Air Dispersion Modeling Guidelines
For PSD Projects

Version Date 9/1/2024

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Overview

This document gives a general background of the modeling and additional impact requirements associated with a Prevention of Significant Deterioration (PSD) air quality assessment. Since every PSD project is unique, it is impossible to address the varied details of every modeling analysis. This document should only be used as a guideline for conducting an air quality analysis; applicants are responsible for accomplishing the analysis according to requirements set forth under 567 IAC 33.

Additional information can be found in, [40 CFR Part 51 Appendix W](https://www.ecfr.gov/current/title-40/part-51/appendix-Appendix%20W%20to%20Part%2051)[1], EPA's draft "[New Source Review Workshop Manual](https://www.epa.gov/sites/default/files/2015-07/documents/1990wman.pdf)" October 1990[2], "[Guidance for Ozone and Fine Particulate Matter Permit Modeling](https://www.epa.gov/system/files/documents/2022-07/Guidance_for_O3_PM25_Permit_Modeling.pdf)" July 2022 (EPA-454-R-22-005)[3], "[Workbook for Plume Visual Screening and Analysis (Revised)](https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=2000DDSL.txt)" October 1992 (EPA-454/R-92-023)[4], and [EPA's website for the Technology Transfer Network (TTN) Support Center for Regulatory Air Models (SCRAM)](https://www.epa.gov/scram)[5].

Additional guidance and Air Quality Bureau staff contact information can be found at the DNR website:

Homepage:	https://www.iowacleanair.gov
Modeling:	https://www.iowadnr.gov/Environmental-Protection/Air-Quality/Modeling
Permitting:	https://www.iowadnr.gov/Environmental-Protection/Air-Quality/Construction-Permits
Contact info:	https://www.iowadnr.gov/About-DNR/DNR-Staff-Offices/Air-Quality-Staff

All PSD permits require an air quality analysis of the ambient impacts associated with the project. This analysis includes an assessment of existing air quality, an air dispersion modeling analysis (including secondary formation analysis), an additional impact analysis, and an evaluation of any adverse impacts to Class I areas. The air dispersion modeling analysis is required to demonstrate that new emissions from the source or major modification, in conjunction with applicable emissions from other existing sources, will not cause or contribute to a violation of any applicable National Ambient Air Quality Standards (NAAQS) or PSD increment.

The Iowa Department of Natural Resources (DNR) may require a NAAQS modeling analysis for non-PSD significant pollutants, especially in areas of NAAQS concern. Since there are known areas with existing ambient concentrations close to the NAAQS for some pollutants, projects that emit these pollutants may need to be evaluated even if these pollutants are proposed to be emitted in amounts less than the PSD significant emission rates. This modeling can be conducted according to the DNR's "[Air Dispersion Modeling Guidelines for Non-PSD, Pre-Construction Permit Applications](http://www.iowadnr.gov/portals/idnr/uploads/air/dispmodel/modeling_guidelines.pdf)."[6]

The additional impact analysis must be conducted for all PSD projects. This analysis assesses the impact of the emissions from the project and any associated growth on soils, vegetation, and visibility. Although there are currently no Class I areas located in Iowa or within 100 kilometers of the borders, a Class II visibility analysis must be addressed.

Modeling Protocol

The DNR requires that all PSD applicants submit a modeling protocol prior to attending the pre-application meeting. By doing so, the DNR can communicate to the applicant the acceptability of the proposed methodology prior to conducting any extensive modeling, hopefully decreasing the chance of errors or inadvertent exclusion of required information. Changes to the protocol may occur as the analysis progresses; however, the protocol establishes a common understanding of the requirements.The DNR has developed a [modeling protocol template](http://www.iowadnr.gov/portals/idnr/uploads/air/dispmodel/protocol_template.pdf)[7] that lists each topic that should be discussed in the modeling protocol. After the modeling protocol is submitted, the DNR modeling team will review it and provide comments during the pre-application meeting. The DNR will provide an approval letter to document acceptance of the protocol.

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[1] https://www.ecfr.gov/current/title-40/part-51/appendix-Appendix%20W%20to%20Part%2051
[2] https://www.epa.gov/sites/default/files/2015-07/documents/1990wman.pdf
[3] https://www.epa.gov/system/files/documents/2022-07/Guidance_for_O3_PM25_Permit_Modeling.pdf
[4] https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=2000DDSL.txt
[5] https://www.epa.gov/scram
[6] http://www.iowadnr.gov/portals/idnr/uploads/air/dispmodel/modeling_guidelines.pdf
[7] http://www.iowadnr.gov/portals/idnr/uploads/air/dispmodel/protocol_template.pdf

Dispersion Modeling Analysis Procedure

The PSD dispersion modeling analysis can be divided into three phases: the source impact analysis, the cumulative impact analysis, and the additional impact analysis.

The source impact analysis is conducted first and includes only new sources and those that will be modified or require permit modification as a result of the project. It is used to determine if a cumulative impact analysis is necessary. It is also used to determine if the minor source baseline date is triggered for the purposes of tracking PSD increment, and can provide information for the additional impact analysis.

