015	ANADARKO GATHERING COMPANY LLC 14	NG Engine	14	293191	4115298	947.66	5.03	45.000	660.270	80.000	3.000	205.460	0.10
KSNO363	1890015	ANADARKO GATHERING COMPANY LLC 15	NG Engine	14	293191	4115298	947.66	5.03	20.000	1100.270	240.000	0.500	9.362	0.10
KSNO364	1890015	ANADARKO GATHERING COMPANY LLC 16	NG Engine	14	293191	4115298	947.66	5.03	20.000	1100.270	240.000	0.500	9.362	0.10
KSNO365	1890015	ANADARKO GATHERING COMPANY LLC 17	Diesel Engine	14	293191	4115298	947.66	5.03	12.000	1100.270	39.000	0.500	28.866	0.10
KSNO366	1890015	ANADARKO GATHERING COMPANY LLC 18	4.00 GLYCOL REBOILER	14	293191	4115298	947.66	5.03	20.000	1000.270	484.000	1.000	0.107	0.05
KSNO367	1890015	ANADARKO GATHERING COMPANY LLC 2	NG Engine	14	293191	4115298	947.66	5.03	32.000	660.270	150.000	0.830	29.543	0.10
KSNO368	1890015	ANADARKO GATHERING COMPANY LLC 3	NG Engine	14	293191	4115298	947.66	5.03	32.000	660.270	149.000	0.830	29.543	0.10
KSNO369	1890015	ANADARKO GATHERING COMPANY LLC 4	NG Engine	14	293191	4115298	947.66	5.03	35.000	660.270	149.000	0.830	29.543	0.10
KSNO370	1890015	ANADARKO GATHERING COMPANY LLC 5	NG Engine	14	293191	4115298	947.66	5.03	35.000	660.270	149.000	0.830	29.543	0.10
KSNO371	1890015	ANADARKO GATHERING COMPANY LLC 6	NG Engine	14	293191	4115298	947.66	5.03	35.000	660.270	149.000	0.830	29.543	0.10
KSNO372	1890015	ANADARKO GATHERING COMPANY LLC 7	NG Engine	14	293191	4115298	947.66	5.03	35.000	660.270	149.000	0.830	29.543	0.10
KSNO373	1890015	ANADARKO GATHERING COMPANY LLC 8	NG Engine	14	293191	4115298	947.66	5.03	35.000	660.270	149.000	0.830	29.543	0.10
KSNO374	1890015	ANADARKO GATHERING COMPANY LLC 9	NG Engine	14	293191	4115298	947.66	5.03	35.000	660.270	149.000	0.830	29.543	0.10
KSNO412	1890054	WTG HUGOTON, LP 1	NG Engine	14	290087	4121793	961.44	5.22	21.000	650.270	64.300	1.000	31.111	0.10
KSNO413	1890054	WTG HUGOTON, LP 2	NG Engine	14	290087	4121793	961.44	5.22	21.000	650.270	64.100	1.000	31.111	0.10
KSNO414	1890054	WTG HUGOTON, LP 3	NG Engine	14	290087	4121793	961.44	5.22	21.000	650.270	64.100	1.000	31.111	0.10
KSNO415	1890054	WTG HUGOTON, LP 4	NG Engine	14	290087	4121793	961.44	5.22	21.000	650.270	64.100	1.000	31.111	0.10
KSNO345	1890008	WTG HUGOTON, LP	NG Engine	14	293270	4120091	949.39	5.61	17.000	800.000	116.900	0.660	0.039	0.10
KSNO351	1890009	WTG HUGOTON, LP	NG Engine	14	293270	4120091	949.39	5.61	17.000	800.000	118.300	0.660	0.029	0.10
KSNO352	1890010	WTG HUGOTON, LP	NG Engine	14	293270	4120091	949.39	5.61	23.000	800.000	66.800	1.330	129.059	0.10
KSNO353	1890011	WTG HUGOTON, LP	NG Engine	14	293270	4120091	949.39	5.61	25.000	800.000	112.400	1.160	3.295	0.10
KSNO354	1890012	WTG HUGOTON, LP	NG Engine	14	293270	4120091	949.39	5.61	23.000	800.000	77.200	1.330	132.694	0.10
KSNO430	1890183	ONEOK FIELD SERVICES COMPANY, L.L.C.	NG Engine	14	283492	4113897	969.29	5.74	28.761	704.857	55.021	1.618	15.386	0.10
KSNO346	1890009	WTG HUGOTON, LP 1	NG Engine	14	293270	4120091	949.39	5.84	17.000	800.270	116.900	0.660	9.793	0.10
KSNO347	1890009	WTG HUGOTON, LP 2	NG Engine	14	293270	4120091	949.39	5.84	17.000	800.270	118.300	0.660	9.793	0.10
KSNO348	1890009	WTG HUGOTON, LP 4	COOPER-BESSEMER GMVA-10	14	293270	4120091	949.39	5.84	23.000	800.270	66.800	1.330	35.559	0.10
KSNO349	1890009	WTG HUGOTON, LP 5	NG Engine	14	293270	4120091	949.39	5.84	25.000	800.270	112.400	1.160	26.775	0.10
KSNO350	1890009	WTG HUGOTON, LP 6	COOPER-BESSEMER GMVA-10	14	293270	4120091	949.39	5.84	23.000	800.270	77.200	1.330	35.559	0.10
KSNO001	0550009	WTG HUGOTON, LP	NG Engine	14	327158	4194163	893.37	6.12	13.000	800.000	121.700	1.000	5.441	0.10
KSNO002	0550009	WTG HUGOTON, LP	NG Engine	14	327158	4194163	893.37	6.12	18.000	950.000	73.100	1.000	3.452	0.10
KSNO003	0550009	WTG HUGOTON, LP	NG Engine	14	327158	4194163	893.37	6.12	24.000	998.000	112.300	1.160	39.731	0.10
KSNO004	0550009	WTG HUGOTON, LP	NG Engine	14	327158	4194163	893.37	6.12	29.000	998.000	112.300	1.160	6.517	0.10
KSNO005	0550009	WTG HUGOTON, LP	NG Engine	14	327158	4194163	893.37	6.12	27.150	509.748	18.245	1.607	0.049	0.10

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO431	1890185	ONEOK FIELD SERVICES COMPANY, LLC 001	NG Engine	14	288858	4123068	965.41	6.23	24.512	814.583	53.826	1.087	10.720	0.10
KSNO425	1890144	ANADARKO GATHERING COMPANY LLC 1	NG Engine	14	287384	4110614	963.31	6.32	16.000	1100.270	148.000	0.830	49.162	0.10
KSNO396	1890044	ANADARKO GATHERING COMPANY LLC	NG Engine	14	282561	4114129	971.19	6.45	24.512	814.583	53.826	1.087	4.438	0.10
KSNO397	1890044	ANADARKO GATHERING COMPANY LLC	NG Engine	14	282561	4114129	971.19	6.45	24.512	814.583	53.826	1.087	7.490	0.10
KSNO398	1890044	ANADARKO GATHERING COMPANY LLC	NG Engine	14	282561	4114129	971.19	6.45	24.512	814.583	53.826	1.087	4.438	0.10
KSNO399	1890044	ANADARKO GATHERING COMPANY LLC	NG Engine	14	282561	4114129	971.19	6.45	20.000	1103.270	230.000	1.000	13.107	0.10
KSNO422	1890137	ANADARKO GATHERING COMPANY LLC	NG Engine	14	282035	4120385	967.86	7.29	28.761	704.857	55.021	1.618	21.409	0.10
KSNO432	1890189	ANADARKO GATHERING COMPANY LLC 1	NG Engine	14	287016	4124348	962.65	7.63	16.000	1105.270	111.000	0.830	38.590	0.10
KSNO440	1890220	ANADARKO GATHERING COMPANY LLC	NG Engine	14	281622	4113136	973.81	7.74	28.761	704.857	55.021	1.618	2.551	0.10
KSNO386	1890025	WTG HUGOTON, LP	NG Engine	14	293047	4110431	950.08	7.92	24.512	814.583	53.826	1.087	7.003	0.10
KSNO387	1890025	WTG HUGOTON, LP 1	NG Engine	14	293047	4110431	950.08	7.92	17.000	800.270	64.700	1.330	35.559	0.10
KSNO388	1890025	WTG HUGOTON, LP 2	NG Engine	14	293047	4110431	950.08	7.92	16.000	800.270	109.800	1.000	23.105	0.10
KSNO389	1890025	WTG HUGOTON, LP 3	NG Engine	14	293047	4110431	950.08	7.92	15.000	800.270	69.300	0.830	10.972	0.10
KSNO390	1890025	WTG HUGOTON, LP 5	NG Engine	14	293047	4110431	950.08	7.92	19.000	800.270	71.300	0.660	14.305	0.10
KSNO391	1890025	WTG HUGOTON, LP 6	NG Engine	14	293047	4110431	950.08	7.92	19.000	800.270	71.300	0.660	7.003	0.10
KSNO392	1890025	WTG HUGOTON, LP 7	NG Engine	14	293047	4110431	950.08	7.92	19.000	800.270	71.300	0.660	7.003	0.10
KSNO393	1890032	WTG HUGOTON, LP 1	NG Engine	14	283401	4110674	977.16	7.95	17.000	800.270	171.100	0.830	19.922	0.10
KSNO394	1890032	WTG HUGOTON, LP 2	NG Engine	14	283401	4110674	977.16	7.95	23.000	800.270	87.100	1.160	29.543	0.10
KSNO395	1890032	WTG HUGOTON, LP 3	NG Engine	14	283401	4110674	977.16	7.95	18.000	800.270	131.700	1.160	55.308	0.10
KSNO419	1890115	EXXONMOBIL PRODUCTION COMPANY	NG Engine	14	280359	4117196	968.32	8.06	28.761	704.857	55.021	1.618	1.209	0.10
KSNO429	1890182	ONEOK FIELD SERVICES COMPANY, LLC	NG Engine	14	286578	4108981	967.51	8.08	28.761	704.857	55.021	1.618	30.237	0.10
KSNO014	0550024	WTG HUGOTON, LP	NG Engine	14	320748	4194270	902.34	8.21	16.000	800.000	89.700	1.000	17.901	0.10
KSNO015	0550024	WTG HUGOTON, LP	NG Engine	14	320748	4194270	902.34	8.21	16.000	800.000	98.200	1.000	34.358	0.10
KSNO016	0550024	WTG HUGOTON, LP	NG Engine	14	320748	4194270	902.34	8.21	15.000	957.000	145.000	0.660	7.695	0.10
KSNO017	0550024	WTG HUGOTON, LP	NG Engine	14	320748	4194270	902.34	8.21	17.000	800.000	91.900	1.000	34.358	0.10
KSNO018	0550024	WTG HUGOTON, LP	NG Engine	14	320748	4194270	902.34	8.21	16.000	800.000	89.900	1.000	33.433	0.10
KSNO019	0550024	WTG HUGOTON, LP	NG Engine	14	320748	4194270	902.34	8.21	21.000	584.000	84.100	0.830	12.160	0.10
KSNO020	0550024	WTG HUGOTON, LP	NG Engine	14	320748	4194270	902.34	8.21	21.000	584.000	84.100	0.830	12.160	0.10
KSNO021	0550024	WTG HUGOTON, LP	NG Engine	14	320748	4194270	902.34	8.21	21.000	584.000	84.100	0.830	12.160	0.10
KSNO022	0550024	WTG HUGOTON, LP	GLYCOL REBOILER	14	320748	4194270	902.34	8.21	27.150	509.748	18.245	1.607	0.109	0.05
KSNO030	0550043	TYSON FRESH MEATS, INC.	NG Boiler	14	322114	4207381	883.79	8.33	43.000	150.000	80.000	3.000	2.941	0.05
KSNO031	0550043	TYSON FRESH MEATS, INC.	NG Boiler	14	322114	4207381	883.79	8.33	58.213	436.409	27.610	3.403	21.569	0.05
KSNO032	0550043	TYSON FRESH MEATS, INC.	NG Engine	14	322114	4207381	883.79	8.33	24.512	814.313	53.826	1.087	2.811	0.10
KSNO033	0550043	TYSON FRESH MEATS, INC.	NG Boiler	14	322114	4207381	883.79	8.33	36.662	429.809	20.609	1.850	8.627	0.05
KSNO034	0550043	TYSON FRESH MEATS, INC.	NG Engine	14	322114	4207381	883.79	8.33	24.512	814.313	53.826	1.087	2.343	0.10
KSNO035	0550043	TYSON FRESH MEATS, INC.	Animal/Poultry Rendering, Cooking	14	322114	4207381	883.79	8.33	46.039	169.632	49.713	2.329	0.168	0.05
KSNO036	0550043	TYSON FRESH MEATS, INC.	NG Boiler	14	322114	4207381	883.79	8.33	36.662	429.809	20.609	1.850	0.167	0.05
KSNO427	1890176	ONEOK FIELD SERVICES COMPANY, L.L.C.	NG Engine	14	293903	4109558	949.42	9.13	24.512	814.583	53.826	1.087	1.429	0.10
KSNO428	1890180	ONEOK FIELD SERVICES COMPANY, L.L.C.	NG Engine	14	294956	4123273	952.70	9.17	28.761	704.857	55.021	1.618	16.822	0.10
KSNO439	1890213	ONEOK FIELD SERVICES COMPANY, L.L.C.	NG Engine	14	280465	4122038	971.83	9.49	28.761	704.857	55.021	1.618	5.612	0.10
KSNO426	1890166	ONEOK FIELD SERVICES COMPANY, L.L.C.	NG Engine	14	288600	4126680	960.68	9.83	28.761	704.857	55.021	1.618	8.729	0.10
KSNO355	1890014	ANADARKO GATHERING COMPANY LLC 001	NG Engine	14	284905	4105801	972.43	11.59	35.000	660.270	43.000	3.000	85.944	0.10
KSNO356	1890014	ANADARKO GATHERING COMPANY LLC 002	GLYCOL REBOILER	14	284905	4105801	972.43	11.59	20.000	600.270	26.000	0.830	0.196	0.05
KSNO403	1890051	ANADARKO GATHERING COMPANY LLC	GLYCOL DEHY REBOILER	14	275641	4120558	980.02	13.30	27.150	510.018	18.245	1.607	0.196	0.05
KSNO404	1890051	ANADARKO GATHERING COMPANY LLC 1	NG Engine	14	275641	4120558	980.02	13.30	42.000	805.270	183.700	1.330	91.603	0.10
KSNO405	1890051	ANADARKO GATHERING COMPANY LLC 2	NG Engine	14	275641	4120558	980.02	13.30	42.000	805.270	183.000	1.330	91.603	0.10
KSNO406	1890051	ANADARKO GATHERING COMPANY LLC 3	NG Engine	14	275641	4120558	980.02	13.30	42.000	805.270	183.700	1.330	91.603	0.10
KSNO407	1890051	ANADARKO GATHERING COMPANY LLC 4	NG Engine	14	275641	4120558	980.02	13.30	42.000	805.270	183.000	1.330	91.603	0.10
KSNO408	1890051	ANADARKO GATHERING COMPANY LLC 5	NG Engine	14	275641	4120558	980.02	13.30	42.000	805.270	183.000	1.330	91.603	0.10
KSNO409	1890051	ANADARKO GATHERING COMPANY LLC 6	NG Engine	14	275641	4120558	980.02	13.30	42.000	805.270	183.000	1.330	91.603	0.10
KSNO410	1890051	ANADARKO GATHERING COMPANY LLC 7	NG Engine	14	275641	4120558	980.02	13.30	14.000	1100.270	383.000	0.500	4.106	0.10
KSNO411	1890051	ANADARKO GATHERING COMPANY LLC 8	CATERPILLAR D349, 1100HP	14	275641	4120558	980.02	13.30	16.000	1100.270	168.000	0.830	29.543	0.10
KSNO400	1890046	WTG HUGOTON, LP 1	NG Engine	14	306223	4124605	930.30	19.43	18.000	800.270	65.100	1.160	38.024	0.10
KSNO401	1890046	WTG HUGOTON, LP 2	NG Engine	14	306223	4124605	930.30	19.43	18.000	800.270	65.000	1.160	38.024	0.10

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO402	1890046	WTG HUGOTON, LP 3	NG Engine	14	306223	4124605	930.30	19.43	23.000	850.270	104.600	0.830	15.447	0.10
KSNO318	1890008	WTG HUGOTON, LP	DEHY VRU VENT PILOT	14	307729	4119753	911.72	19.54	20.740	553.249	11.501	1.087	0.764	0.50
KSNO319	1890008	WTG HUGOTON, LP	BOILER FOR TANK 7	14	307729	4119753	911.72	19.54	27.150	510.018	18.245	1.607	0.024	0.05
KSNO320	1890008	WTG HUGOTON, LP 1	NG Engine	14	307729	4119753	911.72	19.54	27.000	765.270	30.900	1.830	23.105	0.10
KSNO321	1890008	WTG HUGOTON, LP 10	NG Engine	14	307729	4119753	911.72	19.54	27.000	765.270	31.800	1.830	23.105	0.10
KSNO322	1890008	WTG HUGOTON, LP 11	NG Engine	14	307729	4119753	911.72	19.54	27.000	765.270	31.800	1.830	23.105	0.10
KSNO323	1890008	WTG HUGOTON, LP 12	SOLAR T1001S332	14	307729	4119753	911.72	19.54	22.000	850.270	55.600	1.500	2.928	0.25
KSNO324	1890008	WTG HUGOTON, LP 13	SOLAR T1001S332	14	307729	4119753	911.72	19.54	22.000	850.270	55.600	1.500	2.928	0.25
KSNO325	1890008	WTG HUGOTON, LP 14	SOLAR T1001S332	14	307729	4119753	911.72	19.54	22.000	850.270	55.600	1.500	2.928	0.25
KSNO326	1890008	WTG HUGOTON, LP 15	NG Engine	14	307729	4119753	911.72	19.54	29.000	650.270	45.800	1.660	48.343	0.10
KSNO327	1890008	WTG HUGOTON, LP 16	NG Engine	14	307729	4119753	911.72	19.54	27.000	650.270	31.600	2.000	48.343	0.10
KSNO328	1890008	WTG HUGOTON, LP 17	NG Engine	14	307729	4119753	911.72	19.54	27.000	650.270	31.600	2.000	48.343	0.10
KSNO329	1890008	WTG HUGOTON, LP 18	NG Engine	14	307729	4119753	911.72	19.54	21.000	500.270	83.000	1.000	37.506	0.10
KSNO330	1890008	WTG HUGOTON, LP 19	NG Engine	14	307729	4119753	911.72	19.54	21.000	500.270	83.000	1.000	37.506	0.10
KSNO331	1890008	WTG HUGOTON, LP 2	NG Engine	14	307729	4119753	911.72	19.54	27.000	765.270	31.200	1.830	23.105	0.10
KSNO332	1890008	WTG HUGOTON, LP 20	NG Engine	14	307729	4119753	911.72	19.54	21.000	500.270	83.000	1.000	37.506	0.10
KSNO333	1890008	WTG HUGOTON, LP 21	NG Engine	14	307729	4119753	911.72	19.54	14.000	500.270	66.500	0.660	7.639	0.10
KSNO334	1890008	WTG HUGOTON, LP 22	NG Engine	14	307729	4119753	911.72	19.54	14.000	500.270	66.500	0.660	7.639	0.10
KSNO335	1890008	WTG HUGOTON, LP 23	NG Engine	14	307729	4119753	911.72	19.54	14.000	500.270	66.500	0.660	7.639	0.10
KSNO336	1890008	WTG HUGOTON, LP 24	NG Engine	14	307729	4119753	911.72	19.54	13.000	800.270	79.500	0.660	7.021	0.10
KSNO337	1890008	WTG HUGOTON, LP 25	NG Engine	14	307729	4119753	911.72	19.54	13.000	800.270	79.500	0.660	7.021	0.10
KSNO338	1890008	WTG HUGOTON, LP 3	NG Engine	14	307729	4119753	911.72	19.54	27.000	765.270	31.200	1.830	23.105	0.10
KSNO339	1890008	WTG HUGOTON, LP 4	NG Engine	14	307729	4119753	911.72	19.54	27.000	765.270	31.200	1.830	23.105	0.10
KSNO340	1890008	WTG HUGOTON, LP 5	NG Engine	14	307729	4119753	911.72	19.54	27.000	765.270	31.800	1.830	23.105	0.10
KSNO341	1890008	WTG HUGOTON, LP 6	NG Engine	14	307729	4119753	911.72	19.54	27.000	765.270	31.800	1.830	23.105	0.10
KSNO342	1890008	WTG HUGOTON, LP 7	NG Engine	14	307729	4119753	911.72	19.54	27.000	765.270	31.800	1.830	23.105	0.10
KSNO343	1890008	WTG HUGOTON, LP 8	NG Engine	14	307729	4119753	911.72	19.54	27.000	765.270	31.800	1.830	23.105	0.10
KSNO344	1890008	WTG HUGOTON, LP 9	NG Engine	14	307729	4119753	911.72	19.54	27.000	765.270	31.800	1.830	23.105	0.10
KSNO433	1890198	ANADARKO GATHERING COMPANY LLC	NG Engine	14	281491	4097826	982.06	20.98	18.000	1055.000	94.000	1.000	141.869	0.10
KSNO313	1890002	WTG HUGOTON, LP	GLYCOL REBOILER	14	305799	4103709	922.62	21.80	27.150	510.018	18.245	1.607	0.196	0.05
KSNO314	1890002	WTG HUGOTON, LP 1	NG Engine	14	305799	4103709	922.62	21.80	18.000	800.270	69.000	1.330	36.258	0.10
KSNO315	1890002	WTG HUGOTON, LP 2	NG Engine	14	305799	4103709	922.62	21.80	28.000	800.270	69.000	1.330	36.258	0.10
KSNO316	1890002	WTG HUGOTON, LP 3	NG Engine	14	305799	4103709	922.62	21.80	27.000	800.270	101.500	1.000	20.971	0.10
KSNO317	1890002	WTG HUGOTON, LP 4	NG Engine	14	305799	4103709	922.62	21.80	18.000	800.270	93.400	0.830	13.200	0.10
KSNO416	1890058	ANADARKO GATHERING COMPANY LLC	NG Engine	14	292098	4139492	942.07	22.82	16.000	1175.000	155.000	0.830	68.220	0.10
KSNO417	1890058	ANADARKO GATHERING COMPANY LLC	NG Engine	14	292098	4139492	942.07	22.82	16.000	1175.000	155.000	0.830	65.190	0.10
KSNO377	1890023	EXXONMOBIL PRODUCTION COMPANY 1	NG Engine	14	306460	4135892	923.56	26.24	28.000	650.270	140.200	0.830	8.863	0.10
KSNO378	1890023	EXXONMOBIL PRODUCTION COMPANY 2	NG Engine	14	306460	4135892	923.56	26.24	25.000	650.270	158.600	0.830	11.817	0.10
KSNO379	1890023	EXXONMOBIL PRODUCTION COMPANY 3	NG Engine	14	306460	4135892	923.56	26.24	25.000	650.270	193.700	1.330	23.635	0.10
KSNO380	1890023	EXXONMOBIL PRODUCTION COMPANY 4	NG Engine	14	306460	4135892	923.56	26.24	25.000	650.270	111.000	1.330	17.726	0.10
KSNO257	1290012	ANADARKO GATHERING COMPANY LLC 001	NG Engine	14	267105	4101492	1,019.85	26.26	28.000	660.270	94.000	1.330	29.543	0.10
KSNO258	1290012	ANADARKO GATHERING COMPANY LLC 002	NG Engine	14	267105	4101492	1,019.85	26.26	28.000	660.270	94.000	1.330	29.543	0.10
KSNO259	1290012	ANADARKO GATHERING COMPANY LLC 003	NG Engine	14	267105	4101492	1,019.85	26.26	16.000	900.270	97.000	0.830	15.859	0.10
KSNO260	1290012	ANADARKO GATHERING COMPANY LLC 004	NG Engine	14	267105	4101492	1,019.85	26.26	16.000	1100.270	103.000	0.830	15.859	0.10
KSNO261	1290012	ANADARKO GATHERING COMPANY LLC 005	NG Engine	14	267105	4101492	1,019.85	26.26	16.000	900.270	97.000	0.830	15.859	0.10
KSNO262	1290012	ANADARKO GATHERING COMPANY LLC 006	GLYCOL REBOILER	14	267105	4101492	1,019.85	26.26	30.000	600.270	11.000	1.330	0.196	0.05
KSNO381	1890024	EXXONMOBIL PRODUCTION COMPANY 1	NG Engine	14	304910	4139164	920.27	27.75	25.000	650.270	130.900	1.000	10.743	0.10
KSNO382	1890024	EXXONMOBIL PRODUCTION COMPANY 2	NG Engine	14	304910	4139164	920.27	27.75	25.000	650.270	158.600	1.000	13.429	0.10
KSNO383	1890024	EXXONMOBIL PRODUCTION COMPANY 3	NG Engine	14	304910	4139164	920.27	27.75	24.000	650.270	111.000	1.000	17.726	0.10
KSNO384	1890024	EXXONMOBIL PRODUCTION COMPANY 4	NG Engine	14	304910	4139164	920.27	27.75	24.000	650.270	193.700	1.160	23.635	0.10
KSNO385	1890024	EXXONMOBIL PRODUCTION COMPANY 5	NG Engine	14	304910	4139164	920.27	27.75	24.000	650.270	193.700	1.160	23.635	0.10
KSNO099	0670030	BP AMERICA PRODUCTION COMPANY	NG Engine	14	282898	4147063	957.27	30.71	27.786	743.760	63.070	1.480	22.019	0.10
KSNO100	0670030	BP AMERICA PRODUCTION COMPANY	180HP GASOLINE AIR COMP.	14	282898	4147063	957.27	30.71	18.954	392.195	32.792	0.832	4.834	0.29
KSNO101	0670030	BP AMERICA PRODUCTION COMPANY	NG Engine	14	282898	4147063	957.27	30.71	27.786	743.760	63.070	1.480	22.019	0.10

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO102	0670030	BP AMERICA PRODUCTION COMPANY 1	NG Engine	14	282898	4147063	957.27	30.71	32.000	650.270	201.000	1.300	60.429	0.10
KSNO103	0670030	BP AMERICA PRODUCTION COMPANY 2	NG Engine	14	282898	4147063	957.27	30.71	32.000	650.270	201.000	1.300	60.429	0.10
KSNO119	0670035	ONEOK FIELD SERVICES COMPANY, LLC	NG Engine	14	292000	4147800	944.53	31.16	28.761	704.857	55.021	1.618	36.258	0.10
KSNO120	0670035	ONEOK FIELD SERVICES COMPANY, LLC	NG Engine	14	292000	4147800	944.53	31.16	28.761	704.857	55.021	1.618	36.258	0.10
KSNO121	0670035	ONEOK FIELD SERVICES COMPANY, LLC 1	NG Engine	14	292000	4147800	944.53	31.16	31.000	880.270	12.600	4.500	241.717	0.10
KSNO122	0670035	ONEOK FIELD SERVICES COMPANY, LLC 2	NG Engine	14	292000	4147800	944.53	31.16	31.000	880.270	12.600	4.500	241.717	0.10
KSNO183	0930008	WTG HUGOTON, LP	NG Engine	14	299055	4179591	942.62	34.25	29.000	800.000	23.400	1.330	7.440	0.10
KSNO184	0930008	WTG HUGOTON, LP	NG Engine	14	299055	4179591	942.62	34.25	29.000	800.000	23.400	1.330	7.440	0.10
KSNO185	0930008	WTG HUGOTON, LP	NG Engine	14	299055	4179591	942.62	34.25	29.000	800.000	20.600	1.330	7.440	0.10
KSNO186	0930008	WTG HUGOTON, LP	NG Engine	14	299055	4179591	942.62	34.25	13.000	800.000	86.000	0.830	10.672	0.10
KSNO187	0930008	WTG HUGOTON, LP	NG Engine	14	299055	4179591	942.62	34.25	12.000	800.000	75.200	0.830	13.441	0.10
KSNO188	0930008	WTG HUGOTON, LP	NG Engine	14	299055	4179591	942.62	34.25	12.000	800.000	118.900	0.660	13.441	0.10
KSNO189	0930008	WTG HUGOTON, LP	NG Engine	14	299055	4179591	942.62	34.25	18.000	800.000	110.900	0.660	9.764	0.10
KSNO190	0930008	WTG HUGOTON, LP	NG Engine	14	299055	4179591	942.62	34.25	16.000	957.000	95.200	0.830	10.776	0.10
KSNO191	0930008	WTG HUGOTON, LP	NG Engine	14	299055	4179591	942.62	34.25	14.000	800.000	100.100	0.830	13.175	0.10
KSNO192	0930008	WTG HUGOTON, LP	NG Engine	14	299055	4179591	942.62	34.25	15.000	800.000	149.600	0.830	19.697	0.10
KSNO193	0930008	WTG HUGOTON, LP	NG Engine	14	299055	4179591	942.62	34.25	15.000	800.000	149.600	0.830	19.697	0.10
KSNO194	0930008	WTG HUGOTON, LP	NG Engine	14	299055	4179591	942.62	34.25	19.000	800.000	120.200	0.830	3.571	0.10
KSNO195	0930008	WTG HUGOTON, LP	NG Engine	14	299055	4179591	942.62	34.25	19.000	800.000	120.200	0.830	3.571	0.10
KSNO128	0670049	PIONEER NATURAL RESOURCES USA, INC.	TEG REBOILER	14	308100	4147800	907.02	36.68	27.150	510.018	18.245	1.607	0.274	0.05
KSNO129	0670049	PIONEER NATURAL RESOURCES USA, INC.	REGEN HEATER	14	308100	4147800	907.02	36.68	27.150	510.018	18.245	1.607	0.274	0.05
KSNO130	0670049	PIONEER NATURAL RESOURCES USA, INC.	AMINE REBOILER	14	308100	4147800	907.02	36.68	27.150	510.018	18.245	1.607	0.247	0.05
KSNO131	0670049	PIONEER NATURAL RESOURCES USA, INC.	AMINE FLARE	14	308100	4147800	907.02	36.68	103.029	623.836	21.713	4.610	5.703	0.50
KSNO132	0670049	PIONEER NATURAL RESOURCES USA, INC.	NG Engine	14	308100	4147800	907.02	36.68	24.512	814.583	53.826	1.087	3.315	0.10
KSNO133	0670049	PIONEER NATURAL RESOURCES USA, INC.	NG Engine	14	308100	4147800	907.02	36.68	24.512	814.583	53.826	1.087	3.315	0.10
KSNO134	0670049	PIONEER NATURAL RESOURCES USA, INC. 1	Turbine	14	308100	4147800	907.02	36.68	60.000	1400.270	56.800	3.500	13.827	0.25
KSNO135	0670049	PIONEER NATURAL RESOURCES USA, INC. 10	NG Engine	14	308100	4147800	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO136	0670049	PIONEER NATURAL RESOURCES USA, INC. 11	NG Engine	14	308100	4147800	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO137	0670049	PIONEER NATURAL RESOURCES USA, INC. 12	NG Engine	14	308100	4147800	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO138	0670049	PIONEER NATURAL RESOURCES USA, INC. 13	NG Engine	14	308100	4147800	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO139	0670049	PIONEER NATURAL RESOURCES USA, INC. 14	NG Engine	14	308100	4147800	907.02	36.68	60.000	1000.270	116.900	1.500	11.430	0.10
KSNO140	0670049	PIONEER NATURAL RESOURCES USA, INC. 17	NG Engine	14	308100	4147800	907.02	36.68	60.000	1000.270	88.300	1.500	0.879	0.10
KSNO141	0670049	PIONEER NATURAL RESOURCES USA, INC. 18	NG Engine	14	308100	4147800	907.02	36.68	60.000	1000.270	88.300	1.500	0.879	0.10
KSNO142	0670049	PIONEER NATURAL RESOURCES USA, INC. 19	NG Engine	14	308100	4147800	907.02	36.68	60.000	1000.270	88.200	1.500	8.792	0.10
KSNO143	0670049	PIONEER NATURAL RESOURCES USA, INC. 2	Turbine	14	308100	4147800	907.02	36.68	60.000	1400.270	56.800	3.500	13.827	0.25
KSNO144	0670049	PIONEER NATURAL RESOURCES USA, INC. 21	NG Engine	14	308100	4147800	907.02	36.68	60.000	1000.270	128.000	0.830	2.291	0.10
KSNO145	0670049	PIONEER NATURAL RESOURCES USA, INC. 22	NG Engine	14	308100	4147800	907.02	36.68	60.000	1000.270	127.900	0.830	2.291	0.10
KSNO146	0670049	PIONEER NATURAL RESOURCES USA, INC. 23	NG Engine	14	308100	4147800	907.02	36.68	50.000	1000.270	157.300	0.830	23.293	0.10
KSNO147	0670049	PIONEER NATURAL RESOURCES USA, INC. 3	NG Engine	14	308100	4147800	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO148	0670049	PIONEER NATURAL RESOURCES USA, INC. 4	NG Engine	14	308100	4147800	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO149	0670049	PIONEER NATURAL RESOURCES USA, INC. 5	NG Engine	14	308100	4147800	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO150	0670049	PIONEER NATURAL RESOURCES USA, INC. 6	NG Engine	14	308100	4147800	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO151	0670049	PIONEER NATURAL RESOURCES USA, INC. 7	NG Engine	14	308100	4147800	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO152	0670049	PIONEER NATURAL RESOURCES USA, INC. 8	NG Engine	14	308100	4147800	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO153	0670049	PIONEER NATURAL RESOURCES USA, INC. 9	NG Engine	14	308100	4147800	907.02	36.68	60.000	1000.270	117.000	1.500	11.430	0.10
KSNO170	0810015	DCP MIDSTREAM, LP	REBOILER FOR GLYCOL	14	320719	4140430	863.64	40.00	20.740	553.249	11.501	1.087	0.196	0.05
KSNO171	0810015	DCP MIDSTREAM, LP	REBOILER FOR GLYCOL	14	320719	4140430	863.64	40.00	20.740	553.249	11.501	1.087	0.196	0.05
KSNO172	0810015	DCP MIDSTREAM, LP 1	NG Engine	14	320719	4140430	863.64	40.00	24.000	750.270	191.000	1.000	26.857	0.10
KSNO173	0810015	DCP MIDSTREAM, LP 10	NG Engine	14	320719	4140430	863.64	40.00	15.000	1007.270	159.800	0.670	13.818	0.10
KSNO174	0810015	DCP MIDSTREAM, LP 11	NG Engine	14	320719	4140430	863.64	40.00	12.000	990.270	112.500	0.500	5.299	0.10
KSNO175	0810015	DCP MIDSTREAM, LP 2	NG Engine	14	320719	4140430	863.64	40.00	24.000	750.270	191.000	1.000	26.857	0.10
KSNO176	0810015	DCP MIDSTREAM, LP 3	NG Engine	14	320719	4140430	863.64	40.00	24.000	750.270	191.000	1.000	26.857	0.10
KSNO177	0810015	DCP MIDSTREAM, LP 4	NG Engine	14	320719	4140430	863.64	40.00	24.000	750.270	191.000	1.000	26.857	0.10
KSNO178	0810015	DCP MIDSTREAM, LP 5	NG Engine	14	320719	4140430	863.64	40.00	24.000	950.270	112.500	1.000	15.728	0.10

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO179	0810015	DCP MIDSTREAM, LP 6	NG Engine	14	320719	4140430	863.64	40.00	24.000	950.270	112.500	1.000	15.728	0.10
KSNO180	0810015	DCP MIDSTREAM, LP 7	NG Engine	14	320719	4140430	863.64	40.00	24.000	950.270	112.500	1.000	15.728	0.10
KSNO181	0810015	DCP MIDSTREAM, LP 8	NG Engine	14	320719	4140430	863.64	40.00	15.000	1304.270	198.600	0.670	14.979	0.10
KSNO182	0810015	DCP MIDSTREAM, LP 9	NG Engine	14	320719	4140430	863.64	40.00	15.000	1304.270	198.600	0.670	14.979	0.10
KSNO081	0670026	DCP MIDSTREAM, LP 1	NG Engine	14	305613	4154276	922.63	41.19	20.000	700.270	120.000	1.300	29.543	0.10
KSNO082	0670026	DCP MIDSTREAM, LP 2	NG Engine	14	305613	4154276	922.63	41.19	20.000	700.270	120.000	1.300	29.543	0.10
KSNO083	0670026	DCP MIDSTREAM, LP 3	NG Engine	14	305613	4154276	922.63	41.19	20.000	700.270	120.000	1.300	29.543	0.10
KSNO084	0670026	DCP MIDSTREAM, LP 4	NG Engine	14	305613	4154276	922.63	41.19	18.000	1125.270	120.000	1.000	19.847	0.10
KSNO085	0670026	DCP MIDSTREAM, LP 5	NG Engine	14	305613	4154276	922.63	41.19	18.000	1300.270	135.000	0.830	14.979	0.10
KSNO086	0670026	DCP MIDSTREAM, LP 6	NG Engine	14	305613	4154276	922.63	41.19	18.000	1300.270	135.000	0.830	14.979	0.10
KSNO087	0670026	DCP MIDSTREAM, LP 7	NG Engine	14	305613	4154276	922.63	41.19	18.000	1100.270	120.000	0.830	14.979	0.10
KSNO069	0670017	PIONEER NATURAL RESOURCES USA, INC.	NG Engine	14	312116	4151844	921.37	42.27	24.512	814.583	53.826	1.087	16.721	0.10
KSNO070	0670017	PIONEER NATURAL RESOURCES USA, INC.	NG Engine	14	312116	4151844	921.37	42.27	24.512	814.583	53.826	1.087	16.721	0.10
KSNO071	0670017	PIONEER NATURAL RESOURCES USA, INC. 1	NG Engine	14	312116	4151844	921.37	42.27	22.000	1000.270	128.000	0.830	14.979	0.10
KSNO072	0670017	PIONEER NATURAL RESOURCES USA, INC. 2	NG Engine	14	312116	4151844	921.37	42.27	22.000	1000.270	128.000	0.830	14.979	0.10
KSNO073	0670017	PIONEER NATURAL RESOURCES USA, INC. 3	NG Engine	14	312116	4151844	921.37	42.27	17.000	1000.270	49.700	2.000	69.135	0.10
KSNO048	0670007	COLUMBIAN CHEMICALS COMPANY	NAT GAS COMBUSTION	14	306549	4156832	923.39	43.90	85.409	381.656	32.688	3.610	9.462	0.05
KSNO049	0670007	COLUMBIAN CHEMICALS COMPANY 11	DRYER VAPOR BAG COLLECTOR	14	306549	4156832	923.39	43.90	79.000	280.270	41.000	2.000	5.987	0.50
KSNO050	0670007	COLUMBIAN CHEMICALS COMPANY 12	DRYER VAPOR BAG COLLECTOR	14	306549	4156832	923.39	43.90	77.000	320.270	26.000	2.000	5.987	0.50
KSNO051	0670007	COLUMBIAN CHEMICALS COMPANY 47	MAIN PROCESS VENTS CO BOI	14	306549	4156832	923.39	43.90	195.000	450.270	40.000	6.000	123.096	0.50
KSNO052	0670007	COLUMBIAN CHEMICALS COMPANY 48	MAIN PROCESS VENTS CO BOI	14	306549	4156832	923.39	43.90	150.000	400.270	74.000	2.500	123.096	0.50
KSNO108	0670032	BP AMERICA PRODUCTION COMPANY	174 HP INGERSOL AIR COMP	14	280989	4162335	949.16	46.09	26.488	490.199	60.212	1.418	5.389	0.10
KSNO109	0670032	BP AMERICA PRODUCTION COMPANY	DETROIT DIESEL 765HP	14	280989	4162335	949.16	46.09	26.488	490.199	60.212	1.418	23.694	0.10
KSNO110	0670032	BP AMERICA PRODUCTION COMPANY	NG Engine	14	280989	4162335	949.16	46.09	28.761	704.857	55.021	1.618	36.258	0.10
KSNO111	0670032	BP AMERICA PRODUCTION COMPANY	NG Engine	14	280989	4162335	949.16	46.09	27.786	743.760	63.070	1.480	57.555	0.10
KSNO112	0670032	BP AMERICA PRODUCTION COMPANY	NG Engine	14	280989	4162335	949.16	46.09	27.786	743.760	63.070	1.480	57.555	0.10
KSNO113	0670032	BP AMERICA PRODUCTION COMPANY	NG Engine	14	280989	4162335	949.16	46.09	27.786	743.760	63.070	1.480	22.019	0.10
KSNO114	0670032	BP AMERICA PRODUCTION COMPANY	NG Engine	14	280989	4162335	949.16	46.09	27.786	743.760	63.070	1.480	22.019	0.10
KSNO115	0670032	BP AMERICA PRODUCTION COMPANY 4	NG Engine	14	280989	4162335	949.16	46.09	32.000	650.270	161.000	1.300	48.343	0.10
KSNO116	0670032	BP AMERICA PRODUCTION COMPANY 5	NG Engine	14	280989	4162335	949.16	46.09	32.000	650.270	201.000	1.300	53.715	0.10
KSNO117	0670032	BP AMERICA PRODUCTION COMPANY 6	NG Engine	14	280989	4162335	949.16	46.09	32.000	650.270	201.000	1.300	60.429	0.10
KSNO118	0670032	BP AMERICA PRODUCTION COMPANY 7	NG Engine	14	280989	4162335	949.16	46.09	32.000	650.270	201.000	1.300	60.429	0.10
KSNO053	0670008	EXXONMOBIL PRODUCTION COMPANY 1	NG Engine	14	306595	4160063	932.74	46.88	24.000	650.270	196.000	1.160	29.543	0.10
KSNO054	0670008	EXXONMOBIL PRODUCTION COMPANY 10	NG Engine	14	306595	4160063	932.74	46.88	20.000	750.270	140.000	0.490	6.478	0.10
KSNO055	0670008	EXXONMOBIL PRODUCTION COMPANY 11	NG Engine	14	306595	4160063	932.74	46.88	20.000	750.270	140.000	0.490	6.478	0.10
KSNO056	0670008	EXXONMOBIL PRODUCTION COMPANY 12	NG Engine	14	306595	4160063	932.74	46.88	20.000	750.270	140.000	0.360	3.426	0.10
KSNO057	0670008	EXXONMOBIL PRODUCTION COMPANY 13	NG Engine	14	306595	4160063	932.74	46.88	20.000	750.270	140.000	0.280	2.060	0.10
KSNO058	0670008	EXXONMOBIL PRODUCTION COMPANY 14	NG Engine	14	306595	4160063	932.74	46.88	20.000	750.270	140.000	0.310	2.621	0.10
KSNO059	0670008	EXXONMOBIL PRODUCTION COMPANY 15	NG Engine	14	306595	4160063	932.74	46.88	20.000	750.270	140.000	0.310	2.621	0.10
KSNO060	0670008	EXXONMOBIL PRODUCTION COMPANY 15	NG Engine	14	306595	4160063	932.74	46.88	20.000	750.270	140.000	0.310	18.724	0.10
KSNO061	0670008	EXXONMOBIL PRODUCTION COMPANY 2	NG Engine	14	306595	4160063	932.74	46.88	24.000	650.270	196.000	1.160	53.715	0.10
KSNO062	0670008	EXXONMOBIL PRODUCTION COMPANY 3	NG Engine	14	306595	4160063	932.74	46.88	30.000	675.270	145.600	1.500	29.543	0.10
KSNO063	0670008	EXXONMOBIL PRODUCTION COMPANY 4	NG Engine	14	306595	4160063	932.74	46.88	30.000	675.270	145.600	1.500	38.675	0.10
KSNO064	0670008	EXXONMOBIL PRODUCTION COMPANY 5	NG Engine	14	306595	4160063	932.74	46.88	30.000	675.270	111.300	2.000	38.675	0.10
KSNO065	0670008	EXXONMOBIL PRODUCTION COMPANY 5	NG Engine	14	306595	4160063	932.74	46.88	30.000	675.270	111.300	2.000	53.715	0.10
KSNO066	0670008	EXXONMOBIL PRODUCTION COMPANY 7	NG Engine	14	306595	4160063	932.74	46.88	30.000	675.270	111.300	2.000	53.715	0.10
KSNO067	0670008	EXXONMOBIL PRODUCTION COMPANY 8	NG Engine	14	306595	4160063	932.74	46.88	20.000	750.270	140.000	0.490	6.478	0.10
KSNO068	0670008	EXXONMOBIL PRODUCTION COMPANY 9	NG Engine	14	306595	4160063	932.74	46.88	20.000	750.270	140.000	0.490	6.478	0.10
KSNO088	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC.	.375 MMBTU/HR 600-N	14	311387	4158344	924.98	47.43	41.366	424.948	20.936	1.938	0.037	0.05
KSNO089	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 1	NG Engine	14	311387	4158344	924.98	47.43	36.000	730.270	40.000	2.000	64.458	0.10
KSNO090	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 10	3.75 MMBTU/HR BOILER	14	311387	4158344	924.98	47.43	9.000	350.270	5.100	1.670	0.367	0.05
KSNO091	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 2	NG Engine	14	311387	4158344	924.98	47.43	36.000	730.270	40.000	2.000	64.458	0.10
KSNO092	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 3	NG Engine	14	311387	4158344	924.98	47.43	36.000	730.270	40.000	2.000	64.458	0.10
KSNO093	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 4	3889HP ENGINE 20 SOLAR	14	311387	4158344	924.98	47.43	27.000	850.270	38.000	4.000	10.544	0.25

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO094	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 5	3889HP ENGINE 21 SOLAR	14	311387	4158344	924.98	47.43	27.000	850.270	38.000	4.000	10.544	0.25
KSNO095	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 6	4511HP ENGINE 22 SOLAR	14	311387	4158344	924.98	47.43	27.000	850.270	32.100	4.000	12.230	0.25
KSNO096	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 7	1100HP SOLAR TURBINE	14	311387	4158344	924.98	47.43	18.000	850.270	81.700	2.000	2.982	0.25
KSNO097	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 8	1100HP SOLAR TURBINE	14	311387	4158344	924.98	47.43	18.000	800.270	81.700	2.000	2.982	0.25
KSNO098	0670029	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 9	1100HP SOLAR TURBINE	14	311387	4158344	924.98	47.43	18.000	800.270	81.700	2.000	2.982	0.25
KSNO104	0670031	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 1	NG Engine	14	311387	4158344	924.98	47.43	28.000	725.270	52.000	1.670	38.675	0.10
KSNO105	0670031	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 2	NG Engine	14	311387	4158344	924.98	47.43	28.000	750.270	72.000	1.670	53.715	0.10
KSNO106	0670031	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 3	NG Engine	14	311387	4158344	924.98	47.43	28.000	750.270	72.000	1.670	53.715	0.10
KSNO107	0670031	SOUTHERN STAR CENTRAL GAS PIPELINE, INC. 4	NG Engine	14	311387	4158344	924.98	47.43	28.000	750.270	72.000	1.670	53.715	0.10
KSNO292	1750046	NORTHERN NATURAL GAS COMPANY	2.0 MMBTU/HR REBOILER	14	335180	4128840	873.50	48.28	27.150	510.018	18.245	1.607	0.196	0.05
KSNO293	1750046	NORTHERN NATURAL GAS COMPANY 1	NG Engine	14	335180	4128840	873.50	48.28	22.000	700.270	49.600	1.660	52.533	0.10
KSNO294	1750046	NORTHERN NATURAL GAS COMPANY 10	SOLAR TAURUS 60-T7000S	14	335180	4128840	873.50	48.28	54.000	700.270	83.800	3.000	16.579	0.25
KSNO295	1750046	NORTHERN NATURAL GAS COMPANY 11	SOLAR TAURUS 60-T7000S	14	335180	4128840	873.50	48.28	54.000	700.270	83.600	3.000	16.579	0.25
KSNO296	1750046	NORTHERN NATURAL GAS COMPANY 12	NG Engine	14	335180	4128840	873.50	48.28	13.000	700.270	47.000	0.710	4.831	0.10
KSNO297	1750046	NORTHERN NATURAL GAS COMPANY 13	NG Engine	14	335180	4128840	873.50	48.28	13.000	700.270	47.000	0.710	4.962	0.10
KSNO298	1750046	NORTHERN NATURAL GAS COMPANY 14	NG Engine	14	335180	4128840	873.50	48.28	13.000	700.270	69.800	0.710	7.639	0.10
KSNO299	1750046	NORTHERN NATURAL GAS COMPANY 15	NG Engine	14	335180	4128840	873.50	48.28	13.000	700.270	65.000	0.710	7.115	0.10
KSNO300	1750046	NORTHERN NATURAL GAS COMPANY 16	NG Engine	14	335180	4128840	873.50	48.28	13.000	700.270	65.000	0.710	12.920	0.10
KSNO301	1750046	NORTHERN NATURAL GAS COMPANY 2	NG Engine	14	335180	4128840	873.50	48.28	22.000	700.270	50.100	1.660	52.533	0.10
KSNO302	1750046	NORTHERN NATURAL GAS COMPANY 3	NG Engine	14	335180	4128840	873.50	48.28	28.761	704.857	55.021	1.618	55.595	0.10
KSNO303	1750046	NORTHERN NATURAL GAS COMPANY 4	NG Engine	14	335180	4128840	873.50	48.28	28.761	704.857	55.021	1.618	55.595	0.10
KSNO304	1750046	NORTHERN NATURAL GAS COMPANY 5	NG Engine	14	335180	4128840	873.50	48.28	28.761	704.857	55.021	1.618	55.595	0.10
KSNO305	1750046	NORTHERN NATURAL GAS COMPANY 6	NG Engine	14	335180	4128840	873.50	48.28	28.761	704.857	55.021	1.618	55.595	0.10
KSNO306	1750046	NORTHERN NATURAL GAS COMPANY 7	NG Engine	14	335180	4128840	873.50	48.28	25.000	700.270	84.700	1.160	8.813	0.10
KSNO307	1750046	NORTHERN NATURAL GAS COMPANY 8	NG Engine	14	335180	4128840	873.50	48.28	25.000	700.270	86.200	1.160	8.813	0.10
KSNO308	1750046	NORTHERN NATURAL GAS COMPANY 9	NG Engine	14	335180	4128840	873.50	48.28	25.000	700.270	84.100	1.160	8.813	0.10
KSNO309	1750116	WTG HUGOTON, LP 3	NG Engine	14	335180	4128840	873.50	48.28	24.000	700.270	36.700	2.000	55.595	0.10
KSNO310	1750116	WTG HUGOTON, LP 4	NG Engine	14	335180	4128840	873.50	48.28	24.000	700.270	36.700	2.000	55.595	0.10
KSNO311	1750116	WTG HUGOTON, LP 5	NG Engine	14	335180	4128840	873.50	48.28	24.000	700.270	36.700	2.000	55.595	0.10
KSNO312	1750116	WTG HUGOTON, LP 6	NG Engine	14	335180	4128840	873.50	48.28	24.000	700.270	36.700	2.000	55.595	0.10
KSNO123	0670048	OXY USA, INC.	NG Engine	14	308909	4160892	930.62	48.58	24.512	814.583	53.826	1.087	0.562	0.10
KSNO124	0670048	OXY USA, INC.	NG Engine	14	308909	4160892	930.62	48.58	24.512	814.583	53.826	1.087	11.890	0.10
KSNO125	0670048	OXY USA, INC. 1	NG Engine	14	308909	4160892	930.62	48.58	24.000	1100.270	98.500	1.160	41.481	0.10
KSNO126	0670048	OXY USA, INC. 2	NG Engine	14	308909	4160892	930.62	48.58	24.000	1100.270	99.000	1.160	41.481	0.10
KSNO127	0670048	OXY USA, INC. 3	NG Engine	14	308909	4160892	930.62	48.58	24.000	1100.270	99.000	1.160	41.481	0.10
KSNO250	1290011	DCP MIDSTREAM, LP 001	NG Engine	14	239687	4100651	1,094.81	51.35	28.000	750.270	120.000	1.300	29.543	0.10
KSNO251	1290011	DCP MIDSTREAM, LP 002	NG Engine	14	239687	4100651	1,094.81	51.35	28.000	750.270	120.000	1.300	29.543	0.10
KSNO252	1290011	DCP MIDSTREAM, LP 003	NG Engine	14	239687	4100651	1,094.81	51.35	28.000	750.270	120.000	1.300	29.543	0.10
KSNO253	1290011	DCP MIDSTREAM, LP 004	NG Engine	14	239687	4100651	1,094.81	51.35	28.000	750.270	120.000	1.300	29.543	0.10
KSNO254	1290011	DCP MIDSTREAM, LP 005	NG Engine	14	239687	4100651	1,094.81	51.35	28.000	750.270	120.000	1.300	29.543	0.10
KSNO255	1290011	DCP MIDSTREAM, LP 006	NG Engine	14	239687	4100651	1,094.81	51.35	30.000	750.270	120.000	1.300	29.543	0.10
KSNO256	1290011	DCP MIDSTREAM, LP 008	REBOILER FOR DEHY	14	239687	4100651	1,094.81	51.35	20.740	553.249	11.501	1.087	0.196	0.05
KSNO074	0670023	BP AMERICA PRODUCTION COMPANY	NG Engine	14	280181	4167956	949.05	51.76	27.786	743.760	63.070	1.480	22.019	0.10
KSNO075	0670023	BP AMERICA PRODUCTION COMPANY	NG Engine	14	280181	4167956	949.05	51.76	27.786	743.760	63.070	1.480	22.019	0.10
KSNO076	0670023	BP AMERICA PRODUCTION COMPANY	NG Engine	14	280181	4167956	949.05	51.76	27.786	743.760	63.070	1.480	38.024	0.10
KSNO077	0670023	BP AMERICA PRODUCTION COMPANY 2	NG Engine	14	280181	4167956	949.05	51.76	15.000	1400.270	118.000	0.830	38.024	0.10
KSNO271	1750001	MID-KANSAS ELECTRIC COMPANY LLC - CIMARR 1	UNIT 1 BOILER	14	343489	4113766	787.99	55.17	93.000	955.270	54.500	8.000	68.860	0.05
KSNO272	1750001	MID-KANSAS ELECTRIC COMPANY LLC - CIMARR 2	UNIT #2 TURBINE	14	343489	4113766	787.99	55.17	53.000	750.270	200.000	8.870	175.842	0.25
KSNO273	1750001	MID-KANSAS ELECTRIC COMPANY LLC - CIMARR 3	PROCESS BOILER	14	343489	4113766	787.99	55.17	74.000	350.270	35.000	3.870	7.836	0.05
KSNO274	1750001	MID-KANSAS ELECTRIC COMPANY LLC - CIMARR 4	DIESEL BLACKSTART ENGINE	14	343489	4113766	787.99	55.17	13.000	429.270	63.100	0.330	11.209	0.25
KSNO275	1750001	MID-KANSAS ELECTRIC COMPANY LLC - CIMARR 5	DIESEL PUMP ENGINE	14	343489	4113766	787.99	55.17	8.000	840.270	168.400	0.420	4.436	0.25
KSNO276	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 10	NG Engine	14	344522	4112510	774.35	56.28	22.000	685.270	20.000	2.000	21.486	0.10
KSNO277	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 11	NG Engine	14	344522	4112510	774.35	56.28	22.000	685.270	20.000	2.000	26.857	0.10
KSNO278	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 12	NG Engine	14	344522	4112510	774.35	56.28	22.000	720.270	25.000	2.000	26.857	0.10