A cumulative impact analysis is required for each pollutant and averaging period for which the project exceeds the applicable Significant Impact Level (SIL). The cumulative impact analysis includes everything from the source impact analysis and other sources of emissions at the facility and nearby facilities (if applicable). The cumulative impact analysis for PSD projects consists of an evaluation of both the National Ambient Air Quality Standards (NAAQS) and the PSD Increments.

The additional impact analysis includes an evaluation of the project's impact on visibility, soils and vegetation, as well as impacts caused by growth due to the project. The amount of detail needed to complete this analysis will depend on the result of source impact analysis, but it is required for all PSD projects.

Pre-Construction Monitoring

Pre-construction ambient monitoring may be required for any criteria pollutant that is proposed to be emitted above the significant emission rates (or 100 tpy or more for VOCs). The DNR can exempt the applicant from this requirement if the highest modeled concentrations from the project are below the significant monitoring concentrations (SMCs). The SMCs are listed below in Table 1.

Table 1. Significant Monitoring Concentrations

Pollutant	Averaging Period	Significant Monitoring Concentrations ($\mu g/m^3$)
NO_2	Annual	14
SO_2	24-hr	13
$PM_{2.5}$	24-hr	0*
PM_{10}	24-hr	10
CO	8-hr	575
Pb	Calendar quarter	0.1

* On January 22, 2013, the D.C. Court of Appeals vacated the SMC for $PM_{2.5}$, finding that the EPA was precluded from using the $PM_{2.5}$ SMCs to exempt permit applicants from the statutory requirement to compile preconstruction monitoring data.

If the predicted concentrations are above the significant monitoring concentrations and the DNR determines that ambient monitoring is required, the applicant can satisfy the requirement by either 1) establishing a site specific ambient monitoring network, or 2) using existing ambient monitoring data. Should the applicant elect to use existing ambient monitoring data, then the applicant must justify the representativeness of the existing monitoring data. The decision to accept or reject existing ambient monitoring data to meet this requirement is made by the DNR.

Post-Construction Monitoring

EPA's _Ambient Monitoring Guidelines for Prevention of Significant Deterioration_ (May 1987)[8], recommends post construction monitoring be done when there is a valid reason, such as when predicted concentrations are close to the NAAQS and when there are uncertainties in the data modeled. A decision by permitting staff to require post-construction monitoring would be made after the PSD application has been thoroughly reviewed.

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[8] https://www.epa.gov/sites/default/files/2015-07/documents/monguide.pdf

Model Selection and Options

The latest version of the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) is preferred for conducting the dispersion modeling analysis. AERSCREEN may be used as a screening tool. For lead modeling, determining the design concentration requires the use of the EPA post-processor called "Leadpost." The latest version of each of these may be obtained from the [EPA's SCRAM website](https://www.epa.gov/scram)[9].

The regulatory default options should be used in the modeling analysis. The default option includes the use of stack-tip downwash and incorporates the effects of elevated terrain. The AERMOD model automatically selects the default options unless specified to override these options. There are currently no portions of the state for which the urban modeling option should be used.

Source Information

Emission Rates

Refer to Table 8-2 in [40 CFR Part 51](https://www.ecfr.gov/current/title-40/part-51/appendix-Appendix%20W%20to%20Part%2051), Appendix W[10] for the appropriate emission rates to use in the source impact and cumulative impact analyses. The PSD increment portion of the cumulative impact analysis should consider the amount of increment consumed or expanded by existing sources (refer to the PSD Increment Modeling section below).

New or Modified Sources

New sources, and those that will be modified or require permit modification as a result of the project, must be modeled at their potential, or proposed allowable, hourly emission rates. Varying emission rates are not permissible unless included in the permit limitations or it can be demonstrated that the variance is a physical limitation. Refer to the Operating Restrictions section below for guidance on modeling any such limits. Physical or operational limits should not be accounted for by averaging emissions over the period being evaluated.

Nearby Sources

Actual operations may be accounted for when developing the emission inputs for all other sources located at the facility, and at nearby facilities. The emission rate used for the long-term averaging periods (quarterly and annual) may be annualized to account for actual operation of the source, i.e. annual emissions divided by 8760 hours per year. However, annualized emission rates should not be used for short-term averaging periods (24-hours or less). The short-term rate may be adjusted to account for the actual short-term operating level of the source if CEM data or other representative information is available. The long-term averaging periods may be conservatively modeled using the short-term rates.

Data used to account for actual operations shall be based on the most recent two years, unless it is determined that this period is not representative. For minor sources that report emissions once every three years, the most recent 12 months of data should be used. If these minimum data requirements cannot be met, then the potential or permitted allowable emission rate should be used as applicable. If this is not considered representative contact the Construction Permit Section staff for additional guidance.

All calculations used to determine the emission rates for non-project sources must be submitted with the modeling analysis report. If this information is not submitted, the DNR will use allowable (permitted emission rates or standards). If the allowable emission rates produce a modeled violation then the facility will be required to make appropriate changes.

The DNR may require re-modeling if there is a significant change in the method of operation or emission levels.