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO279	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 13	NG Engine	14	344522	4112510	774.35	56.28	22.000	720.270	25.000	2.000	26.857	0.10
KSNO280	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 17	SOLAR TAURUS 70 TURBINE	14	344522	4112510	774.35	56.28	50.000	920.270	66.000	6.300	27.952	0.25
KSNO281	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 17	STARTUPS SHUTDOWNS	14	344522	4112510	774.35	56.28	50.000	920.270	66.000	6.300	10.930	0.25
KSNO282	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 18	SOLAR TAURUS 70 TURBINE	14	344522	4112510	774.35	56.28	50.000	920.270	66.000	6.300	27.952	0.25
KSNO283	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 18	STARTUPS SHUTDOWNS	14	344522	4112510	774.35	56.28	50.000	920.270	66.000	6.300	10.930	0.25
KSNO284	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 19	NG Engine	14	344522	4112510	774.35	56.28	31.000	700.270	147.000	0.670	22.019	0.10
KSNO285	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 2	NG Engine	14	344522	4112510	774.35	56.28	27.000	760.270	37.500	2.000	64.458	0.10
KSNO286	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 20	NG Engine	14	344522	4112510	774.35	56.28	31.000	700.270	147.000	0.670	22.019	0.10
KSNO287	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 3	NG Engine	14	344522	4112510	774.35	56.28	27.000	760.270	37.500	2.000	64.458	0.10
KSNO288	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 4	NG Engine	14	344522	4112510	774.35	56.28	27.000	770.270	60.000	2.000	64.458	0.10
KSNO289	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 5	NG Engine	14	344522	4112510	774.35	56.28	37.000	770.270	38.400	2.500	91.315	0.10
KSNO290	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 6	NG Engine	14	344522	4112510	774.35	56.28	37.000	770.270	38.400	2.500	91.315	0.10
KSNO291	1750021	PANHANDLE EASTERN PIPE LINE COMPANY 9	NG Engine	14	344522	4112510	774.35	56.28	22.000	650.270	85.000	2.000	21.486	0.10
KSNO263	1297127	COLORADO INTERSTATE GAS COMPANY	NG Engine	13	231028.4	4119348.8	941.08	57.00	36.000	650.000	125.100	0.850	16.129	0.10
KSNO264	1297127	COLORADO INTERSTATE GAS COMPANY	NG Engine	13	231028.4	4119348.8	941.08	57.00	36.000	650.000	125.100	0.850	16.129	0.10
KSNO265	1297127	COLORADO INTERSTATE GAS COMPANY	NG Engine	13	231028.4	4119348.8	941.08	57.00	36.000	650.000	125.100	0.850	16.129	0.10
KSNO266	1297127	COLORADO INTERSTATE GAS COMPANY	NG Engine	13	231028.4	4119348.8	897.24	57.00	35.000	800.000	31.700	1.800	64.007	0.10
KSNO267	1297127	COLORADO INTERSTATE GAS COMPANY	NG Engine	13	231028.4	4119348.8	897.24	57.00	35.000	800.000	31.700	1.800	64.007	0.10
KSNO268	1297127	COLORADO INTERSTATE GAS COMPANY	NG Engine	13	231028.4	4119348.8	897.24	57.00	35.000	800.000	31.700	1.800	64.007	0.10
KSNO269	1297127	COLORADO INTERSTATE GAS COMPANY	NG Engine	13	231028.4	4119348.8	897.24	57.00	35.000	800.000	31.700	1.800	64.007	0.10
KSNO270	1297127	COLORADO INTERSTATE GAS COMPANY	NG Engine	13	231028.4	4119348.8	897.24	57.00	23.000	886.000	34.300	1.300	1.495	0.10
KSNO078	0670025	DCP MIDSTREAM, LP	REBOILER FOR DEHY	14	305389	4174597	897.24	60.19	20.740	553.249	11.501	1.087	0.196	0.05
KSNO079	0670025	DCP MIDSTREAM, LP 1	NG Engine	14	305389	4174597	897.24	60.19	30.000	700.270	160.000	2.000	107.430	0.10
KSNO080	0670025	DCP MIDSTREAM, LP 2	NG Engine	14	305389	4174597	929.77	60.19	30.000	700.270	160.000	2.000	107.430	0.10
KSNO163	0810012	BP AMERICA PRODUCTION COMPANY	NG Engine	14	333083	4158521	929.77	61.09	27.786	743.760	63.070	1.480	57.555	0.10
KSNO164	0810012	BP AMERICA PRODUCTION COMPANY	NG Engine	14	333083	4158521	929.77	61.09	27.786	743.760	63.070	1.480	57.555	0.10
KSNO165	0810012	BP AMERICA PRODUCTION COMPANY	DIESEL AIR COMPRESSOR	14	333083	4158521	929.77	61.09	26.488	490.199	60.212	1.418	8.417	0.10
KSNO166	0810012	BP AMERICA PRODUCTION COMPANY	EMERGENCY DIESEL	14	333083	4158521	929.77	61.09	26.488	490.199	60.212	1.418	7.583	0.10
KSNO167	0810012	BP AMERICA PRODUCTION COMPANY 1	NG Engine	14	333083	4158521	929.77	61.09	35.000	650.270	121.000	1.300	48.343	0.10
KSNO168	0810012	BP AMERICA PRODUCTION COMPANY 2	NG Engine	14	333083	4158521	929.77	61.09	35.000	650.270	201.000	1.300	36.258	0.10
KSNO169	0810012	BP AMERICA PRODUCTION COMPANY 3	NG Engine	14	333083	4158521	929.77	61.09	35.000	650.270	201.000	1.300	60.429	0.10
KSNO154	0810004	REGENCY FIELD SERVICES, LLC 1	NG Engine	14	320600	4170345	929.77	62.43	16.000	900.270	92.000	0.810	10.673	0.10
KSNO155	0810004	REGENCY FIELD SERVICES, LLC 2	NG Engine	14	320600	4170345	993.60	62.43	16.000	900.270	92.000	0.810	10.673	0.10
KSNO156	0810004	REGENCY FIELD SERVICES, LLC 3	NG Engine	14	320600	4170345	993.60	62.43	16.000	900.270	92.000	0.810	10.673	0.10
KSNO157	0810004	REGENCY FIELD SERVICES, LLC 4	NG Engine	14	320600	4170345	993.60	62.43	16.000	900.270	92.000	0.810	12.208	0.10
KSNO158	0810004	REGENCY FIELD SERVICES, LLC 5	NG Engine	14	320600	4170345	993.60	62.43	16.000	900.270	92.000	0.810	14.043	0.10
KSNO159	0810004	REGENCY FIELD SERVICES, LLC 6	NG Engine	14	320600	4170345	993.60	62.43	17.000	800.270	95.300	0.830	14.979	0.10
KSNO160	0810004	REGENCY FIELD SERVICES, LLC 7	NG Engine	14	320600	4170345	993.60	62.43	17.000	800.270	95.300	0.830	14.979	0.10
KSNO161	0810004	REGENCY FIELD SERVICES, LLC 8	NG Engine	14	320600	4170345	993.60	62.43	21.000	1200.270	133.500	1.000	44.305	0.10
KSNO162	0810004	REGENCY FIELD SERVICES, LLC 9	NG Engine	14	320600	4170345	993.60	62.43	21.000	1200.270	133.500	1.000	44.305	0.10
KSNO196	0930010	BP AMERICA PRODUCTION COMPANY	NG Engine	14	281545	4185039	993.60	68.53	27.786	743.760	63.070	1.480	57.555	0.10
KSNO197	0930010	BP AMERICA PRODUCTION COMPANY	NG Engine	14	281545	4185039	993.60	68.53	27.786	743.760	63.070	1.480	49.258	0.10
KSNO198	0930010	BP AMERICA PRODUCTION COMPANY	NG Engine	14	281545	4185039	761.95	68.53	27.786	743.760	63.070	1.480	49.258	0.10
KSNO199	0930010	BP AMERICA PRODUCTION COMPANY	NG Engine	14	281545	4185039	761.95	68.53	27.786	743.760	63.070	1.480	22.019	0.10
KSNO200	0930010	BP AMERICA PRODUCTION COMPANY	NG Engine	14	281545	4185039	761.95	68.53	27.786	743.760	63.070	1.480	22.019	0.10
KSNO201	0930010	BP AMERICA PRODUCTION COMPANY	NG Engine	14	281545	4185039	761.95	68.53	27.786	743.760	63.070	1.480	22.019	0.10
KSNO202	0930010	BP AMERICA PRODUCTION COMPANY	NG Engine	14	281545	4185039	761.95	68.53	27.786	743.760	63.070	1.480	22.019	0.10
KSNO203	0930010	BP AMERICA PRODUCTION COMPANY 2	NG Engine	14	281545	4185039	761.95	68.53	32.000	650.270	201.000	1.300	60.429	0.10
KSNO204	0930010	BP AMERICA PRODUCTION COMPANY 3	NG Engine	14	281545	4185039	761.95	68.53	32.000	650.270	201.000	1.300	60.429	0.10
KSNO205	0930010	BP AMERICA PRODUCTION COMPANY 4	NG Engine	14	281545	4185039	761.95	68.53	32.000	650.270	201.000	1.300	60.429	0.10
KSNO226	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511	4104069	761.95	81.46	24.000	975.000	25.000	2.000	45.670	0.10
KSNO227	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511	4104069	761.95	81.46	24.000	975.000	25.000	2.000	45.670	0.10
KSNO228	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511	4104069	761.95	81.46	24.000	975.000	25.000	2.000	45.670	0.10
KSNO229	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511	4104069	761.95	81.46	24.000	975.000	25.000	2.000	45.670	0.10

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO230	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511	4104069	905.25	81.46	24.000	975.000	25.000	2.000	45.670	0.10
KSNO231	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511	4104069	905.25	81.46	24.000	975.000	25.000	2.000	45.670	0.10
KSNO232	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511	4104069	905.25	81.46	26.000	950.000	154.000	1.000	45.670	0.10
KSNO233	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511	4104069	905.25	81.46	24.000	740.000	95.000	1.670	69.197	0.10
KSNO234	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511	4104069	905.25	81.46	24.000	740.000	95.000	1.670	69.197	0.10
KSNO235	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511	4104069	935.52	81.46	24.512	814.313	53.826	1.087	12.801	0.10
KSNO236	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511	4104069	935.52	81.46	24.512	814.313	53.826	1.087	12.801	0.10
KSNO237	1190014	ANR PIPELINE COMPANY	NG Engine	14	368511	4104069	935.52	81.46	58.213	436.409	27.610	3.403	0.378	0.10
KSNO206	0930012	KINDER MORGAN INTERSTATE GAS TRANS 1	NG Engine	14	307937	4199290	935.52	84.72	24.512	814.583	53.826	1.087	14.417	0.10
KSNO207	0930012	KINDER MORGAN INTERSTATE GAS TRANS 2	NG Engine	14	307937	4199290	935.52	84.72	20.000	729.270	128.100	1.700	91.315	0.10
KSNO208	0930012	KINDER MORGAN INTERSTATE GAS TRANS 3	NG Engine	14	307937	4199290	935.52	84.72	16.000	841.270	30.300	3.400	99.373	0.10
KSNO209	0930012	KINDER MORGAN INTERSTATE GAS TRANS 4	3500HP ALL/DEL 350 TURBO	14	307937	4199290	935.52	84.72	22.000	790.270	64.100	1.580	9.489	0.25
KSNO210	0930012	KINDER MORGAN INTERSTATE GAS TRANS 5	NG Engine	14	307937	4199290	935.52	84.72	10.000	790.270	193.600	1.580	33.572	0.10
KSNO211	0937055	COLORADO INTERSTATE GAS COMPANY	NG Engine	14	298339	4201095	935.52	84.83	24.512	814.583	53.826	1.087	44.801	0.10
KSNO212	0937055	COLORADO INTERSTATE GAS COMPANY	NG Engine	14	298339	4201095	935.52	84.83	24.512	814.583	53.826	1.087	44.801	0.10
KSNO213	0937055	COLORADO INTERSTATE GAS COMPANY 1	NG Engine	14	298339	4201095	935.52	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO214	0937055	COLORADO INTERSTATE GAS COMPANY 10	NG Engine	14	298339	4201095	935.52	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO215	0937055	COLORADO INTERSTATE GAS COMPANY 11	NG Engine	14	298339	4201095	935.52	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO216	0937055	COLORADO INTERSTATE GAS COMPANY 12	NG Engine	14	298339	4201095	935.52	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO217	0937055	COLORADO INTERSTATE GAS COMPANY 2	NG Engine	14	298339	4201095	886.98	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO218	0937055	COLORADO INTERSTATE GAS COMPANY 3	NG Engine	14	298339	4201095	888.93	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO219	0937055	COLORADO INTERSTATE GAS COMPANY 4	NG Engine	14	298339	4201095	888.35	84.83	60.000	650.270	94.900	1.800	30.027	0.10
KSNO220	0937055	COLORADO INTERSTATE GAS COMPANY 5	NG Engine	14	298339	4201095	887.79	84.83	60.000	650.270	94.900	1.800	30.027	0.10
KSNO221	0937055	COLORADO INTERSTATE GAS COMPANY 6	NG Engine	14	298339	4201095	887.60	84.83	60.000	650.270	95.000	1.800	30.027	0.10
KSNO222	0937055	COLORADO INTERSTATE GAS COMPANY 7	NG Engine	14	298339	4201095	889.90	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO223	0937055	COLORADO INTERSTATE GAS COMPANY 8	NG Engine	14	298339	4201095	889.87	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO224	0937055	COLORADO INTERSTATE GAS COMPANY 9	NG Engine	14	298339	4201095	889.79	84.83	60.000	650.270	43.000	1.800	30.027	0.10
KSNO006	0550023	SUNFLOWER ELECTRIC POWER CORPORATION H2G	Generator	14	326772.78	4199407.54	769.01	91.04	15.000	915.270	288.031	0.943	13.552	0.25
KSNO007	0550023	SUNFLOWER ELECTRIC POWER CORPORATION H1FI	Fire Pump Engine	14	326527.01	4199544.3	769.01	91.06	26.000	1083.270	45.789	0.943	1.735	0.32
KSNO008	0550023	SUNFLOWER ELECTRIC POWER CORPORATION H2FI	Fire Pump Engine	14	326577.40	4199549.95	769.01	91.08	15.000	1083.270	45.789	0.943	1.735	0.32
KSNO009	0550023	SUNFLOWER ELECTRIC POWER CORPORATION H1A	Auxiliary Boiler	14	326659.16	4199565.1	769.01	91.13	67.500	425.270	13.612	4.500	6.061	0.05
KSNO010	0550023	SUNFLOWER ELECTRIC POWER CORPORATION H1G	Generator	14	326715.42	4199541.6	769.01	91.13	27.000	490.270	174.179	0.833	14.387	0.20
KSNO011	0550023	SUNFLOWER ELECTRIC POWER CORPORATION H2A	Auxiliary Boiler	14	326861.01	4199527.54	769.01	91.18	30.000	299.270	43.293	6.000	5.395	0.05
KSNO012	0550023	SUNFLOWER ELECTRIC POWER CORPORATION H1	Coal Fired Boiler	14	326683	4199766	769.01	91.32	475.000	180.270	102.202	16.333	1359.669	0.05
KSNO013	0550023	SUNFLOWER ELECTRIC POWER CORPORATION H2_1	Coal Fired Boiler	14	326798.44	4199760.40	769.01	91.37	620.000	165.270	91.072	23.000	1303.828	0.05
KSNO238	1190025	PANHANDLE EASTERN PIPE LINE COMPANY	11.25 MMBTU/HR HEATER	14	379932	4118337	769.01	91.53	27.150	510.018	18.245	1.607	1.102	0.05
KSNO239	1190025	PANHANDLE EASTERN PIPE LINE COMPANY	DEHYDRATION UNIT	14	379932	4118337	769.01	91.53	27.150	510.018	18.245	1.607	1.102	0.05
KSNO240	1190025	PANHANDLE EASTERN PIPE LINE COMPANY	11.25 MMBTU/HR HEATER	14	379932	4118337	769.01	91.53	27.150	510.018	18.245	1.607	1.102	0.05
KSNO241	1190025	PANHANDLE EASTERN PIPE LINE COMPANY	11.25 MMBTU/HR HEATER	14	379932	4118337	769.01	91.53	27.150	510.018	18.245	1.607	1.102	0.05
KSNO242	1190025	PANHANDLE EASTERN PIPE LINE COMPANY	NG Engine	14	379932	4118337	744.03	91.53	24.512	814.583	53.826	1.087	18.724	0.10
KSNO243	1190025	PANHANDLE EASTERN PIPE LINE COMPANY	1.0 MMBTU/HR HEATER	14	379932	4118337	896.56	91.53	27.150	510.018	18.245	1.607	0.098	0.05
KSNO244	1190025	PANHANDLE EASTERN PIPE LINE COMPANY	2.0 MMBTU/HR HEATER	14	379932	4118337	896.56	91.53	27.150	510.018	18.245	1.607	0.196	0.05
KSNO245	1190025	PANHANDLE EASTERN PIPE LINE COMPANY 1	NG Engine	14	379932	4118337	896.56	91.53	40.000	100.270	0.500	3.300	87.018	0.10
KSNO246	1190025	PANHANDLE EASTERN PIPE LINE COMPANY 2	NG Engine	14	379932	4118337	896.56	91.53	40.000	100.270	0.500	3.300	87.018	0.10
KSNO247	1190025	PANHANDLE EASTERN PIPE LINE COMPANY 3	NG Engine	14	379932	4118337	896.56	91.53	40.000	100.270	0.500	3.300	87.018	0.10
KSNO248	1190025	PANHANDLE EASTERN PIPE LINE COMPANY 4	NG Engine	14	379932	4118337	896.56	91.53	40.000	100.270	0.500	3.300	87.018	0.10
KSNO249	1190025	PANHANDLE EASTERN PIPE LINE COMPANY 5	NG Engine	14	379932	4118337	896.56	91.53	40.000	100.270	0.500	3.300	87.018	0.10
KSNO225	1190013	MEADE MUNICIPAL POWER PLANT	Large Bore Engine (Dual Fuel, Oil/Gas)	14	381944	4127135	896.56	94.22	29.000	750.000	421.000	4.100	257.078	0.20
KSNO037	0550085	KINDER MORGAN INTERSTATE GAS TRANS	NG Engine	14	320099	4207857	896.56	96.37	24.512	814.583	53.826	1.087	7.490	0.10
KSNO038	0550085	KINDER MORGAN INTERSTATE GAS TRANS	TEG DEHY REBOILER	14	320099	4207857	896.56	96.37	36.662	430.079	20.609	1.850	0.109	0.05
KSNO039	0550085	KINDER MORGAN INTERSTATE GAS TRANS 1	NG Engine	14	320099	4207857	896.56	96.37	23.000	590.270	55.021	1.000	13.429	0.10
KSNO040	0550085	KINDER MORGAN INTERSTATE GAS TRANS 2	NG Engine	14	320099	4207857	867.15	96.37	16.000	650.270	168.900	1.000	13.429	0.10
KSNO041	0550085	KINDER MORGAN INTERSTATE GAS TRANS 3	NG Engine	14	320099	4207857	867.15	96.37	16.000	650.270	168.900	1.000	13.429	0.10
KSNO042	0550085	KINDER MORGAN INTERSTATE GAS TRANS 4	NG Engine	14	320099	4207857	867.15	96.37	27.000	590.270	55.021	1.000	13.429	0.10

NOx Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
KSNO043	0550085	KINDER MORGAN INTERSTATE GAS TRANS 5	NG Engine	14	320099	4207857	867.15	96.37	19.000	750.270	53.826	1.000	17.788	0.10
KSNO044	0550085	KINDER MORGAN INTERSTATE GAS TRANS 6	NG Engine	14	320099	4207857	867.15	96.37	33.000	650.270	42.200	2.000	67.144	0.10
KSNO045	0550085	KINDER MORGAN INTERSTATE GAS TRANS 7	NG Engine	14	320099	4207857	867.15	96.37	23.000	710.270	27.000	2.500	79.901	0.10
KSNO046	0550085	KINDER MORGAN INTERSTATE GAS TRANS 8	NG Engine	14	320099	4207857	867.15	96.37	13.000	720.270	36.200	2.160	44.718	0.10
KSNO047	0550085	KINDER MORGAN INTERSTATE GAS TRANS 9	NG Engine	14	320099	4207857	896.56	96.37	13.000	720.270	36.200	2.160	25.515	0.10
KSNO023	0550026	SUNFLOWER ELECTRIC POWER CORPORATION	EMER. DIESEL GENERATOR	14	333600	4203900	867.15	98.08	38.510	617.364	72.933	2.923	21.990	0.20
KSNO024	0550026	SUNFLOWER ELECTRIC POWER CORPORATION 2	S-2 STEAM GENERATOR	14	333600	4203900	867.15	98.08	124.000	253.270	57.000	10.000	68.367	0.05
KSNO025	0550026	SUNFLOWER ELECTRIC POWER CORPORATION 3	NAT GAS TURBINE	14	333600	4203900	867.15	98.08	32.000	985.270	28.800	10.330	224.111	0.25
KSNO026	0550026	SUNFLOWER ELECTRIC POWER CORPORATION 4	S-4 NAT GAS TURBINE	14	333600	4203900	867.15	98.08	42.000	1035.270	31.900	17.170	635.669	0.25
KSNO027	0550026	SUNFLOWER ELECTRIC POWER CORPORATION 5	S-5 NAT GAS TURBINE	14	333600	4203900	867.15	98.08	42.000	1046.270	32.100	17.170	633.207	0.25
KSNO028	0550026	SUNFLOWER ELECTRIC POWER CORPORATION 6	GC-3 160MMBTU/HR	14	333600	4203900	867.15	98.08	60.000	337.270	26.000	5.670	12.746	0.05
KSNO029	0550026	SUNFLOWER ELECTRIC POWER CORPORATION 7	NAT GAS BOILER	14	333600	4203900	867.15	98.08	60.000	410.270	27.000	1.330	1.210	0.05

OKLAHOMA NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
OKNO034	4567	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #1 - Worthington LTC-6, 800 hp	14	314096	4096421	901.71	33.32	28.000	380.000	51.927	1.000	32.200	0.10
OKNO035	4568	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #2 - Worthington LTC-6, 800 hp	14	314096	4096412	901.76	33.32	28.000	380.000	51.927	1.000	32.200	0.10
OKNO036	4569	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #3 - Worthington LTC-6, 800 hp	14	314096	4096403	901.81	33.32	28.000	380.000	51.927	1.000	32.200	0.10
OKNO037	4570	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #5 - Worthington SUTC-8, 2000 hp	14	314081	4096432	901.64	33.32	37.000	320.000	83.704	1.200	80.500	0.10
OKNO038	4571	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #6 - Worthington LTC-8, 1000 hp	14	314096	4096381	901.93	33.32	35.000	410.000	34.300	1.400	40.200	0.10
OKNO039	4572	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #7 - Worthington LTC-8, 1000 hp	14	314096	4096370	901.98	33.32	35.000	410.000	34.300	1.400	40.200	0.10
OKNO040	4573	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #8 - Worthington LTC-8, 1000 hp	14	314096	4096359	902.03	33.32	35.000	410.000	34.300	1.400	40.200	0.10
OKNO041	4574	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #9 - Worthington LTC-8, 1000 hp	14	314081	4096443	901.57	33.32	35.000	410.000	34.300	1.400	40.200	0.10
OKNO042	4575	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #10 - Worthington LTC-8, 1000 hp	14	314096	4096421	901.71	33.32	35.000	410.000	34.300	1.400	40.200	0.10
OKNO043	4576	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine REV #11 - Waukesha 7042GL, 1075 hp	14	314096	4096421	901.71	33.32	16.000	535.000	53.700	1.200	3.600	0.10
OKNO044	4577	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #12 - Waukesha L7042GSI, 1075 hp	14	314085	4096341	902.12	33.32	30.000	1055.000	114.082	1.000	3.000	0.10
OKNO045	4578	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #13 - Waukesha L7042GSI, 1075 hp	14	314085	4096330	902.16	33.32	30.000	1055.000	114.082	1.000	3.000	0.10
OKNO046	4579	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #14 - Waukesha L7042GSI, 1075 hp	14	314085	4096319	902.21	33.32	30.000	1055.000	114.082	1.000	3.000	0.10
OKNO047	4580	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine REF #4 - Cooper GMX-6, 330 hp	14	314103	4096433	901.65	33.32	16.000	410.000	55.306	0.800	10.300	0.10
OKNO048	4581	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine GEN #1 - Cooper JS-6, 540 hp	14	314105	4096434	901.65	33.32	16.000	425.000	55.306	0.800	10.400	0.10
OKNO049	4582	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine GEN #2 - Cooper JS-6, 540 hp	14	314111	4096434	901.65	33.32	16.000	425.000	55.306	0.800	10.400	0.10
OKNO050	4583	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine GEN #3 - Cooper JS-6, 540 hp	14	314116	4096434	901.64	33.32	16.000	425.000	55.306	0.800	10.400	0.10
OKNO051	13723	TIMBERLAND GATHERING AND PROCESSING CO	Compressor Engine #15 Stack	14	314252	4096325	902.18	33.32	35.000	800.000	103.156	1.200	5.100	0.10
OKNO007	4246	DCP MIDSTREAM LP	U-183 - Recip Eng., 500 hp Stack	14	283113	4083310	953.19	34.34	17.000	1020.000	86.615	0.700	12.100	0.10
OKNO008	4247	DCP MIDSTREAM LP	U-184 - Recip Eng., 500 hp Stack	14	283113	4083340	953.57	34.34	17.000	1020.000	86.615	0.700	12.100	0.10
OKNO009	4248	DCP MIDSTREAM LP	U-49 - Recip Eng., 800 hp Stack	14	283113	4083370	953.97	34.34	17.000	700.000	90.201	0.900	19.400	0.10
OKNO010	4249	DCP MIDSTREAM LP	U-169 - Recip Eng., 896 hp Stack	14	283113	4083400	954.27	34.34	18.000	1033.000	137.768	0.800	21.700	0.10
OKNO011	4250	DCP MIDSTREAM LP	U-304 - Recip Eng., 896 hp Stack	14	283143	4083461	954.59	34.34	18.000	1033.000	137.768	0.800	21.700	0.10
OKNO012	4251	DCP MIDSTREAM LP	U-301 - Recip Eng., 896 hp Stack	14	283143	4083445	954.58	34.34	18.000	1033.000	137.768	0.800	21.700	0.10
OKNO013	4252	DCP MIDSTREAM LP	U-303 - Recip Eng., 896 hp Stack	14	283143	4083430	954.53	34.34	18.000	1033.000	137.768	0.800	21.700	0.10
OKNO014	7007	DCP MIDSTREAM LP	Compressor Engine # 2 - Cooper Bessemer, 1000 hp	14	281698	4083421	954.83	34.62	39.000	739.000	199.404	1.100	15.900	0.10
OKNO015	7008	DCP MIDSTREAM LP	Compressor Engine # 3 - Cooper Bessemer, 1000 hp	14	281698	4083412	954.8	34.62	39.000	750.000	9.560	2.000	15.900	0.10
OKNO016	7009	DCP MIDSTREAM LP	Compressor Engine # 4 - Cooper Bessemer, 1000 hp	14	281698	4083403	954.76	34.62	39.000	739.000	199.404	1.100	15.900	0.10
OKNO017	7010	DCP MIDSTREAM LP	Compressor Engine # 5 - Cooper Bessemer, 1000 hp	14	281698	4083393	954.73	34.62	39.000	750.000	9.560	2.000	15.900	0.10
OKNO018	7011	DCP MIDSTREAM LP	Compressor Engine # 6 - Cooper Bessemer, 1000 hp	14	281698	4083385	954.71	34.62	39.000	739.000	199.404	1.100	15.900	0.10
OKNO019	7015	DCP MIDSTREAM LP	Compressor Engine #10 - Cooper Bessemer, 1000 hp	14	281698	4083342	954.63	34.62	39.000	739.000	199.404	1.100	15.900	0.10
OKNO020	7016	DCP MIDSTREAM LP	Compressor Engine #11 - Cooper Bessemer, 1000 hp	14	281698	4083333	954.61	34.62	39.000	739.000	199.404	1.100	15.900	0.10
OKNO021	7017	DCP MIDSTREAM LP	Compressor Engine #12 - Cooper Bessemer, 1000 hp	14	281698	4083323	954.59	34.62	39.000	739.000	199.404	1.100	15.900	0.10
OKNO022	7018	DCP MIDSTREAM LP	Compressor Engine #13 - Cooper Bessemer, 1000 hp	14	281698	4083314	954.57	34.62	39.000	739.000	199.404	1.100	15.900	0.10
OKNO023	7019	DCP MIDSTREAM LP	Compressor Engine #14 - Cooper Bessemer, 1000 hp	14	281698	4083305	954.55	34.62	39.000	739.000	199.404	1.100	15.900	0.10
OKNO024	7021	DCP MIDSTREAM LP	Compressor Engine #16 - Cooper Bessemer, 2000 hp Stack	14	281707	4083262	954.36	34.62	39.000	680.000	19.125	2.000	13.200	0.10

NOx Nearby Source Parameters and Emissions

OKLAHOMA NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
OKNO025	7022	DCP MIDSTREAM LP	Compressor Engine #17 - Cooper Bessemer, 2000 hp Stack	14	281707	4083253	954.3	34.62	39.000	680.000	19.125	2.000	13.200	0.10
OKNO026	7023	DCP MIDSTREAM LP	Compressor Engine #18 - Cooper Bessemer, 2000 hp Stack	14	281707	4083239	954.21	34.62	39.000	680.000	19.125	2.000	13.200	0.10
OKNO027	4255	ANADARKO GATHERING CO LLC	U-265 - Fairbanks-Morse MEP-8, 1800 hp	14	252995	4091251	1064.64	43.87	20.000	700.000	80.352	2.000	59.500	0.10
OKNO028	4256	ANADARKO GATHERING CO LLC	U-266 - Fairbanks-Morse MEP-8, 1800 hp	14	252983	4091251	1064.66	43.87	20.000	700.000	80.352	2.000	59.500	0.10
OKNO029	4257	ANADARKO GATHERING CO LLC	U-178 - Cat. G399TALC, 730 hp	14	252893	4091281	1064.89	43.87	18.000	1000.000	146.509	0.700	30.600	0.10
OKNO030	4258	ANADARKO GATHERING CO LLC	U-179 - Cat. G399TALC, 730 hp	14	252908	4091281	1064.88	43.87	18.000	1000.000	146.509	0.700	30.600	0.10
OKNO031	4259	ANADARKO GATHERING CO LLC	U-152 - Superior 8G825, 800 hp	14	252923	4091281	1064.85	43.87	14.000	1300.000	220.435	0.700	26.500	0.10
OKNO032	4260	ANADARKO GATHERING CO LLC	U-153 - Superior 8G825, 800 hp	14	252938	4091281	1064.78	43.87	14.000	1300.000	220.435	0.700	26.500	0.10
OKNO033	4261	ANADARKO GATHERING CO LLC	U-158 - Superior 8G825, 800 hp	14	252953	4091281	1064.74	43.87	14.000	1300.000	220.435	0.700	26.500	0.10
OKNO001	3967	WTG HUGOTON LP	Compressor #1 - Cooper Bessemer GMXD-8, 503 hp	14	264638	4068496	980.49	54.27	12.000	600.000	138.042	0.820	12.100	0.10
OKNO002	3968	WTG HUGOTON LP	Compressor #2 - Cooper Bessemer GMXD-8, 503 hp	14	264644	4068496	980.49	54.27	12.000	600.000	138.042	0.820	12.100	0.10
OKNO003	3969	WTG HUGOTON LP	Compressor #3 - Waukesha L7042GSIU, 1068 hp	14	264632	4068496	980.49	54.27	14.000	850.000	110.920	0.980	23.500	0.10
OKNO004	3970	WTG HUGOTON LP	Compressor #4 - Waukesha L7042GU, 706 hp	14	264695	4068502	980.11	54.27	17.000	750.000	64.784	0.980	15.500	0.10
OKNO005	3971	WTG HUGOTON LP	Compressor #5 - Waukesha L7042GU, 706 hp	14	264650	4068496	980.46	54.27	20.000	760.000	64.784	0.980	15.500	0.10
OKNO006	3972	WTG HUGOTON LP	Compressor #6 - White Superior 12GTL825, 1605 hp	14	264701	4068502	979.96	54.27	20.000	870.000	158.082	1.080	41.700	0.10
OKNO052	3448	NATURAL GAS PIPELINE CO OF AMERICA	Compressor Engine #15 - Cooper 12W330C2,6900 hp	14	331424	4047733	869.4	82.04	29.000	530.000	115.535	3.000	30.200	0.10
OKNO053	3441	NATURAL GAS PIPELINE CO OF AMERICA	Compressor Engine #8 - Clark TCV-10, 3400 hp	14	331424	4047714	868.68	82.06	29.000	700.000	123.664	2.500	89.950	0.10
OKNO054	3442	NATURAL GAS PIPELINE CO OF AMERICA	Compressor Engine #9 - Clark TCV-12, 4000 hp	14	331424	4047701	868.2	82.07	29.000	700.000	101.034	3.000	136.680	0.10