Varying Operational Loads

If a source(s) will be operated continuously at reduced loads (50 percent, 75 percent, etc.) then screening modeling should be performed to determine which operating load produces the worse-case predicted impacts for each applicable averaging period. Additional information on this requirement can be found in Section 8.2 of Appendix W of 40 CFR Part 51. If a source(s) will operate at greater than design capacity for periods that could result in violations of the NAAQS, this

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[9] https://www.epa.gov/scram
[10] https://www.ecfr.gov/current/title-40/part-51/appendix-Appendix%20W%20to%20Part%2051

load should be modeled. In either case, the load causing the highest predicted concentration, in addition to the design load, should be modeled.

Alternatively, the worst-case stack parameters (lowest temperature and exit velocity, and highest emission rate) from each of the operational loads for each source may be modeled simultaneously to produce a conservative prediction. If the conservative approach results in model concentrations that are less than the applicable standards, then a more refined method is not necessary. This approach can significantly reduce the time it takes to conduct the analysis, as well as the time it takes for the DNR review.

Operating Restrictions
Sources that do not operate continuously or at a continuous rate may be modeled based on their applicable permit conditions or physical limitations. Please refer to the "DNR Suggested Methodology for Modeling Restricted Hours of Operation" document[11].

Stacks and Vents – Vertical, Capped, Horizontal, and Downward
Emissions vented through a discrete stack or vent should be modeled using one of the point source options in AERMOD. Unobstructed vertical stacks should be modeled using the POINT source type. Stacks with an obstructing rain guard should be modeled using the POINTCAP source type. Stacks with rain guards that do not obstruct the flow at the point of release can be modeled using the POINT source type. Refer to the DNR's stack and vent guidance[12] document for additional details and examples of stack types that are considered unobstructed. Stacks with a horizontal discharge should be modeled using the POINTHOR source type. Care should be exercised when using the POINTHOR source type to ensure that building downwash is included. Stacks with a downward discharge should be modeled using the POINT source type with an exit velocity of 0.001 m/s.

Indoor Venting Emission Units
Indoor venting units must be included in the modeling analysis as a volume source or series of volume sources whose dimensions are based on the size and shape of the building(s) unless the majority of the emissions will exit via a building vent or other opening, in which case the emissions should be modeled as exiting the building through the vent or opening. For guidance on modeling emission units that vent inside a building please use the Volume Source Tool[13].

Please note that the use of the building enclosure credit included on the above referenced spreadsheet is for use with PM_{10} only and will not be applicable for the modeling of $PM_{2.5}$ emissions.

Fugitive Sources
All fugitive sources such as storage piles, transfer points and haul roads must be included in the modeling analysis. Fugitive emissions at nearby facilities generally do not need to be included in the full modeling analysis, unless the nearby facility is located adjacent to the source being evaluated, then the fugitive source must be included in the modeling analysis. It is the current DNR practice to allow the haul road emissions to be omitted from the 24-hour PSD $PM_{2.5}$ and PM_{10} increment analyses, provided that the facility agrees to apply best management practices for haul roads as determined by the construction permit staff.

Storage piles are typically modeled as area sources. The following area source parameters are generally accepted for characterizing storage piles:

Release height =	½ the average height of the pile
Initial vertical dimension (σ_{Zo}) =	average height of pile / 4.3

Haul roads can be characterized as a series of volume sources either adjacent or separate from one another except for

[11] http://www.iowadnr.gov/portals/idnr/uploads/air/dispmodel/op_restrict.pdf
[12] https://www.iowadnr.gov/portals/idnr/uploads/air/dispmodel/stacks_and_vents.pdf
[13] http://www.iowadnr.gov/portals/idnr/uploads/air/dispmodel/vst_v1.5.xlsx

cases where ambient air receptors are within the volume's exclusion zone. If separate volume sources are used, they should be separated by a center to center spacing of no more than twice the road width. The following volume source parameters are used to characterize the roads:

Top of plume height =	1.7 x vehicle height
Release height =	0.5 x top of plume height
Plume width: Single lane=	Vehicle width + 6 m
Two lanes=	Road width + 6 m
Initial lateral dimension (σYo) =	Width of plume / 2.15
Initial vertical dimension (σZo) =	Top of plume / 2.15

The following area source parameters are used to characterize the roads where ambient receptors are located within source dimensions:

Top of plume height =	1.7 x vehicle height
Release height =	0.5 x top of plume height
Length =	Length of roadway
Plume width: Single lane =	Vehicle width + 6 m
Two lanes =	Road width + 6 m
Initial vertical dimension (σZo) =	Top of plume / 2.15

Note: Haul road modeling characterization listed above is based on the EPA's Haul Road Workgroup Final Report dated December 6, 2011[14]

It should be noted that the area and volume source parameters may be varied from those listed above, with appropriate justification acceptable to DNR. Refer to DNR's guidance on haul road modeling[15] for additional information.

Cooling Towers
Emissions from cooling towers must be included in the modeling analysis. Cooling towers should be modeled as a series of point sources, one for each cooling cell. The cooling tower structure should be included as a downwash structure.

Buoyant Line Sources
Some source types are exhausted to the atmosphere through a long series of vents rather than a single stack. If the exhaust from this type of source is significantly warmer than the ambient air the source should be modeled using the BUOYLINE source type in AERMOD to account for the buoyancy of the plume. Examples of such sources include coke ovens or blast furnaces.

Other Non-Standard Type Emission Units
Guidance for evaluating non-standard types of emission units is available on the DNR's dispersion modeling website[16]. This guidance is intended to provide information on how the DNR would typically characterize non-standard sources in a dispersion model. Although this guidance does not preclude the use of other methodologies, the applicant may wish to discuss other methodologies with the DNR prior to conducting extensive modeling analyses.

Merged Streams
The merging of exhaust gas streams cannot be used in the dispersion modeling analysis unless the applicable requirements of 40 CFR Part 51.100(hh)(2) are met. Include justification if merged exhaust streams were included in the modeling analysis.

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[14] https://www.epa.gov/sites/default/files/2020-10/documents/haul_road_workgroup-final_report_package-20120302.pdf
[15] http://www.iowadnr.gov/portals/idnr/uploads/air/dispmodel/haul_roads.pdf
[16] http://www.iowadnr.gov/Environmental-Protection/Air-Quality/Modeling

<u>Ambient Conditions</u>
An emission point with a stack gas exit temperature equal to the interior temperature of the building where the emission unit is located should be modeled at 68° F per the definition of "standard conditions" in 567 IAC 22.1, unless the applicant can provide justification acceptable to the DNR that another temperature is representative of the interior building temperature. An emission point with a temperature equal to that of the ambient air should be modeled at 0° K (which instructs the model to vary the temperature of the source with the hourly ambient temperature in the meteorological dataset).

<u>NO_2 Tiering Methods</u>
EPA's "Guideline on Air Quality Models" (Appendix W of 40 CFR Part 51) recommends a 3-tiered screening approach to estimate ambient concentrations of NO_2.

Tier 1
Assume all emitted NO_x is converted to NO_2.

Tier 2
The default ARM2 (Ambient Ratio Method, version 2) option is based on multiplying an ambient ratio of NO_2/NO_x by a modeled NO_x concentration to estimate ambient NO_2 concentrations. These ratios are based on ambient levels of NO_2 and NO_x derived from national data from the EPA's Air Quality System (AQS). The ARM2 option applies an ambient ratio to the 1-hr modeled NO_x concentrations based on a formula derived empirically from ambient monitored ratios of NO_2/NO_x. The ARM2 option includes default upper and lower limits on the ambient ratio applied to the modeled NO_x concentration of 0.9 and 0.5, respectively. Per EPA guidance[17], ARM2 will produce appropriately conservative results for a Tier 2 demonstration using when either:
- Tier 1 (full conversion) 1-hour concentration is less than 150 ppb (282 µg/m^3), or
- The maximum NO2/NOX in stack ratio (ISR) of any source being modeled is less than 0.2.

If neither of these criteria are met, ARM2 may still be used by setting the minimum ARM2 ratio to match the maximum source ISR.

Tier 3
Perform a detailed analysis on a case-by-case basis using either the Ozone-Limiting Method (OLM) or Plume Volume Molar Ratio Method (PVMRM). Applicants planning to use either of these methods should include an explanation and justification of the input data in the modeling protocol.
- OLM: works best for large groups of sources, area sources, and near-surface releases, including roadway sources
- PVMRM: works best for relatively isolated and elevated point source modeling

EPA has issued a series of guidance memoranda describing the use of the 3-tiered approach.[18] The Tier 2 ARM2 method and the Tier 3 OLM and PVMRM methods are included as default options in the AERMOD dispersion model.

OLM and PVMRM require the specification of an in-stack ratio (ISR) for NO_2/NO_x, either for all modeled NO_2 sources or for each source individually. When an individual source ISR is specified, it will override the default ISR, if any. When possible, source-specific ISRs should be used[19]. Supporting data should be provided with the modeling analysis to justify

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[17] Memorandum dated September 30, 2014: "Clarification on the Use of AERMOD Dispersion Modeling for Demonstrating Compliance with the NO_2 National Ambient Air Quality Standard."

[18]Memorandum dated June 28, 2010: "Applicability of Appendix W Modeling Guidance to the 1-hour NO_2 National Ambient Air Quality Standard;" memorandum dated June 29, 2010: "Guidance Concerning the Implementation of the 1-hour NO2 NAAQS for the Prevention of Significant Deterioration Program;" memorandum dated March 1, 2011: "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour National Ambient Air Quality Standard;" Memorandum dated September 30, 2014: "Clarification on the Use of AERMOD Dispersion Modeling for Demonstrating Compliance with the NO_2 National Ambient Air Quality Standard." These documents can be obtained from the DNR or the EPA SCRAM website (https://www.epa.gov/scram).