COLORADO NEARBY SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
CONO001	001	COLORADO INTERSTATE GAS CO FLANK STA	3 NATURAL GAS ENGINES RATED AT 1475 HP		217225.77	4112369.01	1162.85	71.00	30.000	1200.000	137.500	1.200	34.114	0.10
CONO002	008	COLORADO INTERSTATE GAS CO FLANK STA	NAT GAS FIRED SUPERIOR ICE		217225.77	4112369.01	1162.85	71.00	25.000	800.000	10.000	1.200	4.954	0.10
CONO003	009	COLORADO INTERSTATE GAS CO FLANK STA	NAT GAS FIRED SUPERIOR ICE		217225.77	4112369.01	1162.85	71.00	16.000	1080.000	27.800	0.400	3.630	0.10
CONO004	014	COLORADO INTERSTATE GAS CO FLANK STA	OLMAN HEATH TEG GLYCOL DEHY		217225.77	4112369.01	1162.85	71.00	25.000	600.000	10.200	1.330	0.600	0.05
CONO005	001	CRUSADER ENERGY GROUP INC - STONINGTON	NAT GAS FIRED CATERPILLAR ICE		218239.90	4131075.39	1159.01	71.00	10.000	1039.000	47.700	0.400	5.826	0.10
CONO006	002	CRUSADER ENERGY GROUP, INC	NAT GAS FIRED CATERPILLAR ICE		205183.38	4138394.97	1221.09	85.30	9.000	1134.000	131.000	0.350	5.205	0.10
CONO007	001	CRUSADER ENERGY GROUP	NAT GAS FIRED CATERPILLAR ICE		198064.95	4135337.93	1249.99	91.60	9.000	1134.000	130.700	0.360	4.568	0.10
CONO008	001	MIDSTREAM ENERGY - SPELUNKER CS	WAUKESHA, H24GL NAT GAS ENG RATED AT 517 HP		208806.97	4117287.60	1210.3	79.20	14.000	850.000	153.000	0.660	2.283	0.10
CONO009	009	NORTHEAST KANSAS BIOENERGY, LLC	NAT GAS FIRED BOILERS		206700.24	4142477.61	1216.93	85.00	10.000	400.000	999.000	2.000	3.285	0.05
CONO010	001	CRUSADER ENERGY GROUP	NAT GAS FIRED FORD RICE		224979.96	4137768.66	1138.56	66.20	10.000	800.000	20.000	0.300	0.753	0.10
CONO011	001	CRUSADER ENERGY GROUP	NAT GAS FIRED FORD RICE		210498.89	4133688.45	1195.96	79.10	10.000	800.000	20.000	0.300	0.765	0.10
CONO012	001	CRUSADER ENERGY GROUP	NAT GAS FIRED CHEVROLET 8.1L/496 RICE		199784.23	4138498.28	1243.37	90.60	5.000	1360.000	97.400	0.250	0.185	0.10
CONO013	001	CRUSADER ENERGY GROUP	NAT GAS FIRED CHEVROLET 8.1L/496 RICE		206847.25	4125429.08	1203.2	81.50	5.000	1360.000	97.300	0.250	0.185	0.10
CONO014	001	CRUSADER ENERGY GROUP	NAT GAS FIRED CHEVROLET 8.1L/496 RICE		199555.60	4138256.10	1244.01	90.80	5.000	1360.000	97.300	0.250	0.183	0.10

TEXAS NEARBY POINT SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (m)	Stack Gas Temp. (degK)	Stack Exit Velocity (m/s)	Stack Diameter (m)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
TXNO10	HD0014P	DUKE ENERGY FIELD SERVICES	BLRSTK7	14	279246	4041253	964.73	76.97	13.410	471.880	3.690	1.060	3.500	0.05
TXNO20	HD0014P	DUKE ENERGY FIELD SERVICES	BLRSTK9	14	279263	4041253	964.2	76.97	15.240	455.220	9.030	0.860	5.600	0.05
TXNO30	HD0014P	DUKE ENERGY FIELD SERVICES	FLR1	14	279457	4041422	963.62	76.78	18.280	1273.000	20.000	0.810	0.354	0.50
TXNO40	HD0014P	DUKE ENERGY FIELD SERVICES	STK1	14	279267	4041404	965.97	76.82	3.650	699.660	20.720	0.250	21.021	0.10
TXNO50	HD0014P	DUKE ENERGY FIELD SERVICES	STK17	14	279328	4041303	962.99	76.91	9.750	699.660	17.980	0.350	63.434	0.10
TXNO60	HD0014P	DUKE ENERGY FIELD SERVICES	STK18	14	279337	4041303	962.67	76.91	9.750	699.660	17.670	0.350	46.495	0.10
TXNO70	HD0014P	DUKE ENERGY FIELD SERVICES	STK19	14	279352	4041303	962.09	76.91	9.750	699.660	9.140	0.760	35.203	0.10
TXNO80	HD0014P	DUKE ENERGY FIELD SERVICES	STK2	14	279273	4041404	965.84	76.82	3.650	699.660	20.720	0.250	20.037	0.10
TXNO90	HD0014P	DUKE ENERGY FIELD SERVICES	STK20	14	279364	4041303	961.62	76.91	9.750	699.660	9.140	0.760	34.740	0.10
TXNO100	HD0014P	DUKE ENERGY FIELD SERVICES	STK21	14	279376	4041303	960.63	76.90	9.750	699.660	9.140	0.760	34.703	0.10

NOx Nearby Source Parameters and Emissions

TEXAS NEARBY POINT SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (m)	Stack Gas Temp. (degK)	Stack Exit Velocity (m/s)	Stack Diameter (m)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
TXNO110	HD0014P	DUKE ENERGY FIELD SERVICES	STK22	14	279390	4041303	959.51	76.90	9.750	699.660	9.140	0.760	35.361	0.10
TXNO120	HD0014P	DUKE ENERGY FIELD SERVICES	STK23	14	279403	4041303	959.17	76.90	9.750	699.660	9.140	0.760	33.788	0.10
TXNO130	HD0014P	DUKE ENERGY FIELD SERVICES	STK24	14	279240	4041310	966.06	76.91	10.050	699.660	5.940	0.350	11.489	0.10
TXNO140	HD0014P	DUKE ENERGY FIELD SERVICES	STK25	14	279236	4041310	966.15	76.91	10.050	699.660	5.940	0.350	14.847	0.10
TXNO150	HD0014P	DUKE ENERGY FIELD SERVICES	STK26	14	279233	4041310	966.21	76.91	10.050	699.660	5.940	0.350	10.559	0.10
TXNO160	HD0014P	DUKE ENERGY FIELD SERVICES	STK27	14	279229	4041310	966.29	76.91	10.050	699.660	5.940	0.350	11.160	0.10
TXNO170	HD0014P	DUKE ENERGY FIELD SERVICES	STK28	14	279224	4041310	966.4	76.92	10.050	699.660	5.940	0.350	16.390	0.10
TXNO180	HD0014P	DUKE ENERGY FIELD SERVICES	STK3	14	279279	4041404	965.72	76.82	3.650	699.660	14.020	0.250	13.888	0.10
TXNO190	HD0014P	DUKE ENERGY FIELD SERVICES	STK30	14	279096	4041233	966.77	77.01	8.530	699.660	21.670	0.350	30.023	0.10
TXNO200	HD0014P	DUKE ENERGY FIELD SERVICES	STK31	14	279085	4041233	966.8	77.01	3.960	699.660	18.280	0.250	16.306	0.10
TXNO210	HD0014P	DUKE ENERGY FIELD SERVICES	STK32	14	279078	4041233	966.81	77.01	3.960	699.660	18.280	0.250	15.733	0.10
TXNO220	HD0014P	DUKE ENERGY FIELD SERVICES	STK33	14	279070	4041233	966.82	77.01	3.960	699.660	18.280	0.250	18.550	0.10
TXNO230	HD0014P	DUKE ENERGY FIELD SERVICES	STK34	14	278946	4041413	967.63	76.85	3.650	699.660	7.620	0.250	3.445	0.10
TXNO240	HD0014P	DUKE ENERGY FIELD SERVICES	STK35	14	278872	4041243	967.26	77.02	3.650	699.660	7.620	0.250	3.927	0.10
TXNO250	HD0014P	DUKE ENERGY FIELD SERVICES	STK36	14	279103	4041281	966.94	76.96	18.280	699.660	6.090	1.000	12.550	0.10
TXNO260	HD0014P	DUKE ENERGY FIELD SERVICES	STK37	14	279103	4041264	966.87	76.98	18.280	699.660	6.090	1.000	12.539	0.10
TXNO270	HD0014P	DUKE ENERGY FIELD SERVICES	STK38	14	279062	4041233	966.84	77.01	3.960	699.660	16.580	0.250	2.557	0.10
TXNO280	HD0014P	DUKE ENERGY FIELD SERVICES	STK39	14	279197	4041338	966.79	76.89	3.960	699.660	18.280	0.250	2.557	0.10
TXNO290	HD0014P	DUKE ENERGY FIELD SERVICES	STK4	14	279285	4041404	965.59	76.82	3.650	699.660	11.270	0.250	11.537	0.10
TXNO300	HD0014P	DUKE ENERGY FIELD SERVICES	STK40	14	279203	4041338	966.77	76.89	3.960	699.660	18.280	0.250	2.557	0.10
TXNO310	HD0014P	DUKE ENERGY FIELD SERVICES	STK6	14	279316	4041377	964.8	76.84	17.980	810.770	3.350	2.310	20.532	0.10
TXNO320	HD0014P	DUKE ENERGY FIELD SERVICES	STK7	14	279261	4041342	965.8	76.88	3.350	810.770	18.500	0.240	19.863	0.10
TXNO330	HD0014P	DUKE ENERGY FIELD SERVICES	STK8	14	279267	4041342	965.64	76.88	3.350	699.660	18.280	0.250	10.457	0.10
TXNO340	HD0014P	DUKE ENERGY FIELD SERVICES	STK9	14	279398	4041338	961.5	76.87	3.650	699.660	14.630	0.250	14.126	0.10
TXNO350	HD0014P	DUKE ENERGY FIELD SERVICES	STK41	14	278924	4041145	966.71	77.11	12.190	729.110	12.640	1.010	6.046	0.10
TXNO360	HD0020U	AIR PRODUCTS AND CHEMICALS INC	STK01	14	277193	4041622	974.73	76.87	3.040	477.440	4.570	0.600	0.298	0.50
TXNO370	HD0029C	ANR PIPELINE CO	BLRSTACK01	14	286526	4041432	952.96	76.29	13.710	421.880	21.330	0.510	0.069	0.05
TXNO380	HD0029C	ANR PIPELINE CO	BLRSTACK02	14	286526	4041432	952.96	76.29	13.710	421.880	21.330	0.510	0.077	0.05
TXNO390	HD0029C	ANR PIPELINE CO	GENRSTACK1	14	286526	4041432	952.96	76.29	9.140	755.220	21.330	0.200	15.125	0.10
TXNO400	HD0029C	ANR PIPELINE CO	GENRSTACK2	14	286526	4041432	952.96	76.29	9.140	755.220	21.330	0.200	15.125	0.10
TXNO410	HD0029C	ANR PIPELINE CO	GENRSTACK3	14	286526	4041432	952.96	76.29	9.140	755.220	21.330	0.200	15.125	0.10
TXNO420	HD0029C	ANR PIPELINE CO	GENRSTACK4	14	286526	4041432	952.96	76.29	9.140	755.220	21.330	0.200	15.125	0.10
TXNO430	HD0029C	ANR PIPELINE CO	HTRSTACK01	14	286526	4041432	952.96	76.29	4.570	310.770	21.330	0.100	0.013	0.05
TXNO440	HD0029C	ANR PIPELINE CO	HTRSTACK02	14	286526	4041432	952.96	76.29	4.570	310.770	21.330	0.100	0.013	0.05
TXNO450	HD0029C	ANR PIPELINE CO	HTRSTACK03	14	286526	4041432	952.96	76.29	4.570	310.770	21.330	0.100	0.013	0.05
TXNO460	HD0029C	ANR PIPELINE CO	HTRSTACK04	14	286525	4041432	952.96	76.29	4.570	310.770	21.330	0.100	0.013	0.05
TXNO470	HD0029C	ANR PIPELINE CO	HTRSTACK05	14	286526	4041432	952.96	76.29	4.570	310.770	21.330	0.100	0.013	0.05
TXNO480	HD0029C	ANR PIPELINE CO	STACK01	14	286526	4041432	952.96	76.29	9.140	616.330	31.390	0.760	119.958	0.10
TXNO490	HD0029C	ANR PIPELINE CO	STACK02	14	286526	4041432	952.96	76.29	9.140	616.330	31.390	0.760	117.638	0.10
TXNO500	HD0029C	ANR PIPELINE CO	STACK03	14	286526	4041432	952.96	76.29	9.140	616.330	31.390	0.760	117.275	0.10
TXNO510	HD0029C	ANR PIPELINE CO	STACK04	14	286526	4041432	952.96	76.29	9.140	616.330	31.390	0.760	106.474	0.10
TXNO520	HD0029C	ANR PIPELINE CO	STACK06	14	286526	4041432	952.96	76.29	9.140	616.330	31.390	0.760	111.190	0.10
TXNO530	HD0029C	ANR PIPELINE CO	STACK07	14	286526	4041432	952.96	76.29	9.140	616.330	31.390	0.760	111.771	0.10
TXNO540	HD0029C	ANR PIPELINE CO	STACK09	14	286526	4041432	952.96	76.29	9.140	616.330	31.390	0.760	101.839	0.10
TXNO550	HD0029C	ANR PIPELINE CO	STACK10	14	286526	4041432	952.96	76.29	9.140	616.330	31.390	0.760	86.079	0.10
TXNO560	HD0029C	ANR PIPELINE CO	STACK11	14	286526	4041432	952.96	76.29	9.140	616.330	31.390	0.760	106.180	0.10
TXNO570	HD0029C	ANR PIPELINE CO	STACK12	14	286526	4041432	952.96	76.29	9.140	616.330	31.390	0.760	98.113	0.10
TXNO580	HD0031P	DUKE ENERGY FIELD SERVICES LP	U-202	14	302917	4039608	915.17	79.47	13.710	699.660	0.670	0.300	1.253	0.10
TXNO590	HD0031P	DUKE ENERGY FIELD SERVICES LP	U-204	14	302917	4039608	915.17	79.47	13.710	699.660	0.670	0.300	5.655	0.10
TXNO600	HD0031P	DUKE ENERGY FIELD SERVICES LP	U-206	14	302917	4039608	915.17	79.47	13.710	699.660	0.670	0.300	5.174	0.10
TXNO610	HD0031P	DUKE ENERGY FIELD SERVICES LP	U-208	14	302917	4039608	915.17	79.47	13.710	699.660	0.670	0.300	24.043	0.10
TXNO620	HD0031P	DUKE ENERGY FIELD SERVICES LP	U-209	14	302917	4039608	915.17	79.47	18.280	699.660	5.300	0.600	16.687	0.10
TXNO630	HD0031P	DUKE ENERGY FIELD SERVICES LP	U-210	14	302917	4039608	915.17	79.47	18.280	699.660	5.300	0.600	4.678	0.10
TXNO640	HD0031P	DUKE ENERGY FIELD SERVICES LP	U-211	14	302917	4039608	915.17	79.47	18.280	699.660	5.300	0.600	24.530	0.10
TXNO650	HD0031P	DUKE ENERGY FIELD SERVICES LP	U-212	14	302917	4039608	915.17	79.47	18.280	699.660	5.300	0.450	3.251	0.10

NOx Nearby Source Parameters and Emissions

TEXAS NEARBY POINT SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (m)	Stack Gas Temp. (degK)	Stack Exit Velocity (m/s)	Stack Diameter (m)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
TXNO660	HD0031P	DUKE ENERGY FIELD SERVICES LP	U-213	14	302917	4039608	915.17	79.47	18.280	699.660	5.300	0.600	25.804	0.10
TXNO670	HD0031P	DUKE ENERGY FIELD SERVICES LP	U-214	14	302917	4039608	915.17	79.47	18.280	699.660	5.300	0.600	15.966	0.10
TXNO680	HD0031P	DUKE ENERGY FIELD SERVICES LP	U-216	14	302917	4039608	915.17	79.47	18.280	699.660	5.300	0.600	36.187	0.10
TXNO690	HD0038B	GPM GAS CORPORATION	STK1	14	294535	4039918	937.93	78.04	3.650	699.660	16.460	0.200	10.573	0.10
TXNO700	HD0038B	GPM GAS CORPORATION	STK2	14	294550	4039930	938.02	78.03	7.620	699.660	13.920	0.250	12.315	0.10
TXNO710	HD0038B	GPM GAS CORPORATION	STK3	14	294543	4039918	937.98	78.04	3.650	699.660	18.360	0.200	19.267	0.10
TXNO720	HD0039W	NATURAL GAS PIPELINE CO	86-2	14	307449	4026186	912.42	93.52	4.870	533.000	24.990	0.250	8.867	0.10
TXNO730	OA0044C	BP AMERICA PRODUCTION CO	STACK1	14	316436	4024187	916.53	97.68	3.960	662.440	60.960	0.070	4.534	0.10
TXNO740	OA0044C	BP AMERICA PRODUCTION CO	STACK65	14	316428	4024186	916.54	97.68	4.870	662.440	56.230	0.150	7.984	0.10
TXNO750	OA0051F	GPM GAS CORPORATION	STK2	14	329055	4079280	835.80	56.08	6.090	699.660	16.450	0.250	11.050	0.10
TXNO760	SJ0020P	DUKE ENERGY FIELD SERVICES	STK1	14	259337	4042412	1030.50	80.63	3.960	699.660	18.280	0.250	12.676	0.10
TXNO770	SJ0020P	DUKE ENERGY FIELD SERVICES	STK2	14	259346	4042412	1030.48	80.63	3.960	699.660	16.450	0.250	11.266	0.10
TXNO780	SJ0020P	DUKE ENERGY FIELD SERVICES	STK3	14	259356	4042414	1030.41	80.62	3.960	699.660	17.670	0.250	11.032	0.10
TXNO790	SJ0024H	DUKE ENERGY FIELD SERVICES	STK1	14	260655	4029605	1031.60	92.30	7.920	699.660	27.730	0.350	20.902	0.10
TXNO800	SJ0024H	DUKE ENERGY FIELD SERVICES	STK2	14	260669	4029605	1031.54	92.30	7.920	699.660	27.730	0.350	24.687	0.10
TXNO810	SJ0024H	DUKE ENERGY FIELD SERVICES	STK3	14	260678	4029605	1031.50	92.29	7.920	699.660	27.730	0.350	24.258	0.10
TXNO820	SJ0024H	DUKE ENERGY FIELD SERVICES	STK4	14	260687	4029605	1031.46	92.29	7.920	699.660	27.730	0.350	27.224	0.10
TXNO830	SJ0024H	DUKE ENERGY FIELD SERVICES	STK5	14	260703	4029605	1031.35	92.29	7.920	699.660	56.990	0.350	20.815	0.10
TXNO840	SJ0024H	DUKE ENERGY FIELD SERVICES	STK6	14	260713	4029605	1031.29	92.28	7.920	699.660	63.090	0.350	37.537	0.10
TXNO850	SJ0024H	DUKE ENERGY FIELD SERVICES	STK7	14	260637	4029614	1031.70	92.30	3.650	699.660	16.580	0.250	5.162	0.10

TEXAS NEARBY AREA SOURCES

Model ID	Facility ID	Facility Name	Source Description	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (m)	Rotation (deg)	Width (m)	Length (m)	NOx Emissions PTE (lbs/hr)	NO_2/NOx Ratio
TXNOD1	SJ0006J	TEXHOMA WHEAT GROWERS INC	5803	14	248140	4042884	1058.40	84.87	9.140	0.000	30.480	30.480	0.091	0.50
TXNOD2	SJ0006J	TEXHOMA WHEAT GROWERS INC	5803	14	248140	4042884	1058.40	84.87	9.140	0.000	30.480	30.480	0.091	0.50

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

SO_2 Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	SO_2 Emissions (lbs/hr)
KSSO018	1890103	SEABOARD FOODS, LP	14	288373	4116999	953.17	0.722	73.61	416.37	29.33	3.78	10.80
KSSO019	1890103	SEABOARD FOODS, LP	14	288373	4116999	953.17	0.722	108.52	387.19	36.63	6.55	0.01
KSSO017	1890021	HUGOTON MUNICIPAL POWER PLANT (#2)	14	292326	4115396	947.24	4.726	33.00	505.00	106.40	2.50	4.40
KSSO011	0670010	PIONEER NATURAL RESOURCES USA, INC.	14	291901	4147534	944.19	30.063	96.42	759.66	36.64	2.69	9.10
KSSO008	0670007	COLUMBIAN CHEMICALS COMPANY Dryer Vapor Bag Colle	14	306549	4156832	923.39	43.220	77.00	320.00	26.00	2.00	2.10
KSSO009	0670007	COLUMBIAN CHEMICALS COMPANY Dryer Vapor Bag Colle	14	306549	4156832	923.39	43.220	79.00	280.00	41.00	2.00	2.10
KSSO010	0670007	COLUMBIAN CHEMICALS COMPANY Tail Gas Boiler / Flare	14	306549	4156832	923.39	43.220	195.00	450.00	40.00	6.00	1621.46
KSSO015	1750012	NATIONAL BEEF PACKING COMPANY, L.L.C.	14	331090	4102104	861.01	45.638	58.21	436.41	27.61	3.40	117.00
KSSO016	1870009	JOHNSON CITY MUNICIPAL POWER PLANT	14	257034	4161124	1016.96	53.451	33.51	623.03	59.48	2.13	36.76
KSSO014	1750001	MID-KANSAS ELECTRIC COMPANY -CIMARRON RIV	14	343489	4113766	787.99	55.429	53.00	750.00	200.00	8.87	203.10
KSSO012	0930019	CITY OF LAKIN	14	299200	4202800	946.41	85.808	33.51	623.03	59.48	2.13	23.90
KSSO013	1190013	MEADE MUNICIPAL POWER PLANT	14	379700	4138400	787.84	93.812	33.51	623.03	59.48	2.13	46.00
KSSO001	0550023	SUNFLOWER ELECTRIC POWER CORPORATION Holcomb 1	14	325760	4203843	881.16	93.975	475.00	180.00	113.50	16.33	591.75
KSSO007	0550043	TYSON FRESH MEATS, INC. BLRS 1-5	14	322114	4207381	883.79	95.879	58.21	436.41	27.61	3.40	56.57
KSSO002	0550026	SUNFLOWER ELECTRIC POWER CORPORATION GC3 - Boiler	14	333600	4203900	867.15	97.425	60.00	337.00	26.00	5.67	0.28
KSSO003	0550026	SUNFLOWER ELECTRIC POWER CORPORATION S2 Boiler FO	14	333600	4203900	867.15	97.425	124.00	253.00	57.00	10.00	1.52
KSSO004	0550026	SUNFLOWER ELECTRIC POWER CORPORATION S3 Turbine F	14	333600	4203900	867.15	97.425	32.00	985.00	28.80	10.33	0.39
KSSO005	0550026	SUNFLOWER ELECTRIC POWER CORPORATION S4 Turbine F	14	333600	4203900	867.15	97.425	42.00	1035.00	31.90	17.17	1.10
KSSO006	0550026	SUNFLOWER ELECTRIC POWER CORPORATION S5 Turbine F	14	333600	4203900	867.15	97.425	42.00	1046.00	32.10	17.17	1.09

COLORADO NEARBY SOURCES

Model ID	Facility ID	Facility Name	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	SO_2 Emissions (lbs/hr)
COSO001	0001	COLORADO INTERSTATE GAS CO FLANK STA		217225.773	4112369.014	1162.85	71	30	1200	137.50	1.200	0.0208
COSO002	0001	COLORADO INTERSTATE GAS CO FLANK STA		217225.773	4112369.014	1162.85	71	25	800	10.00	1.200	0.0008
COSO003	0001	COLORADO INTERSTATE GAS CO FLANK STA		217225.773	4112369.014	1162.85	71	16	1080	27.80	0.400	0.0033
COSO004	0001	COLORADO INTERSTATE GAS CO FLANK STA		217225.773	4112369.014	1162.85	71	25	600	10.20	1.330	0.0037
COSO005	0028	CRUSADER ENERGY GROUP INC - STONINGTON		218239.8979	4131075.394	1159.01	71	10	1039	47.70	0.400	0.0011
COSO006	0043	CRUSADER ENERGY GROUP		198064.9517	4135337.935	1249.99	91.6	9	1134	130.70	0.360	0.0006
COSO007	0045	MIDSTREAM ENERGY - SPELUNKER CS		208806.9721	4117287.601	1210.3	79.2	14	850	153.00	0.660	0.0073
COSO008	0047	NORTHEAST KANSAS BIOENERGY, LLC		206700.2432	4142477.614	1216.93	85	10	400	999.00	2.000	0.0205
COSO009	0050	CRUSADER ENERGY GROUP		224979.9641	4137768.665	1138.56	66.2	10	800	20.00	0.300	0.0002
COSO010	0051	CRUSADER ENERGY GROUP		210498.8904	4133688.451	1195.96	79.1	10	800	20.00	0.300	0.0002
COSO011	0052	CRUSADER ENERGY GROUP		199784.2312	4138498.276	1243.37	90.6	5	1360	97.40	0.250	0.0003
COSO012	0053	CRUSADER ENERGY GROUP		206847.2544	4125429.084	1203.2	81.5	5	1360	97.30	0.250	0.0003
COSO013	0054	CRUSADER ENERGY GROUP		199555.5971	4138256.102	1244.01	90.8	5	1360	97.30	0.250	0.0003

SO_2 Nearby Source Parameters and Emissions

TEXAS NEARBY POINT SOURCES

Model ID	Facility ID	Facility Name	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (m)	Stack Gas Temp. (degK)	Stack Exit Velocity (m/s)	Stack Diameter (m)	SO_2 Emissions (lbs/hr)
TXNO10	HD0014P	DUKE ENERGY FIELD SERVICES	14	279062.00	4041233.00	966.84	77.01	3.96	699.66	16.58	0.25	0.0228
TXNO20	HD0014P	DUKE ENERGY FIELD SERVICES	14	279197.00	4041338.00	966.79	76.89	3.96	699.66	18.28	0.25	0.0228
TXNO30	HD0014P	DUKE ENERGY FIELD SERVICES	14	279203.00	4041338.00	966.77	76.89	3.96	699.66	18.28	0.25	0.0228

TEXAS NEARBY AREA SOURCES

Model ID	Facility ID	Facility Name	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (m)	Rotation (deg)	Width (m)	Length (m)	SO_2 Emissions (lbs/hr)
TXNOD1	SJ0006J	TEXHOMA WHEAT GROWERS INC	14	248140	4042884	1058.40	84.87	9.14	0.00	30.48	30.48	0.002
TXNOD2	SJ0006J	TEXHOMA WHEAT GROWERS INC	14	248140	4042884	1058.40	84.87	9.14	0.00	30.48	30.48	0.002

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

SO_2 Nearby Source Parameters and Emissions

KANSAS NEARBY SOURCES

Model ID	Facility ID	Facility Name	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	SO_2 Emissions (lbs/hr)
KSSO018	1890103	SEABOARD FOODS, LP	14	288373	4116999	953.17	0.722	73.61	416.37	29.33	3.78	10.80
KSSO019	1890103	SEABOARD FOODS, LP	14	288373	4116999	953.17	0.722	108.52	387.19	36.63	6.55	0.01
KSSO017	1890021	HUGOTON MUNICIPAL POWER PLANT (#2)	14	292326	4115396	947.24	4.726	33.00	505.00	106.40	2.50	4.40
KSSO011	0670010	PIONEER NATURAL RESOURCES USA, INC.	14	291901	4147534	944.19	30.063	96.42	759.66	36.64	2.69	9.10
KSSO008	0670007	COLUMBIAN CHEMICALS COMPANY Dryer Vapor Bag Colle	14	306549	4156832	923.39	43.220	77.00	320.00	26.00	2.00	2.10
KSSO009	0670007	COLUMBIAN CHEMICALS COMPANY Dryer Vapor Bag Colle	14	306549	4156832	923.39	43.220	79.00	280.00	41.00	2.00	2.10
KSSO010	0670007	COLUMBIAN CHEMICALS COMPANY Tail Gas Boiler / Flare	14	306549	4156832	923.39	43.220	195.00	450.00	40.00	6.00	1621.46
KSSO015	1750012	NATIONAL BEEF PACKING COMPANY, L.L.C.	14	331090	4102104	861.01	45.638	58.21	436.41	27.61	3.40	117.00
KSSO016	1870009	JOHNSON CITY MUNICIPAL POWER PLANT	14	257034	4161124	1016.96	53.451	33.51	623.03	59.48	2.13	36.76
KSSO014	1750001	MID-KANSAS ELECTRIC COMPANY -CIMARRON RIV	14	343489	4113766	787.99	55.429	53.00	750.00	200.00	8.87	203.10
KSSO012	0930019	CITY OF LAKIN	14	299200	4202800	946.41	85.808	33.51	623.03	59.48	2.13	23.90
KSSO013	1190013	MEADE MUNICIPAL POWER PLANT	14	379700	4138400	787.84	93.812	33.51	623.03	59.48	2.13	46.00
KSSO001	0550023	SUNFLOWER ELECTRIC POWER CORPORATION Holcomb 1	14	325760	4203843	881.16	93.975	475.00	180.00	113.50	16.33	591.75
KSSO007	0550043	TYSON FRESH MEATS, INC. BLRS 1-5	14	322114	4207381	883.79	95.879	58.21	436.41	27.61	3.40	56.57
KSSO002	0550026	SUNFLOWER ELECTRIC POWER CORPORATION GC3 - Boiler	14	333600	4203900	867.15	97.425	60.00	337.00	26.00	5.67	0.28
KSSO003	0550026	SUNFLOWER ELECTRIC POWER CORPORATION S2 Boiler FO	14	333600	4203900	867.15	97.425	124.00	253.00	57.00	10.00	1.52
KSSO004	0550026	SUNFLOWER ELECTRIC POWER CORPORATION S3 Turbine F	14	333600	4203900	867.15	97.425	32.00	985.00	28.80	10.33	0.39
KSSO005	0550026	SUNFLOWER ELECTRIC POWER CORPORATION S4 Turbine F	14	333600	4203900	867.15	97.425	42.00	1035.00	31.90	17.17	1.10
KSSO006	0550026	SUNFLOWER ELECTRIC POWER CORPORATION S5 Turbine F	14	333600	4203900	867.15	97.425	42.00	1046.00	32.10	17.17	1.09

COLORADO NEARBY SOURCES

Model ID	Facility ID	Facility Name	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (ft)	Stack Gas Temp. (°F)	Stack Exit Velocity (ft/s)	Stack Diameter (ft)	SO_2 Emissions (lbs/hr)
COSO001	0001	COLORADO INTERSTATE GAS CO FLANK STA		217225.773	4112369.014	1162.85	71	30	1200	137.50	1.200	0.0208
COSO002	0001	COLORADO INTERSTATE GAS CO FLANK STA		217225.773	4112369.014	1162.85	71	25	800	10.00	1.200	0.0008
COSO003	0001	COLORADO INTERSTATE GAS CO FLANK STA		217225.773	4112369.014	1162.85	71	16	1080	27.80	0.400	0.0033
COSO004	0001	COLORADO INTERSTATE GAS CO FLANK STA		217225.773	4112369.014	1162.85	71	25	600	10.20	1.330	0.0037
COSO005	0028	CRUSADER ENERGY GROUP INC - STONINGTON		218239.8979	4131075.394	1159.01	71	10	1039	47.70	0.400	0.0011
COSO006	0043	CRUSADER ENERGY GROUP		198064.9517	4135337.935	1249.99	91.6	9	1134	130.70	0.360	0.0006
COSO007	0045	MIDSTREAM ENERGY - SPELUNKER CS		208806.9721	4117287.601	1210.3	79.2	14	850	153.00	0.660	0.0073
COSO008	0047	NORTHEAST KANSAS BIOENERGY, LLC		206700.2432	4142477.614	1216.93	85	10	400	999.00	2.000	0.0205
COSO009	0050	CRUSADER ENERGY GROUP		224979.9641	4137768.665	1138.56	66.2	10	800	20.00	0.300	0.0002
COSO010	0051	CRUSADER ENERGY GROUP		210498.8904	4133688.451	1195.96	79.1	10	800	20.00	0.300	0.0002
COSO011	0052	CRUSADER ENERGY GROUP		199784.2312	4138498.276	1243.37	90.6	5	1360	97.40	0.250	0.0003
COSO012	0053	CRUSADER ENERGY GROUP		206847.2544	4125429.084	1203.2	81.5	5	1360	97.30	0.250	0.0003
COSO013	0054	CRUSADER ENERGY GROUP		199555.5971	4138256.102	1244.01	90.8	5	1360	97.30	0.250	0.0003

SO_2 Nearby Source Parameters and Emissions

TEXAS NEARBY POINT SOURCES

Model ID	Facility ID	Facility Name	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (m)	Stack Gas Temp. (degK)	Stack Exit Velocity (m/s)	Stack Diameter (m)	SO_2 Emissions (lbs/hr)
TXNO10	HD0014P	DUKE ENERGY FIELD SERVICES	14	279246	4041253	964.73	76.97	13.41	471.88	3.69	1.06	0.016
TXNO20	HD0014P	DUKE ENERGY FIELD SERVICES	14	279263	4041253	964.2	76.97	15.24	455.22	9.03	0.86	0.025
TXNO30	HD0014P	DUKE ENERGY FIELD SERVICES	14	279457	4041422	963.62	76.78	18.28	1273.00	20.00	0.81	122.080
TXNO270	HD0014P	DUKE ENERGY FIELD SERVICES	14	279062	4041233	966.84	77.01	3.96	699.66	16.58	0.25	0.0228
TXNO280	HD0014P	DUKE ENERGY FIELD SERVICES	14	279197	4041338	966.79	76.89	3.96	699.66	18.28	0.25	0.0228
TXNO300	HD0014P	DUKE ENERGY FIELD SERVICES	14	279203	4041338	966.77	76.89	3.96	699.66	18.28	0.25	0.0228
TXNO430	HD0029C	ANR PIPELINE CO	14	286526	4041432	952.96	76.29	4.57	310.77	21.33	0.10	0.000
TXNO440	HD0029C	ANR PIPELINE CO	14	286526	4041432	952.96	76.29	4.57	310.77	21.33	0.10	0.001
TXNO450	HD0029C	ANR PIPELINE CO	14	286526	4041432	952.96	76.29	4.57	310.77	21.33	0.10	0.000
TXNO460	HD0029C	ANR PIPELINE CO	14	286525	4041432	952.96	76.29	4.57	310.77	21.33	0.10	0.000
TXNO470	HD0029C	ANR PIPELINE CO	14	286526	4041432	952.96	76.29	4.57	310.77	21.33	0.10	0.000
TXNO480	HD0029C	ANR PIPELINE CO	14	286526	4041432	952.96	76.29	9.14	616.33	31.39	0.76	0.011
TXNO490	HD0029C	ANR PIPELINE CO	14	286526	4041432	952.96	76.29	9.14	616.33	31.39	0.76	0.011
TXNO500	HD0029C	ANR PIPELINE CO	14	286526	4041432	952.96	76.29	9.14	616.33	31.39	0.76	0.013
TXNO510	HD0029C	ANR PIPELINE CO	14	286526	4041432	952.96	76.29	9.14	616.33	31.39	0.76	0.009
TXNO520	HD0029C	ANR PIPELINE CO	14	286526	4041432	952.96	76.29	9.14	616.33	31.39	0.76	0.013
TXNO530	HD0029C	ANR PIPELINE CO	14	286526	4041432	952.96	76.29	9.14	616.33	31.39	0.76	0.015
TXNO540	HD0029C	ANR PIPELINE CO	14	286526	4041432	952.96	76.29	9.14	616.33	31.39	0.76	0.011
TXNO550	HD0029C	ANR PIPELINE CO	14	286526	4041432	952.96	76.29	9.14	616.33	31.39	0.76	0.007
TXNO560	HD0029C	ANR PIPELINE CO	14	286526	4041432	952.96	76.29	9.14	616.33	31.39	0.76	0.011
TXNO570	HD0029C	ANR PIPELINE CO	14	286526	4041432	952.96	76.29	9.14	616.33	31.39	0.76	0.010
TXNO720	HD0039V	NATURAL GAS PIPELINE CO	14	307449	4026186	912.42	93.52	4.87	533.00	24.99	0.25	0.002

TEXAS NEARBY AREA SOURCES

Model ID	Facility ID	Facility Name	UTM Zone	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Distance from Facility (km)	Stack Height (m)	Rotation (deg)	Width (m)	Length (m)	SO_2 Emissions (lbs/hr)
TXNOD1	SJ0006J	TEXHOMA WHEAT GROWERS INC	14	248140	4042884	1058.40	84.87	9.14	0.00	30.48	30.48	0.002
TXNOD2	SJ0006J	TEXHOMA WHEAT GROWERS INC	14	248140	4042884	1058.40	84.87	9.14	0.00	30.48	30.48	0.002

Recommended Background Concentrations - Abengoa

Pollutant	NAAQS PPM	NAAQS ug/m3	Avg Period	Form of Std	Site	Year	Conc. PPM	Conc. ug/m3
NO_2	0.100	188.3	**1-hour**	3 yr avg of 98th %tile of the daily max 1-hour avg	Peck	2006	0.029	54.6
						2007	0.028	52.7
						2008	0.025	47.1
						2009	0.024	45.2
						2010	0.026	49.0
						5 year avg.	**0.026**	**49.0**
Recommended 1-hour NO_2 Background Concentration: 49.0 ug/m3								
SO_2	0.140	366.8	**24-hour**	Not to be exceeded more than once per year	Cedar Bluff	2006	0.002	5.2
						2007	0.003	7.9
						2008	0.003	7.9
						2009	0.001	2.6
						2010	0.002	5.2
						5 year avg.	**0.002**	**5.8**
Recommended 24-hour SO_2 Background Concentration: 5.8 ug/m3								
SO_2	0.500	1300.0	**3-hour**	Not to be exceeded more than once per year	Cedar Bluff	2006	0.002	5.2
						2007	0.003	7.9
						2008	0.003	7.9
						2009	0.002	5.2
						2010	0.003	7.9
						5 year avg.	**0.003**	**6.8**
Recommended 3-hour SO_2 Background Concentration: 6.8 ug/m3								
SO_2	0.075	N/A	**1-hour**	3 yr avg of 99th %tile of the daily max 1-hour avg	Cedar Bluff	2006	0.003	7.9
						2007	0.004	10.5
						2008	0.004	10.5
						2009	0.003	7.9
						2010	0.003	7.9
						5 year avg.	**0.004**	**8.9**
Recommended 1-hour SO_2 Background Concentration: 8.9 ug/m3								

Recommended Background Concentrations - Abengoa

Pollutant	NAAQS PPM	NAAQS ug/m3	Avg Period	Form of Std	Site	Year	Conc. PPM	Conc. ug/m3
PM_{10}		150	**24-hour Max**	Not to be exceeded more than once per year on avg over 3 years	Dodge City	2006	N/A	85 (6-day)
						2007	N/A	< 75% capture
						2008	N/A	129 (Cont.)
						2009	N/A	85 (Cont.)
						2010	N/A	53 (Cont.)
						4 year avg.		**89**
Recommended 24-hour PM_{10} Background Concentration: 89 ug/m3								
PM_{10}		50	**Annual Mean**	N/A	Dodge City	2006	N/A	27
						2007	N/A	< 75% capture
						2008	N/A	22
						2009	N/A	21
						2010	N/A	17
						4 year avg.		**22**
Recommended Annual Mean PM_{10} Background Concentration: 22 ug/m3								
$PM_{2.5}$		35	**24-hour**	3 year avg of 98th %tile of 24 hour conc.	Cedar Bluff	2006	N/A	18
						2007	N/A	15
						2008	N/A	19
						2009	N/A	15
						2010	N/A	15
						5 year avg.		**17**
Recommended 24-hour $PM_{2.5}$ Background Concentration: 17 ug/m3								
$PM_{2.5}$		15	**Annual Mean**	3 year avg of weighted annual mean	Cedar Bluff	2006	N/A	8
						2007	N/A	7
						2008	N/A	7
						2009	N/A	7
						2010	N/A	7
						5 year avg.		**7**
Recommended Annual Mean $PM_{2.5}$ Background Concentration: 7 ug/m3								

5/9/2011

Recommended Background Concentrations - Abengoa

Pollutant	NAAQS PPM	NAAQS ug/m3	Avg Period	Form of Std	Site	Year	Conc. PPM	Conc. ug/m3
NO_2	0.053	99.8	**Annual Mean**	Shown for a clearer comparison to the 1 hour Std.	Peck	2006	0.004	7.5
						2007	0.004	7.5
						2008	0.004	7.5
						2009	0.004	7.5
						2010	0.004	7.5
						5 year avg.	**0.004**	7.5
Recommended Annual Mean NO_2 Background Concentration: 7.5 ug/m3								

Stephanie Salter

From: Sergio Guerra [SGuerra@kdheks.gov]
Sent: Friday, May 06, 2011 4:31 PM
To: Stephanie Salter; Robert.Wildgen@bioenergy.abengoa.com; Joseph.Birschbach@bioenergy.abengoa.com
Cc: Marian Massoth; Mindy Bowman; Terry Tavener; Daye.Richard@epamail.epa.gov; Tom Gross; BAR ImageNow
Subject: Nearby source inventory
Attachments: FINALAbengoaPSD.xls

Dear all,

Attached is the nearby source inventory for the sources in Kansas within the expected radius of impact. Applicable nearby sources from Oklahoma, Colorado and Texas should also be included in any refined modeling for the ABBK project.

Should you have any questions please let me know,

Sergio

Sergio Guerra
Engineering Associate
KDHE Bureau of Air
Air Permitting Section
1000 SW Jackson, Suite 310
Topeka, KS 66612-1366

Email : sguerra@kdheks.gov
Work #: 785-296-0365
FAX #: 785-291-3953

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Stephanie Salter

From: William G. Stone [WStone@kdheks.gov]
Sent: Friday, June 10, 2011 1:31 PM
To: Stephanie Salter
Cc: Sergio Guerra
Subject: RE: Nearby Summary
Attachments: June10rev_ABBK Nearby Parameters.xls

Stephanie I have added SCC and a description to each record you highlighted on the NOX-PSD tab.

Will Stone

Bureau of Air

1000 SW Jackson, Suite 310

Topeka, KS 66612-1366

(785) 296-6427 (BUS)

(785) 291-3953 (FAX)

wstone@kdheks.gov

Note my email address has changed.

From: Stephanie Salter [mailto:stephanie.salter@wla-consulting.com]
Sent: Friday, June 10, 2011 12:57 PM
To: William G. Stone
Cc: William G. Stone
Subject: RE: Nearby Summary

Will,
I have attached a spreadsheet with several sources that I need additional information on in order to apply a NO2/NOx ratio. Please see the NOx-PSD tab of the spreadsheet and the sources are highlighted in red.

Thanks!

_____
Stephanie Salter

From: Sergio Guerra [mailto:SGuerra@kdheks.gov]
Sent: Friday, June 10, 2011 12:35 PM
To: Stephanie Salter; Mindy Bowman
Cc: William G. Stone
Subject: RE: Nearby Summary

Stephanie,

I left you a message about the items discussed in your email.

1- Colorado Interstate Gas Co, 1297127: Use this source, its coordinates are correct in spite of the difference in the distance value. That value was calculated with a formula that applies to zone 14 and the facility is on zone 13.
2- I am including below the information for the Sunflower project.
3- For the other highlighted cells please call Will stone to let him know if you need the source description or SCC code. Will direct line is :

(785) 296-6427

I am leaving the office now so have a great weekend.

Sergio

From Sunflowers submittals available:
http://www.kdheks.gov/bar/sunflower/Cover-Part-7.pdf

Model ID	X (m)	Y (m)	Load	Stack Height (ft)	Stack Diameter (ft)	Flue Gas Exhaust Temperature (°F)	Flue Gas Exit Velocity (ft/sec)	NO_X Emission Rate (lb/hr)	NO_2/NO_X Ratio
H2_100	326,798.44	4,199,760.4	100%	620	23	165	91.1	1740	0.05
H2_75	326,798.44	4,199,760.4	75%	620	23	165	68.3	1305	
H2_50	326,798.44	4,199,760.4	50%	620	23	165	45.5	870	
H2_25	326,798.44	4,199,760.4	25%	620	23	165	22.7	435	

H2 Auxiliary Boiler Stack Parameters

Model ID	X (m)	Y (m)	NO_X Emission Rate (lb/hr)	Stack Height (ft)	Stack Diameter (ft)	Flue Gas Exhaust Temperature (°F)	Flue Gas Exit Velocity (ft/sec)	NO_2/NO_X Ratio
H2AUX	326,805.6	4,199,740.8	7.2	30	6	299	43.29	0.05

Table 5
H2 Emergency Diesel Generator Stack Parameters

Model ID	X (m)	Y (m)	NO_X Emission Rate (lb/hr)	Stack Height (ft)	Stack Diameter (ft)	Flue Gas Exhaust Temperature (°F)	Flue Gas Exit Velocity (ft/sec)	NO_2/NO_X Ratio
H2GEN	326710.4	4199729.9	1.88	280	0.94	915	288	0.25

Table 6
H2 DFP Booster Pump Stack Parameters

Model ID	X (m)	Y (m)	NO_X Emission Rate (lb/hr)	Stack Height (ft)	Stack Diameter (ft)	Flue Gas Exhaust Temperature (°F)	Flue Gas Exit Velocity (ft/sec)	NO_2/NO_X Ratio
H2FIRE	326,541.5	4,199,760.2	2.31	40	0.94	1,083	45.79	0.32

Table 7
H1 Sources Stack Parameters

Emission Unit	Model ID	X (m)	Y (m)	NO_X Emission Rate (lb/hr)	Stack Height (ft)	Stack Diameter (ft)	Flue Gas Exhaust Temperature (°F)	Flue Gas Exit Velocity (ft/sec)	NO_2/NO_X Ratio
Steam Generator	H1	326,638	4,199,981	1,814.5	475	16.33	180	102.2	0.05
Auxiliary Boiler	H1AUX	326,603.6	4,199,777.7	8.09	67.5	4.5	425	13.6	0.05
Emergency Generator	H1GEN	326,660.5	4,199,753.8	19.2	245	0.83	490	174.2	0.20
New Fire Pump	H1FIRE	326,493.2	4,199,766.1	2.31	40	0.94	1,083	45.8	0.32

Sergio Guerra
Email : sguerra@kdheks.gov
Work #: 785-296-0365

From: Stephanie Salter [mailto:stephanie.salter@wla-consulting.com]
Sent: Friday, June 10, 2011 10:37 AM
To: Mindy Bowman
Cc: Sergio Guerra
Subject: Nearby Summary

I wanted to make sure you received this. If you can please help fill in the equipment description for the NOx sources so that we can apply a NO2/NOx ratio, I would really appreciate it.

Stephanie E. Salter, P.E.

WLA Consulting, Inc.
1640 "L" Street, Suite D | Lincoln, NE 68508
phone (402) 475-8588 | fax (402) 477-1956 | cell (417) 860-7275
e-mail stephanie.salter@WLA-consulting.com

WaterLandAir *"Promises Kept, Solutions Delivered"*

Stephanie Salter

From: Milligan, Eric [Eric.Milligan@deq.ok.gov]
Sent: Monday, May 02, 2011 11:05 AM
To: Stephanie Salter
Subject: RE: Abengoa Bioenergy Hybrid of Kansas
Attachments: ARIES Data(WLA3).xlsx

The spreadsheet you sent was just the additional source that was between 60 and 100 km from the facility and did not include the original data that was forwarded to you early in 2009. Attached is the revised sheet containing the data for the sources of NO2 that meet the criteria to be included in the modeling.

DRAFT & CONFIDENTIAL
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This communication and any response to it may constitute a public record.

-----Original Message-----
From: Stephanie Salter [mailto:stephanie.salter@wla-consulting.com]
Sent: Friday, April 22, 2011 11:20 AM
To: Milligan, Eric
Subject: FW: Abengoa Bioenergy Hybrid of Kansas

Eric,
I am in the process of revising the modeling for the source detailed below and need to request the following from your department:

1. Confirmation that there are no additional NO2 sources

that should be included in our analysis from Oklahoma based on a ROI of 100 km from the approximate facility center: 288200, 4117700.

2. Additional SO2 sources that should also be included in

our analysis from Oklahoma based on a ROI of 100 km from the approximate facility center: 288200, 4117700.

Thank you!

_____
Stephanie Salter

-----Original Message-----
From: Milligan, Eric [mailto:Eric.Milligan@deq.ok.gov]
Sent: Wednesday, September 15, 2010 9:48 AM
To: Stephanie Salter
Subject: RE: Abengoa Bioenergy Hybrid of Kansas

There is only one other facility, which meets the 10D requirement for the state of Oklahoma, within 100 km of the facility. It is listed in the attached workbook. It looks like all sources are natural gas fired engines. These can be 2-cycle or 4-cycle rich or lean burn engines.

DRAFT & CONFIDENTIAL
DO NOT QUOTE OR CITE

This communication and any response to it may constitute a public record.

-----Original Message-----
From: Stephanie Salter [mailto:stephanie.salter@wla-consulting.com]

Sent: Tuesday, September 14, 2010 4:13 PM
To: Milligan, Eric
Subject: FW: Abengoa Bioenergy Hybrid of Kansas

Also, we are modeling using PVMRM, therefore, we will require either the SCC code or equipment description to ascertain the appropriate NOx/NO2 ratio to apply to the source. I can easily assign the NOx/NO2 ratio for the sources you have already provided if you will indicate the fuel type.

Thanks again!

_____
Stephanie Salter

-----Original Message-----
From: Stephanie Salter
Sent: Tuesday, September 14, 2010 4:00 PM
To: 'Milligan, Eric'
Subject: RE: Abengoa Bioenergy Hybrid of Kansas

Eric,
This project has been required to submit 1-hour NO2 modeling. In an effort to demonstrate compliance given the current status of the rule, we are including all nearby sources up to 100 km from the facility. The center UTM cords for the facility are approximately 288243.0, 4117493.5.
Are there any additional sources that we should include besides those in the attached excel file that you have previously provided?

Thanks!

_____
Stephanie Salter

-----Original Message-----
From: Milligan, Eric [mailto:Eric.Milligan@deq.ok.gov]
Sent: Tuesday, December 29, 2009 8:39 AM
To: Stephanie Salter
Subject: RE: Abengoa Bioenergy Hybrid of Kansas

All the sources remain the same. I went out to 60 km on the source review for your facility.

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-----Original Message-----
From: Stephanie Salter [mailto:stephanie.salter@wla-consulting.com]
Sent: Monday, December 28, 2009 11:01 AM
To: Milligan, Eric
Subject: FW: Abengoa Bioenergy Hybrid of Kansas

Eric,
We have refined the model analysis for the referenced facility and the radius of impacts (facility plus 50 km) for PM10 is now 58.5 km. Since this is more than the previous ROI (56.8 km), I wanted to verify that there continued to be no PM10 sources that should be included in our PSD/NAAQS analysis for the facility.

Thank you!

Stephanie E. Salter, P.E.
_____

WLA Consulting, Inc.
1640 "L" Street, Suite D | Lincoln, NE 68508 phone (402) 475-8588 | fax
(402) 477-1956 | cell (417) 860-7275 email stephanie.salter@WLA-consulting.com

---

From: Milligan, Eric [mailto:Eric.Milligan@deq.ok.gov]
Sent: Tuesday, January 20, 2009 12:46 PM
To: Stephanie Salter
Subject: RE: Abengoa Bioenergy Hybrid of Kansas

I talked to Mary and she said to use the system that we currently have in place which is to eliminate any facility whose total emissions are less than 10D.

Attached is the spreadsheet of the sources at any major facility that meet the 10D rule. There were no PM10 or SO2 sources that met that criteria.

However, there were a couple gas plants/compressor stations that did.
If you have any questions please feel free to contact me at (405)
702-4217 or by e-mail.

DRAFT & CONFIDENTIAL
DO NOT QUOTE OR CITE

From: Stephanie Salter [mailto:stephanie.salter@wla-consulting.com]
Sent: Friday, January 16, 2009 11:34 AM
To: Milligan, Eric
Subject: Abengoa Bioenergy Hybrid of Kansas

Eric,

Lee Warden indicated that you were the person I am to work with for development of a nearby source inventory for PSD modeling of a hybrid ethanol plant in Stevens County, KS. Please find attached to this email, a radius of impacts map (which depicts impacts from the facility plus 50 km) and the draft AQIA that was submitted to the Kansas Department of Health and Environment. The pollutants of concern are PM10, NOx and SO2. KDHE has indicated that we must obtain the Oklahoma nearby source information from your department. Please call if you have any questions or concerns.

Stephanie E. Salter, P.E.

WLA Consulting, Inc.

1640 "L" Street, Suite D | Lincoln, NE 68508

phone (402) 475-8588 | fax (402) 477-1956 | cell (417) 860-7275

e-mail stephanie.salter@WLA-consulting.com

WaterLandAir "Promises Kept, Solutions Delivered"

Stephanie Salter

From: Thayer, David [David.Thayer@dphe.state.co.us]
Sent: Friday, April 22, 2011 4:26 PM
To: Stephanie Salter
Subject: RE: Abengoa Bioenergy Hybrid of Kansas
Attachments: Nearby Sources Abengoa Bioenergy Hybrid of Kansas (Definitions).xls; nearby sources abengoa bioenergy hybrid of kansas.xls

I have repeated your previous data extraction to include SO2 emissions. This will also include any new NOx sources that have reported emissions since your last request. You will be invoiced $30 via US mail.

If you have any questions regarding these data please feel free to contact me.

Dave Thayer, Public Health Engineer
Colorado Department of Public Health and Environment Air Pollution Control Division / Stationary Sources Program
david.thayer@state.co.us, Voice:303-692-3187, FAX:303-782-0278

> -----Original Message-----
> From: Stephanie Salter [mailto:stephanie.salter@wla-consulting.com]
> Sent: Friday, April 22, 2011 10:20
> To: Thayer, David
> Subject: FW: Abengoa Bioenergy Hybrid of Kansas
>
> David,
> I am in the process of revising the modeling for the source detailed
> below and need the request the following from your department:
> 1. Confirmation that there are no additional NO2 sources that
> should be included in our analysis from Colorado based on a ROI of 100
> km from the approximate facility center: 288200, 4117700.
> 2. Additional request for SO2 sources that should also be
> included in our analysis from Colorado based on a ROI of 100 km from
> the approximate facility center: 288200, 4117700.
>
> Thank you!
>
> _____
> Stephanie Salter
>
>
> -----Original Message-----
> From: DAVID Thayer [mailto:dmthayer@smtpgate.dphe.state.co.us]
> Sent: Tuesday, September 21, 2010 5:24 PM
> To: Stephanie Salter
> Subject: Re: Abengoa Bioenergy Hybrid of Kansas
>
> I have attached spreadsheets containing the data you requested. You
> will be invoiced $30 via US mail.
>
> If you have any questions regarding these data feel free to contact me.
>
> --
>
> Dave Thayer, Public Health Engineer
> Colorado Department of Public Health and Environment Air Pollution
> Control Division / Stationary Sources Program

> david.thayer@state.co.us, Voice:303-692-3187, FAX:303-782-0278
>
> >>> On Tuesday, September 14, 2010 at 3:15 PM, "Stephanie Salter"
> <stephanie.salter@wla-consulting.com> wrote:
> > Ms. Joyce,
> >
> > I am needing to obtain nearby source inventory data for PSD modeling
> > of a hybrid ethanol plant in Stevens County, KS. The center UTM
> > cords for the facility are approximately 288243.0, 4117493.5.
> >
> > This project has been required to submit 1-hour NO2 modeling. In an
> > effort to demonstrate compliance given the current status of the
> > rule, we are including all nearby sources up to 100 km from the facility.
> > This facility is approximately 60 km from the state line and
> > previously had not had impacts plus 50 km for PSD analysis into CO.
> >
> > Are there any sources in Colorado that we should include in our
> analysis?
> > KDHE has indicated that we are to eliminate any facility whose total
> > emissions are less than the 10D rule. Also, we are modeling using
> > PVMRM, therefore, we will require either the SCC code or equipment
> > description/fuel type to ascertain the appropriate NOx/NO2 ratio to
> apply to the source.
> >
> > Please call if you have any questions or concerns. Thanks!
> >
> >
> > Stephanie E. Salter, P.E.
> > _____
> >
> > WLA Consulting, Inc.
> > 1640 "L" Street, Suite D | Lincoln, NE 68508 phone (402) 475-8588
> > | fax (402) 477-1956 | cell (417) 860-7275 e-mail
> > stephanie.salter@WLA-consulting.com
> >
> > WaterLandAir "Promises Kept, Solutions Delivered"

Stephanie Salter

From: ORTEAM ORTEAM [ORTEAM@tceq.texas.gov]
Sent: Wednesday, May 11, 2011 5:47 PM
To: Stephanie Salter
Subject: Re: PSDB
Attachments: index.cfm.pdf; E-Pay Instructions.pdf; so2iscs.psd; noxiscl.nas; noxiscl.psd; noxiscs.nas; noxiscs.psd; psdb_NOX_L_salt3.txt; psdb_NOX_L_salt4.txt; psdb_NOX_S_salt1.txt; psdb_NOX_S_salt2.txt; psdb_SO2_L_step2.txt; psdb_SO2_L_step4.txt; psdb_SO2_S_step1a.txt; psdb_SO2_S_step3.txt; so2iscl.nas; so2iscl.psd; so2iscs.nas

Please see attached.

TCEQ -IR/CSC/OR&RS-MC 197
PO Box 13087
Austin, Texas 78711-3087
Phone 512-239-0985
Fax 512-239-7106
orteam@tceq.texas.gov
Customer Survey below:
www.tceq.texas.gov/goto/customersurvey

Stephanie Salter

From: Postmaster@tceq.texas.gov on behalf of ORTEAM ORTEAM [ORTEAM@tceq.texas.gov]
Sent: Tuesday, May 03, 2011 5:04 PM
To: Stephanie Salter
Subject: Re: PSDB retrieval information, report #21

Your email has been received and will be processed by ORTEAM Staff Promptly.
>>> stephanie.salter 05/03/11 17:02 >>>

In accordance with the October 31, 2008 TCEQ memo, the following constitutes a PSDB retrieval information, report #21 for the proposed Abengoa Bioenergy Biomass of Kansas, LLC facility to be located near Hugoton, Kansas in Stevens County (approximately 75 km north of the Texas state line).

MEDIA
Data requested through FTP or email to stephanie.salter@wla-consulting.com<mailto:stephanie.salter@wla-consulting.com>

CONSTITUENT
NO2 and SO2
We are modeling NO2 using the PVMRM option, therefore, we will require either the SCC code or equipment description/fuel type to ascertain the appropriate NOx/NO2 ratio to apply to the source.

TYPE
NAAQS and PSD

TERM
Short-term and long-term

SEARCH OPTION
Primary - KDHE has indicated that we are to eliminate any facility whose total emissions are less than the 10D rule.

UTM Zone
Zone 14

CENTER POINT OF RADIUS
288200, 4117700

RADIUS OF IMPACTS
All NO2 and SO2 nearby sources up to 100 km from the center point are requested.

Please call if you have any questions or concerns. Thanks!

Stephanie E. Salter, P.E.