[19]The EPA has provided a *NO$_2$/NO$_x$ In-Stack Ratio (ISR) Database* in which source-specific data can be both entered and/or utilized for Tier 3 OLM and PVMRM analyses; https://www.epa.gov/scram/nitrogen-dioxidenitrogen-oxide-stack-ratio-isr-database. Additionally,

a source's anticipated NO_2/NO_X in-stack ratios, such as manufacturer test data, state or local agency guidance, peer-reviewed literature, and/or the EPA's NO_2/NO_X ratio database. In the absence of this information, the default ISR of 0.5 should be used. The default ambient equilibrium ratio is 0.9, but with justification may be overridden. In a September 30, 2014 EPA memo, *Clarification on the Use of AERMOD Dispersion Modeling for Demonstrating Compliance with the NO2 National Ambient Air Quality Standard*, the EPA proposes the use of a separate default ISR of 0.2 for the more distant nearby sources (greater than 1-3 km away) included in a full impact modeling analysis.

Additionally, OLM and PVMRM require the inclusion of ozone background. The DNR provides hourly background ozone data on the [DNR's Background Data website](http://www.iowadnr.gov/Environmental-Protection/Air-Quality/Modeling/Background-Data)[20].

It should also be noted that all three tiers of NO_2 modeling are classified as screening techniques and therefore negative emission rates should not be used to account for emission reductions or increment expansion. An alternative method would be to perform a modeling analysis on the existing configuration and a separate modeling analysis on the proposed configuration to determine the change in predicted concentration.

Intermittent Sources
The assumption of continuous operation for intermittent emission sources would in many cases result in them becoming the controlling emission scenario for determining compliance with a 1-hour NAAQS. Based on guidance from the March 1, 2011, EPA Memo (*Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO$_2$ National Ambient Air Quality Standard[21]*), the "EPA believes the most appropriate data to use for compliance demonstrations for the 1-hour NAAQS are those based on emissions scenarios that are continuous enough or frequent enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations."

Based on EPA guidance, the DNR has concluded that any source that operates on a purely random schedule (including testing and maintenance) and is limited to operating for no more than 500 hours/yr can be considered an intermittent source. In addition, any source that meets the 500 hour/yr criterion but operates on a scheduled basis for testing and maintenance purposes, can be considered an intermittent source if the scheduled testing and maintenance is limited to the time of the day with the most favorable dispersion conditions (between 9 AM and 4 PM). Intermittent sources may be excluded from the 1-hour NO_2 and SO_2 NAAQS analyses. The protocol should include a discussion of how intermittent sources will be addressed.

Ancillary Sources
Ancillary sources include fire pumps, emergency (not back-up) generators, black start generators, and any other source that will only be operated when the rest of the facility is not (except for test and maintenance purposes). Ancillary sources must be evaluated as part of the PSD NAAQS evaluation; however they may be modeled in a separate analysis. All ancillary sources should be modeled to assure attainment with all applicable (short-term) NAAQS.

Building Downwash
A building downwash analysis shall be conducted using the most recent version of EPA's Building Profile Input Program with Plume Rise Enhancements (BPIP-Prime). Off-property buildings that affect downwash must also be included in this analysis. Buildings should be represented using their peak height. The use of multiple building tiers with varying heights to approximate a sloped roof is not acceptable. Lattice-type structures such as switchyards, water towers, elevated storage tanks, and portable equipment mounted on a movable base should be excluded from the downwash analysis. In some cases, differences in source and building base elevations can affect the building downwash calculations. Therefore, the downwash analysis should be conducted after the source and building base elevations have been input into the model.

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the California Air Pollution Control Officers Association (CAPCOA) Guidance Document on *Modeling Compliance of the Federal 1-Hour NO$_2$ NAAQS* may also be useful in determining source-specific ISRs.

[20] http://www.iowadnr.gov/Environmental-Protection/Air-Quality/Modeling/Background-Data
[21] https://www.epa.gov/sites/default/files/2020-10/documents/additional_clarifications_appendixw_hourly-no2-naaqs_final_03-01-2011.pdf

Receptor and Terrain Elevation Information

Ambient Air

Ambient air is defined in 567 IAC 22.1 as "that portion of the atmosphere, external to buildings, to which the general public has access. Ambient air does not include the atmosphere over land owned or controlled by the source and to which public access is precluded by a fence or other physical barriers." Refer to the 2019 EPA memo[22] for more information on ambient air. Receptors only need to be placed in ambient air locations. Include a description in the modeling protocol of the method that will be used to preclude public access from the portions of the property being excluded from ambient air. The ambient boundary described below is the part of the property where public access is precluded. Examples of precluding public access include but are not limited to: fences, sercuity guards, signs and/or video surveillance.

If adjacent facilities will be modeled together, and the boundary between them is not accessible to the general public, only the individual impacts from each facility need to be evaluated along the shared boundary.

Receptor Spacing Requirements

At a minimum, receptors should include a Cartesian grid with receptors spaced as follows:
- 50 m along the ambient boundary
- 50 m extending from the ambient boundary to 0.5 km
- 100 m extending from 0.5 km to 1.5 km
- 250 m extending from 1.5 km to 3 km
- 500 m extending from 3 km to 5 km

Additional receptors, spaced at 1000 meters, may be necessary beyond 5 km from the source. Receptor grids must be adequate in extent so that concentrations are decreasing at the edges of the grid. If there is a significant terrain rise near the edge of the grid, the grid should be extended to include the area of terrain rise. Fine grids (50 m) should be placed over the area(s) of maximum concentration to ensure that the true maximum concentration is identified.