WLA Consulting, Inc.
1640 "L" Street, Suite D | Lincoln, NE 68508 phone (402) 475-8588 | fax (402) 477-1956 | cell (417) 860-7275 e-mail stephanie.salter@WLA-consulting.com

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Appendix E

Dispersion Parameter Calculations and Visibility Analysis Results

Frequency Distribution
12:00am to 05:59am

Stab.Class	Dir	0 - 1 mps	1 - 2 mps	2 - 3 mps	3 - 4 mps	4 - 5 mps	5 - 6 mps	6 - 7 mps	7 - 8 mps	8 - 9 mps	9 - 10 mps	> 10 mps
A	N	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ENE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	E	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ESE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	S	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WSW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	W	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WNW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
B	N	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ENE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	E	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ESE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	S	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WSW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	W	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WNW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Frequency Distribution
12:00am to 05:59am

Stab.Class	Dir	0 - 1 mps	1 - 2 mps	2 - 3 mps	3 - 4 mps	4 - 5 mps	5 - 6 mps	6 - 7 mps	7 - 8 mps	8 - 9 mps	9 - 10 mps	> 10 mps
C	N	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ENE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	E	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ESE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	S	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WSW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	W	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WNW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
D	N	0.009598	0.000277	0.002676	0.007752	0.007198	0.005906	0.007752	0.004799	0.003599	0.003968	0.007475
	NNE	0.000000	0.000461	0.001384	0.005076	0.004614	0.008767	0.007660	0.005076	0.004245	0.003322	0.006829
	NE	0.000000	0.000554	0.003138	0.005168	0.005537	0.009044	0.006921	0.006275	0.002769	0.003045	0.003507
	ENE	0.000000	0.000646	0.002399	0.005629	0.004891	0.006645	0.004061	0.002399	0.001384	0.000738	0.001661
	E	0.000000	0.000738	0.002307	0.004245	0.003691	0.004153	0.002953	0.001107	0.000738	0.000369	0.000554
	ESE	0.000000	0.000185	0.002030	0.004891	0.004430	0.004245	0.003322	0.001569	0.001292	0.000646	0.000461
	SE	0.000000	0.000554	0.002861	0.006921	0.006460	0.014304	0.009413	0.005722	0.003691	0.001477	0.000923
	SSE	0.000000	0.000554	0.006829	0.015412	0.012920	0.022702	0.019195	0.010982	0.005076	0.002492	0.001938
	S	0.000000	0.000646	0.003415	0.012182	0.009967	0.015965	0.011720	0.008306	0.006645	0.003599	0.004983
	SSW	0.000000	0.000646	0.002584	0.009044	0.007475	0.005906	0.002584	0.003599	0.001477	0.001661	0.001661
	SW	0.000000	0.000831	0.004153	0.011351	0.005260	0.002492	0.000646	0.000831	0.000000	0.000277	0.000092
	WSW	0.000000	0.001292	0.005445	0.010890	0.004799	0.001200	0.000369	0.000092	0.000092	0.000092	0.000092
	W	0.000000	0.000646	0.006829	0.013289	0.015227	0.006275	0.001015	0.000369	0.000092	0.000092	0.000277
	WNW	0.000000	0.000738	0.004430	0.014212	0.013566	0.007383	0.001569	0.000461	0.000738	0.000185	0.000554
	NW	0.000000	0.000185	0.002769	0.009413	0.013012	0.010244	0.005445	0.003322	0.002307	0.000646	0.001661
	NNW	0.000000	0.000092	0.001846	0.005999	0.007567	0.008121	0.005076	0.003968	0.003045	0.003599	0.006460

Frequency Distribution
12:00am to 05:59am

Stab.Class	Dir	0 - 1 mps	1 - 2 mps	2 - 3 mps	3 - 4 mps	4 - 5 mps	5 - 6 mps	6 - 7 mps	7 - 8 mps	8 - 9 mps	9 - 10 mps	> 10 mps
E	N	0.012366	0.000554	0.002769	0.002123	0.002769	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNE	0.000000	0.000092	0.001200	0.001384	0.002307	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NE	0.000000	0.000461	0.002030	0.001846	0.003045	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ENE	0.000000	0.000738	0.001753	0.002492	0.001938	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	E	0.000000	0.000831	0.001477	0.002123	0.001846	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ESE	0.000000	0.001107	0.002215	0.004337	0.003876	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SE	0.000000	0.000831	0.005814	0.009228	0.014120	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSE	0.000000	0.001753	0.010982	0.022979	0.023348	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	S	0.000000	0.001477	0.007475	0.014858	0.013197	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSW	0.000000	0.001015	0.005906	0.005999	0.003322	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SW	0.000000	0.001753	0.004061	0.003599	0.001292	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WSW	0.000000	0.001200	0.003415	0.002676	0.001661	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	W	0.000000	0.001200	0.003230	0.003322	0.005076	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WNW	0.000000	0.001107	0.001661	0.002399	0.003230	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NW	0.000000	0.000554	0.001661	0.001292	0.002953	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNW	0.000000	0.000092	0.001477	0.000831	0.001477	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
F	N	0.005722	0.000092	0.000277	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNE	0.000000	0.000092	0.000277	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NE	0.000000	0.000277	0.000277	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ENE	0.000000	0.000092	0.000646	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	E	0.000000	0.000185	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ESE	0.000000	0.000277	0.000277	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SE	0.000000	0.000277	0.000738	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSE	0.000000	0.000369	0.003045	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	S	0.000000	0.000554	0.002215	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSW	0.000000	0.000461	0.000461	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SW	0.000000	0.000461	0.000831	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WSW	0.000000	0.000369	0.000738	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	W	0.000000	0.000092	0.001292	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WNW	0.000000	0.000185	0.000738	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NW	0.000000	0.000277	0.000554	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNW	0.000000	0.000000	0.000369	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Frequency Distribution
12:00am to 05:59am

Stab.Class	Dir	0 - 1 mps	1 - 2 mps	2 - 3 mps	3 - 4 mps	4 - 5 mps	5 - 6 mps	6 - 7 mps	7 - 8 mps	8 - 9 mps	9 - 10 mps	> 10 mps
A	N	0.000645	0.000000	0.000000	0.000092	0.000000	0.000092	0.000276	0.000092	0.000000	0.000000	0.000000
	NNE	0.000000	0.000184	0.000276	0.000092	0.000092	0.000092	0.000000	0.000000	0.000000	0.000092	0.000092
	NE	0.000000	0.000000	0.000000	0.000092	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ENE	0.000000	0.000000	0.000092	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	E	0.000000	0.000000	0.000092	0.000092	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ESE	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SE	0.000000	0.000000	0.000000	0.000276	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSE	0.000000	0.000000	0.000092	0.000092	0.000092	0.000092	0.000000	0.000092	0.000000	0.000000	0.000000
	S	0.000000	0.000000	0.000092	0.000092	0.000368	0.000092	0.000000	0.000000	0.000000	0.000092	0.000092
	SSW	0.000000	0.000000	0.000184	0.000276	0.000000	0.000092	0.000092	0.000000	0.000000	0.000000	0.000000
	SW	0.000000	0.000000	0.000000	0.000000	0.000276	0.000092	0.000092	0.000000	0.000000	0.000000	0.000000
	WSW	0.000000	0.000092	0.000092	0.000092	0.000276	0.000184	0.000000	0.000184	0.000000	0.000000	0.000000
	W	0.000000	0.000092	0.000092	0.000368	0.000092	0.000092	0.000092	0.000000	0.000000	0.000000	0.000000
	WNW	0.000000	0.000000	0.000092	0.000092	0.000184	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NW	0.000000	0.000092	0.000276	0.000460	0.000092	0.000276	0.000000	0.000092	0.000000	0.000000	0.000000
	NNW	0.000000	0.000000	0.000000	0.000184	0.000000	0.000184	0.000184	0.000000	0.000000	0.000092	0.000092
B	N	0.007551	0.000276	0.001473	0.000829	0.001105	0.001842	0.000460	0.000645	0.000184	0.000552	0.001381
	NNE	0.000000	0.000368	0.000829	0.000184	0.001013	0.000552	0.000460	0.000368	0.000276	0.000000	0.000645
	NE	0.000000	0.000276	0.000552	0.000737	0.000368	0.000276	0.000460	0.000092	0.000092	0.000000	0.000092
	ENE	0.000000	0.000000	0.000460	0.000092	0.000368	0.000184	0.000000	0.000092	0.000000	0.000000	0.000000
	E	0.000000	0.000184	0.000276	0.000460	0.000368	0.000276	0.000092	0.000000	0.000092	0.000000	0.000000
	ESE	0.000000	0.000184	0.000276	0.000368	0.000368	0.000000	0.000000	0.000092	0.000000	0.000000	0.000092
	SE	0.000000	0.000000	0.000276	0.000184	0.000460	0.000552	0.000184	0.000276	0.000276	0.000000	0.000368
	SSE	0.000000	0.000000	0.000276	0.000276	0.000552	0.000460	0.000552	0.000000	0.000184	0.000000	0.000092
	S	0.000000	0.000184	0.000737	0.000645	0.000552	0.000645	0.000184	0.000276	0.000460	0.001013	0.000921
	SSW	0.000000	0.000552	0.000552	0.000737	0.000552	0.000829	0.000645	0.000737	0.000368	0.000460	0.000184
	SW	0.000000	0.000184	0.001013	0.000645	0.000921	0.000460	0.000645	0.000092	0.000368	0.000184	0.000368
	WSW	0.000000	0.000829	0.001473	0.001381	0.001013	0.000645	0.000276	0.000276	0.000000	0.000000	0.000092
	W	0.000000	0.000184	0.001657	0.000921	0.001289	0.000737	0.000000	0.000276	0.000000	0.000000	0.000184
	WNW	0.000000	0.000184	0.001565	0.001197	0.001565	0.001289	0.000737	0.000184	0.000000	0.000000	0.000092
	NW	0.000000	0.000276	0.001197	0.002026	0.002210	0.001565	0.000737	0.000276	0.000368	0.000092	0.000000
	NNW	0.000000	0.000276	0.001013	0.001565	0.001934	0.001197	0.001197	0.000552	0.000552	0.000276	0.000000

Frequency Distribution
12:00am to 05:59am

Stab.Class	Dir	0 - 1 mps	1 - 2 mps	2 - 3 mps	3 - 4 mps	4 - 5 mps	5 - 6 mps	6 - 7 mps	7 - 8 mps	8 - 9 mps	9 - 10 mps	> 10 mps
C	N	0.011602	0.000276	0.001381	0.001750	0.001565	0.001473	0.002118	0.001842	0.001565	0.000552	0.003131
	NNE	0.000000	0.000276	0.001197	0.001657	0.002210	0.002026	0.001657	0.001473	0.001289	0.001013	0.002947
	NE	0.000000	0.000092	0.000645	0.001289	0.002118	0.001105	0.001197	0.000921	0.000552	0.000645	0.000737
	ENE	0.000000	0.000184	0.001105	0.001473	0.000829	0.001289	0.000737	0.000460	0.000552	0.000000	0.000184
	E	0.000000	0.000368	0.000645	0.000829	0.000829	0.000829	0.000368	0.000184	0.000000	0.000000	0.000092
	ESE	0.000000	0.000000	0.001289	0.001197	0.000276	0.000368	0.000368	0.000092	0.000092	0.000092	0.000000
	SE	0.000000	0.000368	0.000645	0.001565	0.000737	0.000368	0.000368	0.000184	0.000276	0.000368	0.000368
	SSE	0.000000	0.000092	0.001750	0.001289	0.002210	0.001197	0.001197	0.000552	0.000460	0.000184	0.000368
	S	0.000000	0.000276	0.001381	0.001197	0.001197	0.000737	0.001473	0.001013	0.000552	0.000460	0.000552
	SSW	0.000000	0.000368	0.001381	0.001842	0.001657	0.001934	0.001289	0.001013	0.000645	0.000645	0.001565
	SW	0.000000	0.000276	0.001105	0.001657	0.001381	0.001657	0.000552	0.000737	0.000460	0.000368	0.000276
	WSW	0.000000	0.000368	0.002118	0.002947	0.001657	0.001197	0.000552	0.000276	0.000092	0.000000	0.000276
	W	0.000000	0.000460	0.001842	0.002762	0.002210	0.001842	0.000645	0.000368	0.000092	0.000092	0.000092
	WNW	0.000000	0.000276	0.000737	0.002302	0.002302	0.001197	0.000368	0.000092	0.000000	0.000276	0.000184
	NW	0.000000	0.000276	0.001289	0.001934	0.002578	0.002210	0.001934	0.001013	0.000276	0.000276	0.000276
	NNW	0.000000	0.000276	0.001105	0.001473	0.002210	0.001197	0.001657	0.001105	0.000829	0.000829	0.001750
D	N	0.012983	0.000000	0.001750	0.003499	0.004236	0.004788	0.005249	0.006446	0.005801	0.005249	0.010958
	NNE	0.000000	0.000829	0.001657	0.002855	0.003131	0.006354	0.005341	0.005893	0.004144	0.003867	0.007735
	NE	0.000000	0.000184	0.001473	0.003315	0.002947	0.006446	0.005433	0.004052	0.002578	0.001473	0.002210
	ENE	0.000000	0.000276	0.000921	0.002026	0.002578	0.005249	0.003499	0.002855	0.001565	0.001013	0.000276
	E	0.000000	0.000276	0.001381	0.002486	0.002670	0.002855	0.002302	0.001381	0.000829	0.000368	0.000645
	ESE	0.000000	0.000368	0.001842	0.002302	0.001842	0.002762	0.001934	0.001934	0.001197	0.000460	0.000000
	SE	0.000000	0.000460	0.001105	0.002855	0.003407	0.006814	0.005249	0.003591	0.002210	0.001842	0.001750
	SSE	0.000000	0.000829	0.002302	0.003131	0.003315	0.014917	0.013352	0.006906	0.004880	0.001842	0.002947
	S	0.000000	0.000645	0.002578	0.003591	0.003683	0.013260	0.013812	0.012799	0.009484	0.008564	0.011971
	SSW	0.000000	0.000460	0.002762	0.003775	0.004328	0.009761	0.008564	0.008840	0.007827	0.004880	0.009024
	SW	0.000000	0.000552	0.004328	0.006998	0.004880	0.006169	0.004144	0.002578	0.001842	0.000829	0.001013
	WSW	0.000000	0.000737	0.004328	0.006906	0.004512	0.002670	0.001289	0.000276	0.000000	0.000184	0.000552
	W	0.000000	0.000368	0.003683	0.007827	0.007551	0.005985	0.001657	0.000645	0.000000	0.000000	0.000000
	WNW	0.000000	0.000184	0.002670	0.007090	0.008932	0.005801	0.002670	0.000460	0.000092	0.000184	0.000276
	NW	0.000000	0.000184	0.001565	0.004420	0.006722	0.007274	0.005617	0.003775	0.001750	0.001197	0.002762
	NNW	0.000000	0.000460	0.000737	0.002762	0.003591	0.004696	0.006169	0.005893	0.004328	0.004052	0.010405

Frequency Distribution
12:00am to 05:59am

Stab.Class	Dir	0 - 1 mps	1 - 2 mps	2 - 3 mps	3 - 4 mps	4 - 5 mps	5 - 6 mps	6 - 7 mps	7 - 8 mps	8 - 9 mps	9 - 10 mps	> 10 mps
E	N	0.004420	0.000184	0.000829	0.000645	0.001750	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNE	0.000000	0.000184	0.001013	0.000552	0.001289	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NE	0.000000	0.000276	0.001197	0.001105	0.001842	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ENE	0.000000	0.000368	0.000921	0.001934	0.001934	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	E	0.000000	0.000092	0.000921	0.000921	0.001473	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ESE	0.000000	0.000184	0.000737	0.001934	0.001934	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SE	0.000000	0.000368	0.001473	0.004788	0.003499	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSE	0.000000	0.000368	0.003867	0.010405	0.012431	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	S	0.000000	0.000460	0.003499	0.007827	0.008932	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSW	0.000000	0.000552	0.002486	0.005617	0.005985	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SW	0.000000	0.000921	0.002670	0.003223	0.004236	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WSW	0.000000	0.000184	0.001750	0.001657	0.002118	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	W	0.000000	0.000276	0.001565	0.002578	0.004972	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WNW	0.000000	0.000184	0.000737	0.001289	0.002118	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NW	0.000000	0.000276	0.000460	0.001013	0.001105	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNW	0.000000	0.000184	0.000645	0.000829	0.001289	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
F	N	0.001934	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNE	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ENE	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	E	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ESE	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SE	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSE	0.000000	0.000460	0.001105	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	S	0.000000	0.000184	0.000552	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSW	0.000000	0.000184	0.000552	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SW	0.000000	0.000000	0.000552	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WSW	0.000000	0.000092	0.000276	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	W	0.000000	0.000276	0.000368	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WNW	0.000000	0.000184	0.000276	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NW	0.000000	0.000092	0.000276	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNW	0.000000	0.000092	0.000368	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Frequency Distribution
12:00am to 05:59am

Stab.Class	Dir	0 - 1 mps	1 - 2 mps	2 - 3 mps	3 - 4 mps	4 - 5 mps	5 - 6 mps	6 - 7 mps	7 - 8 mps	8 - 9 mps	9 - 10 mps	> 10 mps
A	N	0.001562	0.000000	0.000459	0.000000	0.000276	0.000184	0.000184	0.000092	0.000092	0.000092	0.000184
	NNE	0.000000	0.000000	0.000000	0.000184	0.000276	0.000184	0.000184	0.000000	0.000000	0.000000	0.000367
	NE	0.000000	0.000000	0.000000	0.000092	0.000000	0.000276	0.000092	0.000184	0.000092	0.000000	0.000092
	ENE	0.000000	0.000000	0.000000	0.000092	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000
	E	0.000000	0.000000	0.000000	0.000000	0.000367	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ESE	0.000000	0.000184	0.000000	0.000276	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SE	0.000000	0.000000	0.000092	0.000184	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSE	0.000000	0.000000	0.000092	0.000459	0.000184	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	S	0.000000	0.000000	0.000092	0.000184	0.000092	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000
	SSW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000092	0.000092	0.000000	0.000000	0.000000
	SW	0.000000	0.000000	0.000184	0.000000	0.000000	0.000000	0.000000	0.000184	0.000000	0.000000	0.000000
	WSW	0.000000	0.000000	0.000000	0.000000	0.000276	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000
	W	0.000000	0.000092	0.000000	0.000184	0.000092	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000
	WNW	0.000000	0.000000	0.000000	0.000184	0.000092	0.000184	0.000000	0.000000	0.000184	0.000000	0.000000
	NW	0.000000	0.000000	0.000276	0.000459	0.000367	0.000000	0.000092	0.000000	0.000092	0.000000	0.000000
	NNW	0.000000	0.000000	0.000000	0.000000	0.000276	0.000000	0.000184	0.000000	0.000000	0.000000	0.000000
B	N	0.017180	0.000000	0.000827	0.000827	0.001011	0.001194	0.001286	0.000459	0.000643	0.000459	0.002572
	NNE	0.000000	0.000000	0.000184	0.000919	0.001102	0.001378	0.000735	0.000643	0.000367	0.000551	0.002389
	NE	0.000000	0.000000	0.000827	0.001378	0.001286	0.001194	0.000919	0.000551	0.000367	0.000184	0.000184
	ENE	0.000000	0.000092	0.000367	0.000643	0.001011	0.000551	0.000367	0.000092	0.000184	0.000092	0.000000
	E	0.000000	0.000000	0.000367	0.000827	0.000643	0.000551	0.000367	0.000184	0.000092	0.000000	0.000000
	ESE	0.000000	0.000184	0.000827	0.000459	0.000643	0.000459	0.000276	0.000184	0.000092	0.000000	0.000000
	SE	0.000000	0.000000	0.000551	0.000643	0.000827	0.001011	0.000184	0.000459	0.000276	0.000092	0.000000
	SSE	0.000000	0.000184	0.000919	0.000827	0.001102	0.001011	0.000276	0.000551	0.000551	0.000092	0.000092
	S	0.000000	0.000184	0.000735	0.001011	0.000827	0.001194	0.001011	0.000919	0.000276	0.000276	0.000184
	SSW	0.000000	0.000000	0.000735	0.001102	0.000827	0.001470	0.000827	0.000827	0.000459	0.000643	0.000276
	SW	0.000000	0.000092	0.000735	0.001378	0.000735	0.000184	0.000184	0.000092	0.000367	0.000184	0.000827
	WSW	0.000000	0.000000	0.000276	0.000459	0.001011	0.000367	0.000092	0.000276	0.000000	0.000000	0.000184
	W	0.000000	0.000000	0.000367	0.000919	0.000643	0.000184	0.000092	0.000367	0.000092	0.000184	0.000276
	WNW	0.000000	0.000000	0.000092	0.000919	0.000827	0.000551	0.000276	0.000276	0.000092	0.000000	0.000092
	NW	0.000000	0.000276	0.000276	0.001011	0.001194	0.000827	0.000643	0.000367	0.000092	0.000092	0.000367
	NNW	0.000000	0.000000	0.000367	0.001286	0.001102	0.000276	0.000827	0.000919	0.000827	0.000276	0.000919

Frequency Distribution
12:00am to 05:59am

Stab.Class	Dir	0 - 1 mps	1 - 2 mps	2 - 3 mps	3 - 4 mps	4 - 5 mps	5 - 6 mps	6 - 7 mps	7 - 8 mps	8 - 9 mps	9 - 10 mps	> 10 mps
C	N	0.021406	0.000092	0.000919	0.001011	0.000919	0.002389	0.001011	0.002389	0.001929	0.001746	0.002664
	NNE	0.000000	0.000000	0.000551	0.000735	0.001378	0.001011	0.002297	0.002205	0.001746	0.001286	0.002480
	NE	0.000000	0.000092	0.000367	0.001562	0.001654	0.002113	0.001746	0.001470	0.001011	0.000919	0.000459
	ENE	0.000000	0.000092	0.000735	0.001011	0.001470	0.001194	0.000735	0.000276	0.000367	0.000276	0.000551
	E	0.000000	0.000184	0.000827	0.001286	0.001378	0.001378	0.000276	0.000184	0.000276	0.000092	0.000000
	ESE	0.000000	0.000367	0.000919	0.002389	0.001102	0.000919	0.001011	0.000000	0.000276	0.000000	0.000092
	SE	0.000000	0.000184	0.001102	0.002480	0.001102	0.002021	0.000827	0.000551	0.000000	0.000551	0.000184
	SSE	0.000000	0.000092	0.000827	0.003032	0.002113	0.001837	0.001286	0.001286	0.000459	0.000735	0.000459
	S	0.000000	0.000000	0.001378	0.001929	0.003767	0.002664	0.002940	0.001378	0.002297	0.001102	0.002297
	SSW	0.000000	0.000092	0.000919	0.001378	0.002572	0.003491	0.002297	0.001654	0.002021	0.001102	0.002664
	SW	0.000000	0.000000	0.000643	0.001929	0.001562	0.001286	0.002113	0.001654	0.000827	0.000367	0.001194
	WSW	0.000000	0.000000	0.000551	0.001378	0.001378	0.001378	0.000827	0.000643	0.000459	0.000367	0.000276
	W	0.000000	0.000092	0.000367	0.001011	0.001102	0.000827	0.000184	0.000092	0.000184	0.000000	0.000459
	WNW	0.000000	0.000000	0.000459	0.000919	0.001011	0.000643	0.000367	0.000459	0.000184	0.000367	0.000551
	NW	0.000000	0.000184	0.000827	0.001378	0.001562	0.001562	0.001011	0.001378	0.000459	0.000643	0.001102
	NNW	0.000000	0.000184	0.000459	0.001654	0.002021	0.001562	0.001194	0.001011	0.001470	0.000643	0.003215
D	N	0.016353	0.000000	0.000735	0.001654	0.003032	0.005420	0.006798	0.005972	0.004961	0.005420	0.012311
	NNE	0.000000	0.000000	0.000643	0.001837	0.002664	0.004869	0.004318	0.005604	0.005053	0.003124	0.007166
	NE	0.000000	0.000000	0.001011	0.002021	0.002021	0.006706	0.005880	0.004226	0.003491	0.001929	0.001011
	ENE	0.000000	0.000092	0.000735	0.002572	0.002572	0.004410	0.004777	0.002572	0.001562	0.001286	0.000735
	E	0.000000	0.000092	0.000735	0.002480	0.002021	0.004318	0.003307	0.002113	0.001470	0.001102	0.000092
	ESE	0.000000	0.000000	0.001194	0.003583	0.003124	0.004502	0.002940	0.001470	0.001194	0.001378	0.000735
	SE	0.000000	0.000184	0.001470	0.002848	0.003583	0.006247	0.005972	0.005145	0.004318	0.003215	0.003859
	SSE	0.000000	0.000184	0.001562	0.003859	0.003859	0.013137	0.013505	0.015434	0.012311	0.007625	0.011484
	S	0.000000	0.000184	0.001470	0.003950	0.005328	0.012494	0.016812	0.018741	0.017455	0.015710	0.037483
	SSW	0.000000	0.000000	0.001194	0.003583	0.004961	0.007993	0.008728	0.009554	0.009646	0.007533	0.016996
	SW	0.000000	0.000092	0.001562	0.004318	0.002940	0.004777	0.004226	0.002756	0.001929	0.001746	0.002572
	WSW	0.000000	0.000092	0.000827	0.002205	0.001837	0.004134	0.001837	0.000735	0.000827	0.000367	0.000551
	W	0.000000	0.000092	0.000919	0.002572	0.002297	0.002848	0.001837	0.001011	0.000735	0.000459	0.000735
	WNW	0.000000	0.000184	0.000367	0.001286	0.002021	0.002297	0.002389	0.001286	0.000459	0.000551	0.000643
	NW	0.000000	0.000276	0.000919	0.001929	0.001929	0.002848	0.002113	0.002297	0.002205	0.001654	0.006063
	NNW	0.000000	0.000000	0.000827	0.001562	0.002297	0.004410	0.005972	0.005237	0.005420	0.004042	0.013505

Frequency Distribution
12:00am to 05:59am

Stab.Class	Dir	0 - 1 mps	1 - 2 mps	2 - 3 mps	3 - 4 mps	4 - 5 mps	5 - 6 mps	6 - 7 mps	7 - 8 mps	8 - 9 mps	9 - 10 mps	> 10 mps
E	N	0.005788	0.000092	0.000367	0.000367	0.001654	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNE	0.000000	0.000184	0.000459	0.001286	0.001194	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NE	0.000000	0.000092	0.000643	0.001470	0.001194	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ENE	0.000000	0.000092	0.000276	0.001562	0.001470	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	E	0.000000	0.000367	0.000367	0.001011	0.001011	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ESE	0.000000	0.000092	0.000551	0.000551	0.000827	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SE	0.000000	0.000092	0.000367	0.001011	0.001654	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSE	0.000000	0.000276	0.000459	0.002297	0.004318	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	S	0.000000	0.000184	0.000276	0.001654	0.003215	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSW	0.000000	0.000092	0.000551	0.001011	0.002756	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SW	0.000000	0.000000	0.000184	0.000735	0.002021	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WSW	0.000000	0.000000	0.000551	0.000276	0.001562	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	W	0.000000	0.000000	0.000276	0.001102	0.001929	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WNW	0.000000	0.000000	0.000551	0.000827	0.000735	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NW	0.000000	0.000000	0.000551	0.000735	0.000643	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNW	0.000000	0.000092	0.000092	0.000367	0.000735	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
F	N	0.001194	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNE	0.000000	0.000092	0.000184	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NE	0.000000	0.000184	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ENE	0.000000	0.000092	0.000184	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	E	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ESE	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SE	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSE	0.000000	0.000000	0.000276	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	S	0.000000	0.000000	0.000184	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSW	0.000000	0.000092	0.000276	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SW	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WSW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	W	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WNW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNW	0.000000	0.000092	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Frequency Distribution
12:00am to 05:59am

Stab.Class	Dir	0 - 1 mps	1 - 2 mps	2 - 3 mps	3 - 4 mps	4 - 5 mps	5 - 6 mps	6 - 7 mps	7 - 8 mps	8 - 9 mps	9 - 10 mps	> 10 mps
A	N	0.000000	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000
	NE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ENE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	E	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ESE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	S	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WSW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000
	W	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WNW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NW	0.000000	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
B	N	0.000184	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000092	0.000184	0.000000	0.000000
	NNE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NE	0.000000	0.000000	0.000000	0.000000	0.000092	0.000000	0.000092	0.000000	0.000000	0.000000	0.000092
	ENE	0.000000	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000092	0.000000	0.000000
	E	0.000000	0.000000	0.000000	0.000092	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000
	ESE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000092	0.000092	0.000000	0.000092	0.000000	0.000000
	SE	0.000000	0.000000	0.000092	0.000000	0.000184	0.000000	0.000092	0.000000	0.000092	0.000000	0.000000
	SSE	0.000000	0.000000	0.000000	0.000184	0.000092	0.000184	0.000000	0.000000	0.000000	0.000000	0.000000
	S	0.000000	0.000092	0.000092	0.000369	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSW	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SW	0.000000	0.000000	0.000092	0.000092	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WSW	0.000000	0.000000	0.000092	0.000092	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	W	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WNW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000
	NW	0.000000	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000

Frequency Distribution
12:00am to 05:59am

Stab.Class	Dir	0 - 1 mps	1 - 2 mps	2 - 3 mps	3 - 4 mps	4 - 5 mps	5 - 6 mps	6 - 7 mps	7 - 8 mps	8 - 9 mps	9 - 10 mps	> 10 mps
C	N	0.000184	0.000000	0.000092	0.000092	0.000092	0.000000	0.000000	0.000000	0.000092	0.000000	0.000000
	NNE	0.000000	0.000000	0.000092	0.000000	0.000092	0.000000	0.000184	0.000092	0.000000	0.000000	0.000276
	NE	0.000000	0.000000	0.000000	0.000092	0.000000	0.000000	0.000000	0.000092	0.000000	0.000092	0.000000
	ENE	0.000000	0.000000	0.000092	0.000184	0.000092	0.000092	0.000092	0.000092	0.000000	0.000000	0.000092
	E	0.000000	0.000000	0.000000	0.000000	0.000184	0.000184	0.000184	0.000000	0.000000	0.000000	0.000000
	ESE	0.000000	0.000000	0.000000	0.000092	0.000000	0.000000	0.000184	0.000092	0.000184	0.000000	0.000000
	SE	0.000000	0.000000	0.000000	0.000092	0.000092	0.000000	0.000092	0.000000	0.000000	0.000092	0.000092
	SSE	0.000000	0.000000	0.000092	0.000276	0.000276	0.000369	0.000092	0.000092	0.000184	0.000000	0.000000
	S	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000184	0.000092	0.000092	0.000092	0.000000
	SSW	0.000000	0.000000	0.000092	0.000000	0.000184	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SW	0.000000	0.000000	0.000000	0.000184	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000092
	WSW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	W	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WNW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000092	0.000184	0.000184	0.000000	0.000000	0.000000
D	N	0.007556	0.000184	0.002212	0.007648	0.006543	0.007188	0.004884	0.003962	0.004331	0.003225	0.008662
	NNE	0.000000	0.000276	0.001935	0.004884	0.005990	0.009583	0.006082	0.005529	0.004147	0.003502	0.006819
	NE	0.000000	0.000553	0.003502	0.008109	0.010229	0.010966	0.008386	0.004423	0.002949	0.001935	0.003778
	ENE	0.000000	0.000829	0.003594	0.009031	0.008662	0.007003	0.005713	0.003686	0.002672	0.002304	0.001751
	E	0.000000	0.000921	0.004055	0.009491	0.010874	0.006082	0.003870	0.001474	0.001290	0.001198	0.000645
	ESE	0.000000	0.001014	0.004055	0.011426	0.014191	0.010413	0.006174	0.003041	0.001751	0.001198	0.001659
	SE	0.000000	0.000369	0.003502	0.017785	0.021471	0.029948	0.019536	0.013822	0.007556	0.004055	0.003225
	SSE	0.000000	0.001106	0.007188	0.018245	0.015942	0.026815	0.024788	0.018706	0.012993	0.009307	0.009399
	S	0.000000	0.000461	0.003686	0.012809	0.011150	0.010966	0.011242	0.007648	0.005252	0.003502	0.010136
	SSW	0.000000	0.000461	0.004423	0.007556	0.003317	0.004055	0.002212	0.002304	0.002027	0.001290	0.001843
	SW	0.000000	0.000184	0.003594	0.004423	0.002119	0.001106	0.000737	0.000461	0.000737	0.000276	0.001014
	WSW	0.000000	0.000829	0.002488	0.002857	0.002212	0.001382	0.000461	0.000276	0.000461	0.000092	0.000461
	W	0.000000	0.000184	0.001751	0.003410	0.002488	0.002488	0.000184	0.000461	0.000184	0.000276	0.000921
	WNW	0.000000	0.000000	0.001198	0.002672	0.003317	0.001106	0.000737	0.000276	0.000184	0.000461	0.000553
	NW	0.000000	0.000184	0.001382	0.003317	0.004515	0.005345	0.002119	0.001198	0.000737	0.000737	0.001290
	NNW	0.000000	0.000184	0.001567	0.004147	0.005437	0.007556	0.003962	0.002488	0.003410	0.001382	0.005529

Frequency Distribution
12:00am to 05:59am

Stab.Class	Dir	0 - 1 mps	1 - 2 mps	2 - 3 mps	3 - 4 mps	4 - 5 mps	5 - 6 mps	6 - 7 mps	7 - 8 mps	8 - 9 mps	9 - 10 mps	> 10 mps
E	N	0.010321	0.000461	0.002027	0.002119	0.003502	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNE	0.000000	0.000276	0.002304	0.003317	0.002949	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NE	0.000000	0.000645	0.002764	0.003502	0.004239	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ENE	0.000000	0.000829	0.003594	0.002212	0.002857	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	E	0.000000	0.000461	0.002119	0.002672	0.002488	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ESE	0.000000	0.000645	0.002672	0.003686	0.003041	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SE	0.000000	0.000645	0.002304	0.004515	0.013085	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSE	0.000000	0.000921	0.004607	0.012440	0.018614	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	S	0.000000	0.000737	0.003041	0.004423	0.005990	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSW	0.000000	0.000737	0.002580	0.001659	0.001935	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SW	0.000000	0.001106	0.002396	0.001935	0.001382	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WSW	0.000000	0.000369	0.002304	0.002212	0.001843	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	W	0.000000	0.000737	0.000829	0.002304	0.003594	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WNW	0.000000	0.000184	0.000645	0.001935	0.004147	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NW	0.000000	0.000553	0.001567	0.003041	0.005529	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNW	0.000000	0.000276	0.001751	0.001843	0.006450	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
F	N	0.004239	0.000092	0.000737	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNE	0.000000	0.000092	0.000737	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NE	0.000000	0.000276	0.000553	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ENE	0.000000	0.000369	0.000461	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	E	0.000000	0.000276	0.000645	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	ESE	0.000000	0.000092	0.000829	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SE	0.000000	0.000737	0.000921	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSE	0.000000	0.001014	0.001935	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	S	0.000000	0.000461	0.001014	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SSW	0.000000	0.000184	0.000645	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	SW	0.000000	0.000369	0.000369	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WSW	0.000000	0.000000	0.000184	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	W	0.000000	0.000092	0.000184	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	WNW	0.000000	0.000000	0.000184	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NW	0.000000	0.000092	0.000184	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NNW	0.000000	0.000276	0.000369	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Pasquill-Gifford Calculations

Pasquill-Gifford horizontal diffusion coefficient = σ_y

Pasquill-Gifford vertical diffusion coefficient = σ_z

Wind speed for the given wind speed category = u

Cimarron National Grasslands

$\sigma_y = 465.11628\ (x)\ \tan(TH)$	
σy for D class	1179.69
σy for E class	883.38
σy for F class	588.25

Hugoton Municipal Airport

$\sigma_y = 465.11628\ (x)\ \tan(TH)$	
σy for D class	55.57
σy for E class	41.55
σy for F class	27.63

Cimarron National Grasslands

$\sigma_z = ax^b$	
σz for D class	221.37
σz for E class	117.06
σz for F class	64.00

Hugoton Municipal Airport

$\sigma_z = ax^b$	
σz for D class	26.78
σz for E class	18.27
σz for F class	11.98

Table E-1 from User's Guide Updated Pages

Table 1-1 User's Guide for the Industrial Source Complex (ISC2) Dispersion Models, Volume II - Description of Model Algorithms (EPA-450/4-92-008b)

Parameters Used to Calculate Pasquill-Gifford σ_y

Pasquill Stability Category	$\sigma_y = 465.11628\ (x)\ \tan(TH)$ $TH = 0.017453293\ [c - d\ \ln(x)]$	
	c	d
A	24.1670	2.5334
B	18.3330	1.8096
C	12.5000	1.0857
D	8.3330	0.7238
E	6.2500	0.5429
F	4.1667	0.3619

Where σ_y is in meters and x is in kilometers

Table E-2 from User's Guide Updated Pages

Table 1-2 User's Guide for the Industrial Source Complex (ISC2) Dispersion Models, Volume II - Description of Model Algorithms (EPA-450/4-92-008b)

Parameters Used to Calculate Pasquill-Gifford σ_z

Pasquill Stability Category	$\sigma_z = ax^b$			Pasquill Stability Category	$\sigma_z = ax^b$		
	x (km)	a	b		x (km)	a	b
A*	<0.10	122.800	0.9447	E	<0.10	24.260	0.83660
	0.10-0.15	158.080	1.0542		0.10-0.30	23.331	0.81956
	0.16-0.2	170.220	1.0932		0.31-1.00	21.628	0.75660
	0.21-0.25	179.520	1.1262		1.01-2.00	21.628	0.63077
	0.26-0.30	217.410	1.2644		2.01-4.00	22.534	0.57154
	0.31-0.40	258.890	1.4094		4.01-10.00	24.703	0.50527
	0.41-0.50	346.750	1.7283		1.01-20.00	26.970	0.46713
	0.51-3.11	453.850	2.1166		20.01-40.00	35.420	0.37615
	>3.11	**	**		>40.00	47.618	0.29592
B*	<0.20	90.673	0.93198	F	<0.20	15.209	0.81558
	0.21-0.40	98.483	0.98332		0.21-0.70	14.457	0.78407
	>0.40	109.300	1.09710		0.71-1.00	13.953	0.68465
C*	All	61.141	0.91465		1.01-2.00	13.953	0.63227
D	<0.30	34.459	0.86974		2.01-3.00	14.823	0.54503
	0.31-1.00	32.093	0.81066		3.01-7.00	16.187	0.46490
	1.01-3.00	32.093	0.64403		7.01-15.00	17.836	0.41507
	3.01-10.00	33.504	0.60486		15.01-30.00	22.651	0.32681
	10.01-30.00	36.650	0.56589		30.01-60.00	27.074	0.27436
	>30.00	44.053	0.51179		>60.00	32.219	0.21716

* If calculated value of σ_z exceeds 5000 m, σ_z is set to 5000 m.

** σ_z is equal to 5000 m.

Cimarron National Grasslands

Distance 24 km

Stability Class	σ_y (m)	σ_z (m)	$\sigma_y\sigma_z$
D	1179.69	221.37	2.61E+05
E	883.38	117.06	1.03E+05
F	588.25	64.00	3.76E+04

Wind Speed Category (m/s)	u Midpoint of Category (m/s)	Stability Class		
		D	E	F
0-1	0.5	1.31E+05	5.17E+04	1.88E+04
1-2	1.5	3.92E+05	1.55E+05	5.65E+04
2-3	2.5	6.53E+05	2.59E+05	9.41E+04
3-4	3.5	9.14E+05	3.62E+05	--
4-5	4.5	1.18E+06	4.65E+05	--
5-6	5.5	1.44E+06	--	--

Hugoton Municipal Airport

Distance 0.8 km

Stability Class	σ_y (m)	σ_z (m)	$\sigma_y\sigma_z$
D	55.57	26.78	1.49E+03
E	41.55	18.27	7.59E+02
F	27.63	11.98	3.31E+02

Wind Speed Category (m/s)	u Midpoint of Category (m/s)	Stability Class		
		D	E	F
0-1	0.5	7.44E+02	3.79E+02	1.65E+02
1-2	1.5	2.23E+03	1.14E+03	4.96E+02
2-3	2.5	3.72E+03	1.90E+03	8.27E+02
3-4	3.5	5.21E+03	2.66E+03	--
4-5	4.5	6.70E+03	3.42E+03	--

Trajectory Distance Calculations

Cimarron National Grasslands
Distance 24 km

Wind Speed Category (m/s)	Midpoint of Category (m/s)	Transport Time (Hours)
0-1	0.5	13.3
1-2	1.5	4.4
2-3	2.5	2.7
3-4	3.5	1.9
4-5	4.5	1.5
5-6	5.5	1.2

Hugoton Municipal Airport
Distance 0.8 km

Wind Speed Category (m/s)	Midpoint of Category (m/s)	Transport Time (Hours)
0-1	0.5	0.44
1-2	1.5	0.15
2-3	2.5	0.09
3-4	3.5	0.06
4-5	4.5	0.05

Visual Effects Screening Analysis for
Source: Abengoa Bioenergy
Class I Area: Hugoton Municipal Airpor

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	77.00	TON/YR
NOx (as NO2)	687.34	TON/YR
Primary NO2	.00	TON/YR
Soot	.00	TON/YR
Primary SO4	.00	TON/YR

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.03 ppm
Background Visual Range:	60.00 km
Source-Observer Distance:	.80 km
Min. Source-Class I Distance:	.80 km
Max. Source-Class I Distance:	2.60 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	5
Wind Speed:	4.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	164.	2.6	5.	4.00	20.214*	.10	-.011
SKY	140.	164.	2.6	5.	4.00	9.091*	.10	-.099
TERRAIN	10.	164.	2.6	5.	4.00	24.317*	.10	.116*
TERRAIN	140.	164.	2.6	5.	4.00	5.460*	.10	.040

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	5.	.2	164.	4.00	6.150*	.10	.086
SKY	140.	5.	.2	164.	4.00	3.130	.10	-.068
TERRAIN	10.	5.	.2	164.	4.00	47.183*	.10	.179*
TERRAIN	140.	5.	.2	164.	4.00	6.914*	.10	.050

```
"Abengoa Bioenergy       "
"Hugoton Municipal Airpor"
    5    5
    77.000   687.340      .000      .000      .000
      .800      .800     2.600    60.000
    1     1.500    3
    1     2.500    8
    1     2.500    6
    1     2.000    1
    1     1.500    4
    1      .040     1.000    6
    1    11.250
 34
  1 0     5.0  163.8     .2     .6     .7 2.19   .050   2.00  25.44   2.00  13.57   2.00  97.23   2.00  22.92
  2 0    10.0  158.8     .4     .4     .6 3.98   .050   2.00  16.94   2.00   8.89   2.00  84.15   2.00  16.79
  3 0    15.0  153.8     .5     .4     .5 5.64   .050   2.15  12.97   2.00   6.77   2.00  76.15   2.00  14.02
  4 0    20.0  148.8     .5     .3     .5 7.21   .050   2.67  10.63   2.00   5.54   2.00  70.56   2.00  12.38
  5 0    25.0  143.8     .6     .3     .4 8.69   .053   3.16   9.09   2.00   4.74   2.00  66.36   2.00  11.26
  6 0    30.0  138.8     .6     .2     .410.08   .060   3.62   8.00   2.00   4.17   2.00  63.07   2.00  10.45
  7 0    35.0  133.8     .6     .2     .411.38   .068   4.07   7.19   2.00   3.76   2.00  60.41   2.00   9.82
  8 0    40.0  128.8     .7     .2     .312.57   .075   4.49   6.58   2.00   3.44   2.00  58.23   2.00   9.33
  9 0    45.0  123.8     .7     .2     .313.66   .082   4.87   6.11   2.00   3.20   2.00  56.41   2.00   8.93
 10 0    50.0  118.8     .7     .2     .314.64   .088   5.21   5.74   2.00   3.01   2.00  54.87   2.00   8.60
 11 0    55.0  113.8     .7     .2     .315.50   .093   5.50   5.45   2.00   2.86   2.00  53.57   2.00   8.32
 12 0    60.0  108.8     .7     .2     .316.23   .097   5.76   5.22   2.05   2.74   2.00  52.47   2.00   8.09
 13 0    65.0  103.8     .7     .2     .316.85   .101   5.97   5.05   2.13   2.66   2.00  51.53   2.00   7.89
 14 0    70.0   98.8     .8     .2     .317.34   .104   6.14   4.93   2.19   2.59   2.00  50.74   2.00   7.73
 15 0    75.0   93.8     .8     .2     .317.70   .106   6.26   4.84   2.23   2.55   2.00  50.07   2.00   7.59
 16 0    80.0   88.8     .8     .2     .317.93   .108   6.34   4.79   2.26   2.53   2.00  49.51   2.00   7.47
 17 1    85.0   83.8     .8     .2     .318.03   .108   6.37   4.78   2.27   2.53   2.00  49.06   2.00   7.37
 18 1    90.0   78.8     .8     .2     .318.00   .108   6.36   4.80   2.27   2.54   2.00  48.70   2.00   7.28
 19 1    95.0   73.8     .8     .2     .317.84   .107   6.31   4.86   2.25   2.58   2.00  48.41   2.00   7.21
 20 1   100.0   68.8     .8     .2     .417.55   .105   6.21   4.96   2.22   2.64   2.00  48.20   2.00   7.15
 21 1   105.0   63.8     .9     .2     .417.14   .103   6.07   5.10   2.17   2.72   2.00  48.04   2.00   7.11
 22 1   110.0   58.8     .9     .2     .416.59   .100   5.88   5.28   2.10   2.82   2.00  47.94   2.00   7.07
 23 1   115.0   53.8     .9     .2     .515.92   .096   5.65   5.53   2.02   2.96   2.00  47.86   2.00   7.03
 24 1   120.0   48.8     .9     .2     .515.13   .091   5.38   5.84   2.00   3.14   2.00  47.78   2.00   7.00
 25 1   125.0   43.8     .9     .2     .614.21   .085   5.06   6.24   2.00   3.37   2.00  47.66   2.00   6.95
 26 1   130.0   38.8    1.0     .2     .713.19   .079   4.70   6.76   2.00   3.66   2.00  47.42   2.00   6.89
 27 1   135.0   33.8    1.0     .3     .812.04   .072   4.31   7.43   2.00   4.05   2.00  46.93   2.00   6.78
 28 1   140.0   28.8    1.1     .3    1.010.80   .065   3.87   8.33   2.00   4.56   2.00  45.91   2.00   6.58
 29 1   145.0   23.8    1.1     .4    1.4 9.44   .057   3.41   9.59   2.00   5.29   2.00  43.73   2.00   6.20
 30 1   150.0   18.8    1.2     .5    2.3 7.99   .050   2.93  11.45   2.00   6.36   2.00  38.61   2.00   5.35
 31 1   155.0   13.8    1.4     .7    7.0 6.44   .050   2.41  14.52   2.00   8.10   2.00  22.79   2.00   2.97
 32 1   132.8   35.9    1.0     .3     .712.56   .075   4.48   7.11   2.00   3.87   2.00  47.19   2.00   6.83
 33 1    84.4   84.4     .8     .2     .318.02   .108   6.37   4.78   2.27   2.53   2.00  49.11   2.00   7.38
 34 1   163.8    4.9    2.6    1.8    1.8 3.31   .050   2.00  32.67   2.00  16.77   2.00  65.39   2.00  15.30
 34
  1 0   5.000   .050   .408   .636  -.302   .308   .237   .680  -.499   .298   .382   .609  -.202   .348
  2 0  10.000   .050   .261   .458  -.197   .170   .153   .497  -.349   .150   .242   .431  -.128   .201
  3 0  15.000   .050   .194   .363  -.149   .119   .113   .396  -.273   .101   .180   .338  -.096   .144
  4 0  20.000   .050   .156   .303  -.121   .093   .089   .332  -.227   .076   .145   .281  -.077   .113
  5 0  25.000   .053   .132   .262  -.103   .077   .074   .287  -.195   .062   .122   .242  -.065   .094
  6 0  30.000   .060   .114   .232  -.090   .066   .063   .255  -.173   .052   .106   .214  -.057   .081
```