The receptor grid used in the cumulative impact analysis may be limited to those receptors where the project is predicted to cause a significant concentration. This serves to decrease model runtime and simplifies the process of determining whether or not the project will significantly contribute to any modeled violations. However, it also has the side-effect of requiring that the receptor grid be redefined each time changes are made to the project because areas of significant impact may change. For this reason it may be beneficial to instead retain the full receptor grid. Receptors should also be placed at 50-meter intervals along each offsite facility's ambient boundary in the source impact analysis so that they will be carried forward into the cumulative impact analysis if necessary.

In projects where at least one non-project facility is identified in the modeling inventory, it will be necessary to conduct multiple analyses in order to accurately represent the impact on ambient air: the main analysis depicting the combined impact from all facilities on the shared ambient air, and one or more secondary analyses depicting the impact within the fence line or ambient air boundary of each non-project facility from all other sources. This is necessary in order to account for impacts from the project facility on the property of the other facilities in the modeling inventory. Conservatively including receptors within the fence lines of the non-project facilities in order to reduce the number of model runs should be avoided as this can dramatically overestimate the ambient concentration.

> Example:
> Facility A has applied for a PSD permit and two additional facilities (facilities B and C) have been identified in the modeling inventory as sources to include in the analysis.
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> In this example, three analyses should be conducted:
> 1. Shared Ambient Air – Sources from Facilities A, B, and C should be included in the model and receptors should be excluded within the ambient air boundary of all three facilities.

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[22] https://www.epa.gov/sites/production/files/2019-12/documents/revised_policy_on_exclusions_from_ambient_air.pdf

2. Impact on Facility B's Property – Sources from Facility A and C included in model with receptors within and along facility B's ambient air boundary.
3. Impact on Facility C's Property – Sources from Facility A and B included in model with receptors within and along facility C's ambient air boundary.

Applicants are encouraged to consider the effect that changes to their ambient air boundary might have on future modeling analyses and subsequent permitting. A change in the ambient air boundary alone will not trigger a modeling analysis, but the updated ambient air boundary should be reflected in future analyses.

Terrain Data
Whenever possible, the base elevations of the sources and buildings should be based on plant survey data. If this data is not available, the most recent version of AERMAP should be used to import terrain and source elevations from the National Elevation Dataset (NED). These data are available on the DNR's elevation data webpage[23].

All terrain that would intersect a line projected at a 10% slope from each and every receptor must be included in the AERMAP domain.

Depending on the topography, the base elevation of a source may not necessarily match the base elevation of the building on, or near, which it is located. This is most notable when a building is built into the side of a hill. When this occurs, the elevation of the source should be based on the natural contour of the hill – as if the land had not been graded when the building was constructed – and the stack height should be the height of the top of the stack above that base elevation. Stack heights are based on the elevation above the ground. Therefore, if the base elevation is set higher than it truly is, the stack height will be artificially taller. The base elevation of the building should be the lowest elevation along the base of the building, and its height should be the height of the peak of the roof above that elevation.
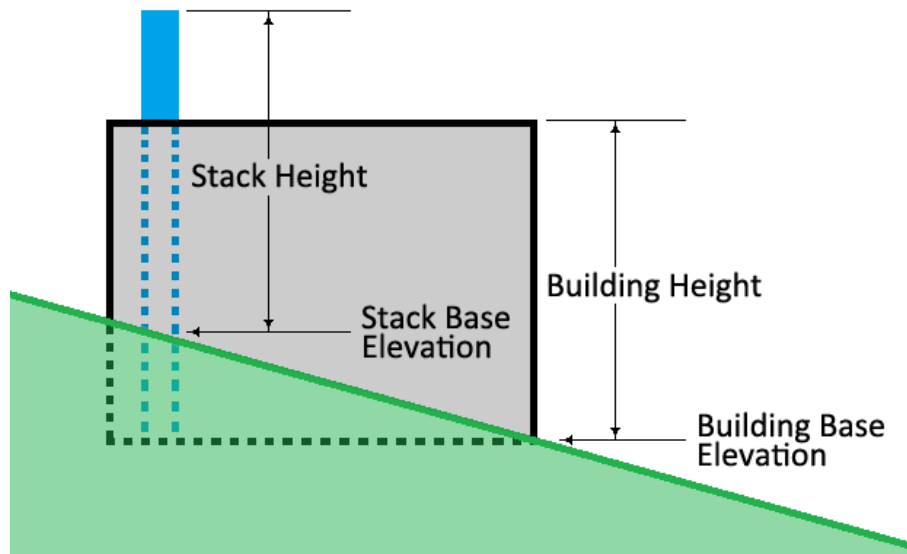
Meteorological Data
The DNR maintains pre-processed meteorological data for AERMOD for several National Weather Service (NWS) station locations. This data is available on the DNR's meteorological data webpage[24]. The website also contains a summary of the meteorological data that are appropriate for use in each Iowa county, as well as the representivity analysis that was conducted to determine the appropriate meteorological stations. The profile base should be set to the station elevation of the station being used. The meteorological data sets located on the website include information on the profile base elevations for each station. As deemed necessary, prognostic meteorological data that is appropriate for the location of the applicant's facility may be used with the prior approval of the DNR modeling team. Meteorological data sets other

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[23] http://www.iowadnr.gov/Environmental-Protection/Air-Quality/Modeling/Elevation-Data
[24] http://www.iowadnr.gov/Environmental-Protection/Air-Quality/Modeling/Meteorological-Data

than those provided on the website may be used with the prior approval of the DNR modeling team.

Determination of Impact on Air Quality

Source Impact Analysis

The purpose of this preliminary analysis is to evaluate the impact caused by the emissions from the project or the change associated with the modification. For projects that do not affect any existing sources this is accomplished by modeling only the new emission sources. If the project includes changes to the emission rates for existing sources the net change in emissions can be modeled. Projects involving changes to existing stack parameters will require special consideration. In these cases the stack parameters and emission rates associated with the emission units both before and after the modification should be input into the same model run, with the emission units before the modification modeled as negative emissions and the emission units after the proposed modification modeled as positive emissions, each with the appropriate stack parameters.

The predicted concentrations caused by the project should be compared to the appropriate SILs listed in Table 2. A source impact analysis that indicates a project will cause concentrations less than the applicable SILs shall be sufficient to demonstrate that the project will not cause or contribute to a violation of the corresponding NAAQS and Increment. As such, no further modeling is required for the applicable pollutant and averaging period. Projects that cause concentrations that exceed a SIL should continue to a cumulative impact analysis for the corresponding NAAQS.

Due to a January 22, 2013 court decision, the $PM_{2.5}$ SILs may only be used in this way if the difference between the NAAQS and the monitored background is greater than the SIL. Information related to determining the use of appropriate monitoring data for this evaluation can be found in EPA's July, 1987 "Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD)" document[25].

Table 2. Significant Impact Levels

Pollutant	Averaging Period	Significant Impact Levels ($\mu g/m^3$)	Modeling Value Rank ($\mu g/m^3$)
NO_2	1-hr	7.5[a]	H1H averaged over 5 years
	Annual	1[b]	H1H
SO_2	1-hr	7.9[c]	H1H averaged over 5 years
	3-hr	25[b]	H1H
$PM_{2.5}$	24-hr	1.2[b]	H1H averaged over 5 years
	Annual	0.3[d]	H1H averaged over 5 years
PM_{10}	24-hr	5[b]	H1H
CO	1-hr	2,000[b]	H1H
	8-hr	500[b]	H1H
O_3	8-hr	2[e]	H1H averaged over 5 years

[a] The 1-hour NO_2 SIL has not been formally proposed. The SIL listed above (4 ppb, or 7.5 $\mu g/m^3$) reflects EPA guidance presented in the U.S.EPA Memo, *General Guidance 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*, June 28, 2010.

[b] 567 IAC 33.3(20) and 40 CFR 51.165(b)(2)

[c] The 1-hour SO_2 SIL has not been formally proposed. The SIL listed above (3 ppb, or 7.9 $\mu g/m^3$) presented in the U.S.EPA Memo, *Guidance Concerning the Implementation of the 1-hour SO_2 NAAQS for the Prevention of Significant Deterioration Program*, August 23, 2010.

[d] EPA suggests a lower annual $PM_{2.5}$ SIL (0.13 $\mu g/m^3$) in their April 30, 2024 *Supplement to the Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program* document. The higher value presented here is in rule at 40 CFR 51.165(b)(2). Iowa statute prohibits the DNR from implementing a rule that is more stringent than the applicable federal regulation, so the DNR will continue to use 0.3 $\mu g/m^3$ until such a time that the federal regulation is changed.

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[25] https://www.epa.gov/sites/default/files/2015-07/documents/monguide.pdf

A Significant Impact Area (SIA) should be determined for each pollutant and averaging period that exceeds the applicable SIL. The SIA is a circular area with a radius that extends from the source to the most distant point where the modeling predicts concentrations equal to the SIL, or 50 kilometers, whichever is less. The SIA is determined for each averaging period for each pollutant with predicted concentrations equal to or greater than the SILs. The SIA for each pollutant is the largest SIA determined for all applicable averaging periods.

Cumulative Impact Analysis
Source Inventory
In addition to emissions from the project, the cumulative impact analysis considers emissions from any existing sources at the facility, nearby sources, and the growth associated with the new project. The existing sources to consider for inclusion in the cumulative impact analysis are all sources within the screening area (the annular area extending 50 kilometers beyond the SIA).