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  7 0  35.000   .068   .102   .210  -.080   .058   .055   .231  -.156   .046   .095   .193  -.051   .072
  8 0  40.000   .075   .092   .193  -.073   .052   .049   .212  -.144   .041   .086   .177  -.046   .065
  9 0  45.000   .082   .085   .179  -.068   .048   .045   .197  -.134   .037   .079   .164  -.042   .060
 10 0  50.000   .088   .079   .168  -.064   .045   .041   .185  -.126   .035   .074   .154  -.040   .056
 11 0  55.000   .093   .075   .160  -.060   .042   .039   .176  -.120   .032   .070   .146  -.037   .052
 12 0  60.000   .097   .072   .153  -.058   .040   .036   .168  -.115   .031   .067   .140  -.036   .050
 13 0  65.000   .101   .069   .148  -.056   .038   .035   .163  -.112   .030   .064   .135  -.034   .048
 14 0  70.000   .104   .067   .144  -.054   .037   .033   .158  -.109   .029   .063   .131  -.033   .047
 15 0  75.000   .106   .065   .141  -.053   .036   .032   .155  -.107   .028   .061   .129  -.033   .046
 16 0  80.000   .108   .064   .140  -.053   .036   .031   .153  -.106   .028   .061   .127  -.032   .045
 17 1  85.000   .108   .064   .139  -.052   .036   .031   .152  -.106   .027   .060   .126  -.032   .045
 18 1  90.000   .108   .064   .139  -.053   .036   .030   .153  -.107   .027   .060   .127  -.032   .045
 19 1  95.000   .107   .064   .140  -.053   .036   .030   .154  -.108   .028   .061   .128  -.033   .045
 20 1 100.000   .105   .065   .142  -.054   .037   .030   .156  -.110   .028   .062   .129  -.033   .046
 21 1 105.000   .103   .067   .145  -.056   .038   .030   .159  -.113   .029   .063   .132  -.034   .047
 22 1 110.000   .100   .069   .149  -.057   .039   .030   .164  -.117   .030   .065   .136  -.035   .049
 23 1 115.000   .096   .071   .155  -.060   .041   .031   .170  -.123   .032   .068   .141  -.037   .051
 24 1 120.000   .091   .075   .162  -.063   .043   .031   .177  -.130   .033   .072   .148  -.038   .053
 25 1 125.000   .085   .079   .170  -.067   .046   .032   .187  -.138   .036   .076   .156  -.041   .057
 26 1 130.000   .079   .085   .181  -.073   .049   .033   .198  -.150   .039   .082   .166  -.044   .061
 27 1 135.000   .072   .092   .194  -.080   .054   .034   .212  -.164   .043   .089   .179  -.048   .066
 28 1 140.000   .065   .101   .211  -.089   .060   .034   .229  -.183   .049   .099   .195  -.053   .074
 29 1 145.000   .057   .113   .230  -.101   .067   .033   .248  -.209   .056   .112   .214  -.060   .083
 30 1 150.000   .050   .129   .247  -.119   .076   .029   .262  -.247   .065   .129   .234  -.071   .093
 31 1 155.000   .050   .150   .216  -.147   .071   .015   .203  -.305   .058   .156   .218  -.086   .092
 32 1 132.820   .075   .089   .188  -.076   .052   .033   .206  -.157   .041   .086   .173  -.046   .064
 33 1  84.375   .108   .064   .139  -.052   .036   .031   .152  -.106   .027   .060   .126  -.032   .045
 34 1 163.836   .050   .175   .478  -.276   .223  -.160   .570  -.548   .336   .248   .445  -.145   .231
"Abengoa Bioenergy       "
"Hugoton Municipal Airpor"
    5    5
    77.000   687.340      .000      .000      .000
      .800      .800     2.600    60.000
    1     1.500    3
    1     2.500    8
    1     2.500    6
    1     2.000    1
    1     1.500    4
    1      .040     1.000    6
    1    11.250
 34
  1 0     5.0  163.8     .2     .6     .7 2.19   .050   2.00  25.44   2.00  13.57   2.00  97.23   2.00  22.92
  2 0    10.0  158.8     .4     .4     .6 3.98   .050   2.00  16.94   2.00   8.89   2.00  84.15   2.00  16.79
  3 0    15.0  153.8     .5     .4     .5 5.64   .050   2.15  12.97   2.00   6.77   2.00  76.15   2.00  14.02
  4 0    20.0  148.8     .5     .3     .5 7.21   .050   2.67  10.63   2.00   5.54   2.00  70.56   2.00  12.38
  5 0    25.0  143.8     .6     .3     .4 8.69   .053   3.16   9.09   2.00   4.74   2.00  66.36   2.00  11.26
  6 0    30.0  138.8     .6     .2     .410.08   .060   3.62   8.00   2.00   4.17   2.00  63.07   2.00  10.45
  7 0    35.0  133.8     .6     .2     .411.38   .068   4.07   7.19   2.00   3.76   2.00  60.41   2.00   9.82
  8 0    40.0  128.8     .7     .2     .312.57   .075   4.49   6.58   2.00   3.44   2.00  58.23   2.00   9.33
  9 0    45.0  123.8     .7     .2     .313.66   .082   4.87   6.11   2.00   3.20   2.00  56.41   2.00   8.93
 10 0    50.0  118.8     .7     .2     .314.64   .088   5.21   5.74   2.00   3.01   2.00  54.87   2.00   8.60
 11 0    55.0  113.8     .7     .2     .315.50   .093   5.50   5.45   2.00   2.86   2.00  53.57   2.00   8.32
 12 0    60.0  108.8     .7     .2     .316.23   .097   5.76   5.22   2.05   2.74   2.00  52.47   2.00   8.09
 13 0    65.0  103.8     .7     .2     .316.85   .101   5.97   5.05   2.13   2.66   2.00  51.53   2.00   7.89
```

14	0	70.0	98.8	.8	.2	.317	34	.104	6.14	4.93	2.19	2.59	2.00	50.74	2.00	7.73
15	0	75.0	93.8	.8	.2	.317	70	.106	6.26	4.84	2.23	2.55	2.00	50.07	2.00	7.59
16	0	80.0	88.8	.8	.2	.317	93	.108	6.34	4.79	2.26	2.53	2.00	49.51	2.00	7.47
17	1	85.0	83.8	.8	.2	.318	03	.108	6.37	4.78	2.27	2.53	2.00	49.06	2.00	7.37
18	1	90.0	78.8	.8	.2	.318	00	.108	6.36	4.80	2.27	2.54	2.00	48.70	2.00	7.28
19	1	95.0	73.8	.8	.2	.317	84	.107	6.31	4.86	2.25	2.58	2.00	48.41	2.00	7.21
20	1	100.0	68.8	.8	.2	.417	55	.105	6.21	4.96	2.22	2.64	2.00	48.20	2.00	7.15
21	1	105.0	63.8	.9	.2	.417	14	.103	6.07	5.10	2.17	2.72	2.00	48.04	2.00	7.11
22	1	110.0	58.8	.9	.2	.416	59	.100	5.88	5.28	2.10	2.82	2.00	47.94	2.00	7.07
23	1	115.0	53.8	.9	.2	.515	92	.096	5.65	5.53	2.02	2.96	2.00	47.86	2.00	7.03
24	1	120.0	48.8	.9	.2	.515	13	.091	5.38	5.84	2.00	3.14	2.00	47.78	2.00	7.00
25	1	125.0	43.8	.9	.2	.614	21	.085	5.06	6.24	2.00	3.37	2.00	47.66	2.00	6.95
26	1	130.0	38.8	1.0	.2	.713	19	.079	4.70	6.76	2.00	3.66	2.00	47.42	2.00	6.89
27	1	135.0	33.8	1.0	.3	.812	04	.072	4.31	7.43	2.00	4.05	2.00	46.93	2.00	6.78
28	1	140.0	28.8	1.1	.3	1.010	80	.065	3.87	8.33	2.00	4.56	2.00	45.91	2.00	6.58
29	1	145.0	23.8	1.1	.4	1.4	9.44	.057	3.41	9.59	2.00	5.29	2.00	43.73	2.00	6.20
30	1	150.0	18.8	1.2	.5	2.3	7.99	.050	2.93	11.45	2.00	6.36	2.00	38.61	2.00	5.35
31	1	155.0	13.8	1.4	.7	7.0	6.44	.050	2.41	14.52	2.00	8.10	2.00	22.79	2.00	2.97
32	1	132.8	35.9	1.0	.3	.712	56	.075	4.48	7.11	2.00	3.87	2.00	47.19	2.00	6.83
33	1	84.4	84.4	.8	.2	.318	02	.108	6.37	4.78	2.27	2.53	2.00	49.11	2.00	7.38
34	1	163.8	4.9	2.6	1.8	1.8	3.31	.050	2.00	32.67	2.00	16.77	2.00	65.39	2.00	15.30

34

1	0	5.000	.050	.408	.636	-.302	.308	.237	.680	-.499	.298	.382	.609	-.202	.348
2	0	10.000	.050	.261	.458	-.197	.170	.153	.497	-.349	.150	.242	.431	-.128	.201
3	0	15.000	.050	.194	.363	-.149	.119	.113	.396	-.273	.101	.180	.338	-.096	.144
4	0	20.000	.050	.156	.303	-.121	.093	.089	.332	-.227	.076	.145	.281	-.077	.113
5	0	25.000	.053	.132	.262	-.103	.077	.074	.287	-.195	.062	.122	.242	-.065	.094
6	0	30.000	.060	.114	.232	-.090	.066	.063	.255	-.173	.052	.106	.214	-.057	.081
7	0	35.000	.068	.102	.210	-.080	.058	.055	.231	-.156	.046	.095	.193	-.051	.072
8	0	40.000	.075	.092	.193	-.073	.052	.049	.212	-.144	.041	.086	.177	-.046	.065
9	0	45.000	.082	.085	.179	-.068	.048	.045	.197	-.134	.037	.079	.164	-.042	.060
10	0	50.000	.088	.079	.168	-.064	.045	.041	.185	-.126	.035	.074	.154	-.040	.056
11	0	55.000	.093	.075	.160	-.060	.042	.039	.176	-.120	.032	.070	.146	-.037	.052
12	0	60.000	.097	.072	.153	-.058	.040	.036	.168	-.115	.031	.067	.140	-.036	.050
13	0	65.000	.101	.069	.148	-.056	.038	.035	.163	-.112	.030	.064	.135	-.034	.048
14	0	70.000	.104	.067	.144	-.054	.037	.033	.158	-.109	.029	.063	.131	-.033	.047
15	0	75.000	.106	.065	.141	-.053	.036	.032	.155	-.107	.028	.061	.129	-.033	.046
16	0	80.000	.108	.064	.140	-.053	.036	.031	.153	-.106	.028	.061	.127	-.032	.045
17	1	85.000	.108	.064	.139	-.052	.036	.031	.152	-.106	.027	.060	.126	-.032	.045
18	1	90.000	.108	.064	.139	-.053	.036	.030	.153	-.107	.027	.060	.127	-.032	.045
19	1	95.000	.107	.064	.140	-.053	.036	.030	.154	-.108	.028	.061	.128	-.033	.045
20	1	100.000	.105	.065	.142	-.054	.037	.030	.156	-.110	.028	.062	.129	-.033	.046
21	1	105.000	.103	.067	.145	-.056	.038	.030	.159	-.113	.029	.063	.132	-.034	.047
22	1	110.000	.100	.069	.149	-.057	.039	.030	.164	-.117	.030	.065	.136	-.035	.049
23	1	115.000	.096	.071	.155	-.060	.041	.031	.170	-.123	.032	.068	.141	-.037	.051
24	1	120.000	.091	.075	.162	-.063	.043	.031	.177	-.130	.033	.072	.148	-.038	.053
25	1	125.000	.085	.079	.170	-.067	.046	.032	.187	-.138	.036	.076	.156	-.041	.057
26	1	130.000	.079	.085	.181	-.073	.049	.033	.198	-.150	.039	.082	.166	-.044	.061
27	1	135.000	.072	.092	.194	-.080	.054	.034	.212	-.164	.043	.089	.179	-.048	.066
28	1	140.000	.065	.101	.211	-.089	.060	.034	.229	-.183	.049	.099	.195	-.053	.074
29	1	145.000	.057	.113	.230	-.101	.067	.033	.248	-.209	.056	.112	.214	-.060	.083
30	1	150.000	.050	.129	.247	-.119	.076	.029	.262	-.247	.065	.129	.234	-.071	.093
31	1	155.000	.050	.150	.216	-.147	.071	.015	.203	-.305	.058	.156	.218	-.086	.092
32	1	132.820	.075	.089	.188	-.076	.052	.033	.206	-.157	.041	.086	.173	-.046	.064

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 33 1  84.375   .108   .064   .139  -.052   .036   .031   .152  -.106   .027   .060   .126  -.032   .045
 34 1 163.836   .050   .175   .478  -.276   .223  -.160   .570  -.548   .336   .248   .445  -.145   .231
"Abengoa Bioenergy       "
"Hugoton Municipal Airpor"
    5    5
    77.000   687.340      .000      .000      .000
      .800      .800     2.600    60.000
    0     1.500    3
    0     2.500    8
    0     2.500    6
    0     2.000    1
    0     1.500    4
    0      .040     1.000    6
    0    11.250
 34
  1 0     5.0  163.8     .2     .6     .7 2.19   .100   4.00  25.44   4.00  13.57   4.00  97.23   4.00  22.92
  2 0    10.0  158.8     .4     .4     .6 3.98   .100   4.00  16.94   4.00   8.89   4.00  84.15   4.00  16.79
  3 0    15.0  153.8     .5     .4     .5 5.64   .100   4.00  12.97   4.00   6.77   4.00  76.15   4.00  14.02
  4 0    20.0  148.8     .5     .3     .5 7.21   .100   4.00  10.63   4.00   5.54   4.00  70.56   4.00  12.38
  5 0    25.0  143.8     .6     .3     .4 8.69   .100   4.00   9.09   4.00   4.74   4.00  66.36   4.00  11.26
  6 0    30.0  138.8     .6     .2     .410.08   .100   4.00   8.00   4.00   4.17   4.00  63.07   4.00  10.45
  7 0    35.0  133.8     .6     .2     .411.38   .100   4.07   7.19   4.00   3.76   4.00  60.41   4.00   9.82
  8 0    40.0  128.8     .7     .2     .312.57   .100   4.49   6.58   4.00   3.44   4.00  58.23   4.00   9.33
  9 0    45.0  123.8     .7     .2     .313.66   .100   4.87   6.11   4.00   3.20   4.00  56.41   4.00   8.93
 10 0    50.0  118.8     .7     .2     .314.64   .100   5.21   5.74   4.00   3.01   4.00  54.87   4.00   8.60
 11 0    55.0  113.8     .7     .2     .315.50   .100   5.50   5.45   4.00   2.86   4.00  53.57   4.00   8.32
 12 0    60.0  108.8     .7     .2     .316.23   .100   5.76   5.22   4.00   2.74   4.00  52.47   4.00   8.09
 13 0    65.0  103.8     .7     .2     .316.85   .101   5.97   5.05   4.00   2.66   4.00  51.53   4.00   7.89
 14 0    70.0   98.8     .8     .2     .317.34   .104   6.14   4.93   4.00   2.59   4.00  50.74   4.00   7.73
 15 0    75.0   93.8     .8     .2     .317.70   .106   6.26   4.84   4.00   2.55   4.00  50.07   4.00   7.59
 16 0    80.0   88.8     .8     .2     .317.93   .108   6.34   4.79   4.00   2.53   4.00  49.51   4.00   7.47
 17 1    85.0   83.8     .8     .2     .318.03   .108   6.37   4.78   4.00   2.53   4.00  49.06   4.00   7.37
 18 1    90.0   78.8     .8     .2     .318.00   .108   6.36   4.80   4.00   2.54   4.00  48.70   4.00   7.28
 19 1    95.0   73.8     .8     .2     .317.84   .107   6.31   4.86   4.00   2.58   4.00  48.41   4.00   7.21
 20 1   100.0   68.8     .8     .2     .417.55   .105   6.21   4.96   4.00   2.64   4.00  48.20   4.00   7.15
 21 1   105.0   63.8     .9     .2     .417.14   .103   6.07   5.10   4.00   2.72   4.00  48.04   4.00   7.11
 22 1   110.0   58.8     .9     .2     .416.59   .100   5.88   5.28   4.00   2.82   4.00  47.94   4.00   7.07
 23 1   115.0   53.8     .9     .2     .515.92   .100   5.65   5.53   4.00   2.96   4.00  47.86   4.00   7.03
 24 1   120.0   48.8     .9     .2     .515.13   .100   5.38   5.84   4.00   3.14   4.00  47.78   4.00   7.00
 25 1   125.0   43.8     .9     .2     .614.21   .100   5.06   6.24   4.00   3.37   4.00  47.66   4.00   6.95
 26 1   130.0   38.8    1.0     .2     .713.19   .100   4.70   6.76   4.00   3.66   4.00  47.42   4.00   6.89
 27 1   135.0   33.8    1.0     .3     .812.04   .100   4.31   7.43   4.00   4.05   4.00  46.93   4.00   6.78
 28 1   140.0   28.8    1.1     .3    1.010.80   .100   4.00   8.33   4.00   4.56   4.00  45.91   4.00   6.58
 29 1   145.0   23.8    1.1     .4    1.4 9.44   .100   4.00   9.59   4.00   5.29   4.00  43.73   4.00   6.20
 30 1   150.0   18.8    1.2     .5    2.3 7.99   .100   4.00  11.45   4.00   6.36   4.00  38.61   4.00   5.35
 31 1   155.0   13.8    1.4     .7    7.0 6.44   .100   4.00  14.52   4.00   8.10   4.00  22.79   4.00   2.97
 32 1   132.8   35.9    1.0     .3     .712.56   .100   4.48   7.11   4.00   3.87   4.00  47.19   4.00   6.83
 33 1    84.4   84.4     .8     .2     .318.02   .108   6.37   4.78   4.00   2.53   4.00  49.11   4.00   7.38
 34 1   163.8    4.9    2.6    1.8    1.8 3.31   .100   4.00  32.67   4.00  16.77   4.00  65.39   4.00  15.30
 34
  1 0   5.000   .100   .408   .636  -.302   .308   .237   .680  -.499   .298   .382   .609  -.202   .348
  2 0  10.000   .100   .261   .458  -.197   .170   .153   .497  -.349   .150   .242   .431  -.128   .201
  3 0  15.000   .100   .194   .363  -.149   .119   .113   .396  -.273   .101   .180   .338  -.096   .144
  4 0  20.000   .100   .156   .303  -.121   .093   .089   .332  -.227   .076   .145   .281  -.077   .113
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  5 0  25.000   .100   .132   .262  -.103   .077   .074   .287  -.195   .062   .122   .242  -.065   .094
  6 0  30.000   .100   .114   .232  -.090   .066   .063   .255  -.173   .052   .106   .214  -.057   .081
  7 0  35.000   .100   .102   .210  -.080   .058   .055   .231  -.156   .046   .095   .193  -.051   .072
  8 0  40.000   .100   .092   .193  -.073   .052   .049   .212  -.144   .041   .086   .177  -.046   .065
  9 0  45.000   .100   .085   .179  -.068   .048   .045   .197  -.134   .037   .079   .164  -.042   .060
 10 0  50.000   .100   .079   .168  -.064   .045   .041   .185  -.126   .035   .074   .154  -.040   .056
 11 0  55.000   .100   .075   .160  -.060   .042   .039   .176  -.120   .032   .070   .146  -.037   .052
 12 0  60.000   .100   .072   .153  -.058   .040   .036   .168  -.115   .031   .067   .140  -.036   .050
 13 0  65.000   .101   .069   .148  -.056   .038   .035   .163  -.112   .030   .064   .135  -.034   .048
 14 0  70.000   .104   .067   .144  -.054   .037   .033   .158  -.109   .029   .063   .131  -.033   .047
 15 0  75.000   .106   .065   .141  -.053   .036   .032   .155  -.107   .028   .061   .129  -.033   .046
 16 0  80.000   .108   .064   .140  -.053   .036   .031   .153  -.106   .028   .061   .127  -.032   .045
 17 1  85.000   .108   .064   .139  -.052   .036   .031   .152  -.106   .027   .060   .126  -.032   .045
 18 1  90.000   .108   .064   .139  -.053   .036   .030   .153  -.107   .027   .060   .127  -.032   .045
 19 1  95.000   .107   .064   .140  -.053   .036   .030   .154  -.108   .028   .061   .128  -.033   .045
 20 1 100.000   .105   .065   .142  -.054   .037   .030   .156  -.110   .028   .062   .129  -.033   .046
 21 1 105.000   .103   .067   .145  -.056   .038   .030   .159  -.113   .029   .063   .132  -.034   .047
 22 1 110.000   .100   .069   .149  -.057   .039   .030   .164  -.117   .030   .065   .136  -.035   .049
 23 1 115.000   .100   .071   .155  -.060   .041   .031   .170  -.123   .032   .068   .141  -.037   .051
 24 1 120.000   .100   .075   .162  -.063   .043   .031   .177  -.130   .033   .072   .148  -.038   .053
 25 1 125.000   .100   .079   .170  -.067   .046   .032   .187  -.138   .036   .076   .156  -.041   .057
 26 1 130.000   .100   .085   .181  -.073   .049   .033   .198  -.150   .039   .082   .166  -.044   .061
 27 1 135.000   .100   .092   .194  -.080   .054   .034   .212  -.164   .043   .089   .179  -.048   .066
 28 1 140.000   .100   .101   .211  -.089   .060   .034   .229  -.183   .049   .099   .195  -.053   .074
 29 1 145.000   .100   .113   .230  -.101   .067   .033   .248  -.209   .056   .112   .214  -.060   .083
 30 1 150.000   .100   .129   .247  -.119   .076   .029   .262  -.247   .065   .129   .234  -.071   .093
 31 1 155.000   .100   .150   .216  -.147   .071   .015   .203  -.305   .058   .156   .218  -.086   .092
 32 1 132.820   .100   .089   .188  -.076   .052   .033   .206  -.157   .041   .086   .173  -.046   .064
 33 1  84.375   .108   .064   .139  -.052   .036   .031   .152  -.106   .027   .060   .126  -.032   .045
 34 1 163.836   .100   .175   .478  -.276   .223  -.160   .570  -.548   .336   .248   .445  -.145   .231
"Abengoa Bioenergy       "
"Hugoton Municipal Airpor"
    5    5
    77.000   687.340      .000      .000      .000
      .800      .800     2.600    60.000
    0     1.500    3
    0     2.500    8
    0     2.500    6
    0     2.000    1
    0     1.500    4
    0      .034     4.000    5
    0    11.250
 34
  1 0     5.0  163.8     .2     .6     .7 3.35   .100   4.00   6.15   4.00   3.13   4.00  47.18   4.00   6.91
  2 0    10.0  158.8     .4     .4     .6 6.07   .100   4.00   3.85   4.00   2.04   4.00  35.13   4.00   4.61
  3 0    15.0  153.8     .5     .4     .5 8.59   .100   4.00   2.98   4.00   1.61   4.00  29.45   4.00   3.67
  4 0    20.0  148.8     .5     .3     .510.95   .100   4.00   2.50   4.00   1.36   4.00  26.00   4.00   3.14
  5 0    25.0  143.8     .6     .3     .413.17   .100   4.70   2.19   4.00   1.19   4.00  23.63   4.00   2.79
  6 0    30.0  138.8     .6     .2     .415.24   .100   5.42   1.97   4.00   1.07   4.00  21.89   4.00   2.55
  7 0    35.0  133.8     .6     .2     .417.15   .103   6.07   1.81   4.00    .98   4.00  20.55   4.00   2.36
  8 0    40.0  128.8     .7     .2     .318.89   .113   6.67   1.69   4.00    .91   4.00  19.49   4.00   2.22
  9 0    45.0  123.8     .7     .2     .320.46   .123   7.20   1.59   4.00    .86   4.00  18.62   4.00   2.10
 10 0    50.0  118.8     .7     .2     .321.85   .131   7.67   1.52   4.00    .82   4.00  17.90   4.00   2.01
 11 0    55.0  113.8     .7     .2     .323.07   .138   8.08   1.47   4.00    .79   4.00  17.30   4.00   1.93
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12	0	60.0	108.8	.7	.2	.324.11	.145	8.43	1.43	4.00	.77	4.00	16.79	4.00	1.86
13	0	65.0	103.8	.7	.2	.324.96	.150	8.71	1.40	4.00	.75	4.00	16.36	4.00	1.80
14	0	70.0	98.8	.8	.2	.325.64	.154	8.94	1.38	4.00	.74	4.00	15.98	4.00	1.75
15	0	75.0	93.8	.8	.2	.326.14	.157	9.11	1.38	4.00	.73	4.00	15.66	4.00	1.71
16	0	80.0	88.8	.8	.2	.326.46	.159	9.21	1.38	4.00	.74	4.00	15.39	4.00	1.67
17	1	85.0	83.8	.8	.2	.326.61	.160	9.26	1.40	4.00	.74	4.00	15.15	4.00	1.64
18	1	90.0	78.8	.8	.2	.326.58	.159	9.25	1.43	4.00	.76	4.00	14.94	4.00	1.61
19	1	95.0	73.8	.8	.2	.326.37	.158	9.18	1.47	4.00	.77	4.00	14.77	4.00	1.58
20	1	100.0	68.8	.8	.2	.425.98	.156	9.05	1.52	4.00	.80	4.00	14.61	4.00	1.56
21	1	105.0	63.8	.9	.2	.425.42	.152	8.86	1.59	4.00	.84	4.00	14.47	4.00	1.54
22	1	110.0	58.8	.9	.2	.424.67	.148	8.62	1.68	4.00	.88	4.00	14.34	4.00	1.52
23	1	115.0	53.8	.9	.2	.523.75	.142	8.31	1.80	4.00	.94	4.00	14.22	4.00	1.50
24	1	120.0	48.8	.9	.2	.522.65	.136	7.94	1.95	4.00	1.01	4.00	14.08	4.00	1.47
25	1	125.0	43.8	.9	.2	.621.37	.128	7.51	2.14	4.00	1.11	4.00	13.92	4.00	1.45
26	1	130.0	38.8	1.0	.2	.719.90	.119	7.01	2.40	4.00	1.23	4.00	13.70	4.00	1.41
27	1	135.0	33.8	1.0	.3	.818.27	.110	6.45	2.75	4.00	1.40	4.00	13.37	4.00	1.36
28	1	140.0	28.8	1.1	.3	1.016.45	.100	5.83	3.25	4.00	1.64	4.00	12.83	4.00	1.29
29	1	145.0	23.8	1.1	.4	1.414.47	.100	5.15	4.01	4.00	2.00	4.00	11.88	4.00	1.18
30	1	150.0	18.8	1.2	.5	2.312.32	.100	4.40	5.26	4.00	2.58	4.00	9.98	4.00	.97
31	1	155.0	13.8	1.4	.7	7.010.00	.100	4.00	7.65	4.00	3.66	4.00	5.22	4.00	.50
32	1	132.8	35.9	1.0	.3	.719.00	.114	6.71	2.59	4.00	1.32	4.00	13.53	4.00	1.39
33	1	84.4	84.4	.8	.2	.326.60	.160	9.26	1.40	4.00	.74	4.00	15.18	4.00	1.64
34	1	163.8	4.9	2.6	1.8	1.8 5.28	.100	4.00	20.21	4.00	9.09	4.00	24.32	4.00	5.46

34

1	0	5.000	.100	.086	.179	-.068	.050	.047	.196	-.132	.042	.081	.165	-.043	.062
2	0	10.000	.100	.047	.106	-.041	.028	.018	.117	-.085	.023	.046	.097	-.025	.034
3	0	15.000	.100	.033	.077	-.030	.019	.008	.085	-.067	.016	.032	.070	-.018	.024
4	0	20.000	.100	.025	.061	-.025	.015	.003	.067	-.056	.012	.025	.056	-.014	.019
5	0	25.000	.100	.020	.051	-.021	.012	.000	.056	-.049	.010	.021	.046	-.012	.016
6	0	30.000	.100	.017	.044	-.018	.011	-.001	.049	-.043	.008	.018	.040	-.010	.013
7	0	35.000	.103	.015	.039	-.016	.009	-.002	.043	-.040	.007	.016	.036	-.009	.012
8	0	40.000	.113	.013	.036	-.015	.008	-.003	.039	-.037	.007	.014	.032	-.008	.011
9	0	45.000	.123	.012	.033	-.014	.008	-.003	.036	-.035	.006	.013	.030	-.007	.010
10	0	50.000	.131	.011	.031	-.013	.007	-.004	.034	-.033	.006	.012	.028	-.007	.009
11	0	55.000	.138	.010	.029	-.013	.007	-.004	.032	-.031	.005	.012	.026	-.007	.009
12	0	60.000	.145	.010	.028	-.012	.006	-.004	.030	-.030	.005	.011	.025	-.006	.008
13	0	65.000	.150	.009	.027	-.012	.006	-.005	.029	-.030	.005	.011	.024	-.006	.008
14	0	70.000	.154	.009	.026	-.011	.006	-.005	.028	-.029	.005	.010	.023	-.006	.008
15	0	75.000	.157	.009	.025	-.011	.006	-.005	.028	-.029	.005	.010	.023	-.006	.007
16	0	80.000	.159	.009	.025	-.011	.006	-.005	.027	-.029	.004	.010	.022	-.006	.007
17	1	85.000	.160	.008	.025	-.011	.006	-.006	.027	-.029	.004	.010	.022	-.006	.007
18	1	90.000	.159	.008	.025	-.011	.006	-.006	.027	-.030	.004	.010	.022	-.006	.007
19	1	95.000	.158	.008	.025	-.011	.006	-.007	.027	-.030	.005	.010	.022	-.006	.007
20	1	100.000	.156	.008	.025	-.012	.006	-.007	.028	-.031	.005	.010	.023	-.006	.007
21	1	105.000	.152	.008	.026	-.012	.006	-.008	.029	-.033	.005	.010	.023	-.006	.008
22	1	110.000	.148	.009	.027	-.013	.006	-.009	.029	-.034	.005	.011	.024	-.006	.008
23	1	115.000	.142	.009	.028	-.013	.007	-.010	.031	-.036	.005	.011	.025	-.006	.008
24	1	120.000	.136	.009	.029	-.014	.007	-.011	.032	-.039	.006	.012	.026	-.007	.009
25	1	125.000	.128	.009	.031	-.015	.007	-.013	.034	-.043	.006	.012	.028	-.007	.009
26	1	130.000	.119	.010	.033	-.017	.008	-.015	.037	-.047	.007	.013	.030	-.008	.010
27	1	135.000	.110	.010	.036	-.019	.009	-.019	.040	-.053	.007	.015	.033	-.009	.011
28	1	140.000	.100	.011	.040	-.022	.010	-.024	.044	-.062	.008	.016	.036	-.010	.012
29	1	145.000	.100	.011	.044	-.026	.011	-.031	.049	-.075	.010	.018	.040	-.011	.014
30	1	150.000	.100	.012	.049	-.032	.012	-.045	.053	-.095	.012	.021	.045	-.013	.015

31	1	155.000	.100	.010	.044	-.043	.012	-.071	.044	-.131	.011	.026	.043	-.017	.015
32	1	132.820	.114	.010	.035	-.018	.008	-.017	.038	-.050	.007	.014	.031	-.008	.010
33	1	84.375	.160	.008	.025	-.011	.006	-.006	.027	-.029	.004	.010	.022	-.006	.007
34	1	163.836	.100	-.011	.116	-.099	.040	-.213	.171	-.300	.088	.041	.100	-.032	.039

AB-CIM

Visual Effects Screening Analysis for
Source: Abengoa Bioenergy
Class I Area: Cimarron Natl Grasslands

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	77.00	TON/YR
NOx (as NO2)	687.34	TON/YR
Primary NO2	.00	TON/YR
Soot	.00	TON/YR
Primary SO4	.00	TON/YR

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	6
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.03 ppm
Background Visual Range:	60.00 km
Source-Observer Distance:	24.00 km
Min. Source-Class I Distance:	24.00 km
Max. Source-Class I Distance:	105.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	5
Wind Speed:	5.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	140.	32.1	29.	4.00	.477	.10	-.000
SKY	140.	140.	32.1	29.	4.00	.198	.10	-.003
TERRAIN	10.	84.	24.0	84.	4.00	.188	.10	.002
TERRAIN	140.	84.	24.0	84.	4.00	.054	.10	.001

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	4.00	1.058	.10	.004
SKY	140.	0.	1.0	168.	4.00	.312	.10	-.010
TERRAIN	10.	0.	1.0	168.	4.00	1.061	.10	.015
TERRAIN	140.	0.	1.0	168.	4.00	.317	.10	.012

```
"Abengoa Bioenergy       "
"Cimarron Natl Grasslands"
    5    5
    77.000   687.340      .000      .000      .000
    24.000    24.000   105.000    60.000
    0     1.500    3
    0     2.500    8
    0     2.500    6
    0     2.000    1
    0     1.500    4
    0      .034     5.000    5
    0    11.250
 34
  1 0     5.0  163.8    7.5   16.7   19.9 1.03   .100   4.00    .78   4.00    .30   4.00    .48   4.00    .19
  2 0    10.0  158.8   11.5   12.9   17.1 1.63   .100   4.00    .71   4.00    .29   4.00    .38   4.00    .15
  3 0    15.0  153.8   14.0   10.6   15.1 2.18   .100   4.00    .66   4.00    .27   4.00    .34   4.00    .13
  4 0    20.0  148.8   15.8    9.0   13.6 2.69   .100   4.00    .62   4.00    .26   4.00    .31   4.00    .11
  5 0    25.0  143.8   17.2    7.9   12.5 3.17   .100   4.00    .59   4.00    .25   4.00    .29   4.00    .10
  6 0    30.0  138.8   18.2    7.1   11.6 3.63   .100   4.00    .56   4.00    .24   4.00    .27   4.00    .09
  7 0    35.0  133.8   19.1    6.5   10.9 4.05   .100   4.00    .53   4.00    .23   4.00    .26   4.00    .09
  8 0    40.0  128.8   19.8    6.0   10.4 4.44   .100   4.00    .51   4.00    .22   4.00    .25   4.00    .08
  9 0    45.0  123.8   20.4    5.6    9.9 4.79   .100   4.00    .49   4.00    .21   4.00    .24   4.00    .07
 10 0    50.0  118.8   21.0    5.3    9.6 5.10   .100   4.00    .47   4.00    .20   4.00    .23   4.00    .07
 11 0    55.0  113.8   21.5    5.1    9.4 5.38   .100   4.00    .45   4.00    .20   4.00    .22   4.00    .07
 12 0    60.0  108.8   21.9    4.9    9.3 5.61   .100   4.00    .44   4.00    .19   4.00    .22   4.00    .06
 13 0    65.0  103.8   22.4    4.8    9.2 5.80   .100   4.00    .43   4.00    .19   4.00    .21   4.00    .06
 14 0    70.0   98.8   22.8    4.7    9.2 5.95   .100   4.00    .43   4.00    .18   4.00    .20   4.00    .06
 15 0    75.0   93.8   23.2    4.7    9.3 6.05   .100   4.00    .42   4.00    .18   4.00    .20   4.00    .06
 16 0    80.0   88.8   23.6    4.7    9.4 6.10   .100   4.00    .42   4.00    .18   4.00    .19   4.00    .05
 17 1    85.0   83.8   24.1    4.7    9.6 6.10   .100   4.00    .42   4.00    .18   4.00    .19   4.00    .05
 18 1    90.0   78.8   24.5    4.8    9.9 6.06   .100   4.00    .42   4.00    .18   4.00    .18   4.00    .05
 19 1    95.0   73.8   24.9    4.9   10.4 5.98   .100   4.00    .42   4.00    .18   4.00    .18   4.00    .05
 20 1   100.0   68.8   25.4    5.0   10.9 5.84   .100   4.00    .42   4.00    .18   4.00    .17   4.00    .05
 21 1   105.0   63.8   25.8    5.2   11.6 5.67   .100   4.00    .43   4.00    .18   4.00    .16   4.00    .05
 22 1   110.0   58.8   26.4    5.5   12.5 5.45   .100   4.00    .43   4.00    .19   4.00    .16   4.00    .05
 23 1   115.0   53.8   27.0    5.8   13.6 5.18   .100   4.00    .44   4.00    .19   4.00    .15   4.00    .04
 24 1   120.0   48.8   27.6    6.2   15.1 4.88   .100   4.00    .45   4.00    .19   4.00    .13   4.00    .04
 25 1   125.0   43.8   28.4    6.8   17.1 4.54   .100   4.00    .46   4.00    .20   4.00    .12   4.00    .04
 26 1   130.0   38.8   29.4    7.5   19.9 4.16   .100   4.00    .47   4.00    .20   4.00    .10   4.00    .03
 27 1   135.0   33.8   30.5    8.4   24.0 3.75   .100   4.00    .48   4.00    .20   4.00    .08   4.00    .02
 28 1   140.0   28.8   32.1    9.7   30.5 3.30   .100   4.00    .48   4.00    .20   4.00    .06   4.00    .01
 29 1   145.0   23.8   34.2   11.6   42.4 2.83   .100   4.00    .46   4.00    .19   4.00    .03   4.00    .01
 30 1   150.0   18.8   37.3   14.6   70.4 2.33   .100   4.00    .43   4.00    .17   4.00    .01   4.00    .00
 31 1   155.0   13.8   42.7   19.7  210.6 1.81   .100   4.00    .34   4.00    .13   4.00    .00   4.00    .00
 32 0      .5  168.3    1.0   23.0   23.5  .23   .100   4.00   1.06   4.00    .31   4.00   1.06   4.00    .32
 33 1    84.4   84.4   24.0    4.7    9.6 6.11   .100   4.00    .42   4.00    .18   4.00    .19   4.00    .05
 34 1   165.5    3.3  105.0   81.6   81.6  .57   .100   4.00    .00   4.00    .00   4.00    .01   4.00    .00
 34
  1 0   5.000   .100  -.001   .006  -.006   .004  -.009   .009  -.013   .008   .003   .005  -.002   .003
  2 0  10.000   .100  -.001   .004  -.005   .003  -.008   .007  -.011   .006   .002   .004  -.002   .002
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AB-CIMR

3	0	15.000	.100	-.000	.004	-.004	.002	-.008	.006	-.011	.005	.002	.003	-.001	.002
4	0	20.000	.100	-.000	.003	-.004	.002	-.007	.005	-.010	.004	.002	.003	-.001	.001
5	0	25.000	.100	-.000	.003	-.003	.002	-.007	.004	-.009	.004	.001	.003	-.001	.001
6	0	30.000	.100	-.000	.003	-.003	.001	-.006	.004	-.009	.003	.001	.002	-.001	.001
7	0	35.000	.100	-.000	.002	-.003	.001	-.006	.004	-.009	.003	.001	.002	-.001	.001
8	0	40.000	.100	-.000	.002	-.003	.001	-.006	.004	-.008	.003	.001	.002	-.001	.001
9	0	45.000	.100	-.000	.002	-.002	.001	-.006	.003	-.008	.002	.001	.002	-.001	.001
10	0	50.000	.100	-.000	.002	-.002	.001	-.005	.003	-.008	.002	.001	.002	-.001	.001
11	0	55.000	.100	-.000	.002	-.002	.001	-.005	.003	-.007	.002	.001	.002	-.001	.001
12	0	60.000	.100	-.000	.002	-.002	.001	-.005	.003	-.007	.002	.001	.002	-.001	.001
13	0	65.000	.100	-.000	.002	-.002	.001	-.005	.003	-.007	.002	.001	.002	-.001	.001
14	0	70.000	.100	-.000	.002	-.002	.001	-.005	.003	-.007	.002	.001	.002	-.001	.001
15	0	75.000	.100	-.000	.002	-.002	.001	-.005	.003	-.007	.002	.001	.002	-.001	.001
16	0	80.000	.100	-.000	.002	-.002	.001	-.005	.003	-.007	.002	.001	.002	-.001	.001
17	1	85.000	.100	-.000	.002	-.002	.001	-.005	.003	-.007	.002	.001	.002	-.001	.001
18	1	90.000	.100	-.000	.002	-.002	.001	-.005	.002	-.007	.002	.001	.002	-.001	.001
19	1	95.000	.100	-.000	.002	-.002	.001	-.005	.002	-.007	.002	.001	.002	-.001	.001
20	1	100.000	.100	-.000	.002	-.002	.001	-.005	.002	-.007	.002	.001	.002	-.001	.001
21	1	105.000	.100	-.000	.002	-.002	.001	-.005	.002	-.007	.002	.001	.002	-.001	.001
22	1	110.000	.100	-.000	.002	-.002	.001	-.005	.002	-.007	.002	.001	.002	-.001	.001
23	1	115.000	.100	-.000	.002	-.002	.001	-.005	.002	-.007	.002	.001	.002	-.001	.001
24	1	120.000	.100	-.000	.002	-.002	.001	-.005	.002	-.007	.002	.001	.001	-.001	.001
25	1	125.000	.100	-.000	.001	-.002	.001	-.005	.002	-.007	.001	.001	.001	-.001	.001
26	1	130.000	.100	-.000	.001	-.003	.001	-.005	.002	-.008	.001	.001	.001	-.001	.001
27	1	135.000	.100	-.000	.001	-.003	.001	-.005	.001	-.008	.001	.001	.001	-.001	.001
28	1	140.000	.100	-.000	.001	-.003	.001	-.005	.001	-.008	.001	.001	.001	-.001	.000
29	1	145.000	.100	-.000	.000	-.003	.000	-.005	.000	-.008	.000	.001	.001	-.001	.000
30	1	150.000	.100	-.000	.000	-.003	.000	-.005	.000	-.007	.000	.001	.000	-.001	.000
31	1	155.000	.100	-.000	.000	-.003	.000	-.004	.000	-.005	.000	.001	.000	-.001	.000
32	0	.486	.100	.004	.015	-.010	.012	-.006	.015	-.015	.014	.010	.016	-.006	.011
33	1	84.375	.100	-.000	.002	-.002	.001	-.005	.003	-.007	.002	.001	.002	-.001	.001
34	1	165.460	.100	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000