Once the extent of the SIA is determined contact the DNR. Adjacent facilities should be included in the modeling analysis if they have a Potential to Emit (PTE) that is greater than or equal to the applicable Significant Emission Rate (SER), or if the DNR has previously established that they need to be. The need to include an adjacent facility may be waived on a case-by-case basis (e.g. their emissions are unlikely to interact). Additional facilities within the screening area may also need to be included in the modeling analysis if their emissions would not be adequately captured as part of the background concentration. The DNR will provide this source inventory to the applicant along with all applicable emission rates and source parameters. If available, the DNR will also provide input files from previous modeling analyses which may help expedite the modeling analysis. The source parameters included in the source inventory will reflect the most recent data and should be used in lieu of the existing model parameters where they conflict. Since the cumulative impact analysis consists of separate modeling analyses for the NAAQS and the PSD increments, two separate modeling inventories may need to be developed. If the SIA or the screening areas extend into surrounding states, the DNR will coordinate with the appropriate agency to obtain the modeling inventory for those states. Note that the accuracy of the source inventory provided by the DNR is dependent on correct determination of the SIA.

NAAQS Modeling
Modeled attainment of the NAAQS is based on the total ambient impact from the sources exlipcitly included in the modeling analysis and the measured background levels. The NAAQS are listed in Table 3. Depending on the standard, the concentration that is compared to the NAAQS will vary. For example, the 3-hour SO_2 NAAQS must not be exceeded more than once per year, so the highest concentration at each receptor is ignored, and the highest of the remaining concentrations (highest-second-high, or "H2H") must be considered.

Table 3. NAAQS Levels for Modeling Applications

Pollutant	Averaging Period	NAAQS (µg/m³)	Modeling Value Rank
NO_2	1-hr	188	H8H averaged over 5 years
	Annual	100	H1H
SO_2	1-hr	196	H4H averaged over 5 years
	3-hr	1,300	H2H
$PM_{2.5}$	24-hr	35	H8H averaged over 5 years
	Annual	9.0	H1H averaged over 5 years
PM_{10}	24-hr	150	H6H out of entire 5-year period
CO	1-hr	40,000	H2H
	8-hr	10,000	H2H
Lead	3-month rolling average	0.15	H1H

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$)	Modeling Value Rank
O₃	8-hr	137	H4H averaged over 5 years

A separate source group should be included in the NAAQS analysis that represents the local facility cluster (a group of one or more contiguous facilities, which includes the applicant facility). The DNR will identify the sources included in the local facility cluster in the source inventory provided to the applicant. The results from this source group should be included in the analysis report to provide additional detail regarding the portion of the total predicted concentration that is attributable to emission sources in the immediate vicinity of the project source(s). This information is used by the DNR to determine if future projects in the area should be modeled.

Background Concentrations
Appropriate background concentrations must be added to modeled concentrations before compliance with the NAAQS can be determined. The background concentrations should be based on the pre-construction monitoring data if applicable. If pre-construction monitoring was waived due to concentrations less than the SMCs, the DNR maintains default background concentrations that can be used with no additional justification. Applicants may also propose site-specific background concentrations. The most recent data from a previously-approved site-specific background monitor may be used without additional justification. Current background concentrations, and guidance for proposing site-specific background concentrations, are available on the [DNR's background data webpage](#)[26].

PSD Increment Modeling
The PSD increments are the maximum allowable increase in concentration of a pollutant that can occur above the applicable baseline concentration. The baseline concentration is the ambient concentration of a pollutant existing at the time that the first complete PSD permit application affecting the area was submitted. All of Iowa is considered to be a Class II area. The Class II PSD increments are listed in Table 4. Please note the short term increments are based on the H2H.

Table 4. PSD Increments

Pollutant	Averaging Period	PSD Class II Increment ($\mu g/m^3$)
NO₂	Annual	25
SO₂	3-hr	512
	24-hr	91
	Annual	20
PM₂.₅	24-hr	9
	Annual	4
PM₁₀	24-hr	30
	Annual	17

The emissions to be included in the increment analysis are the actual emissions increases (or decreases) after the major source baseline date that are associated with construction at a major source, and the actual emissions increases (or decreases) at any stationary source after the minor source baseline date. Iowa baseline dates are listed in Table 5.

Table 5. Baseline Dates for Iowa

Pollutant	Major Source Baseline Date	Minor Source Baseline Date
NO₂	February 8,1988	March 14, 1988
SO₂	January 6, 1975	September 6, 1978
PM₁₀	January 6, 1975	Varies by location*

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[26] http://www.iowadnr.gov/Environmental-Protection/Air-Quality/Modeling/Background-Data

Pollutant	Major Source Baseline Date	Minor Source Baseline Date
PM$_{2.5}$	October 20, 2010	Varies by location*

*The minor source baseline date for PM$_{10}$ and PM$_{2.5}$ varies by location in the state of Iowa, and the PM$_{2.5}$ minor source baseline date has yet to be triggered in some locations. Refer to the baseline area map[27] for corresponding dates.

For short-term averaging periods, the difference between the current maximum actual emission rates and the maximum actual emission rates as of the applicable baseline date is modeled. The maximum actual emission rates are considered to be the highest occurrence for that averaging period during the previous two years of operation.

For the annual averaging period the difference between the current average actual emission rates and the average actual emission rates as of the applicable baseline date is modeled. In both cases the average actual emissions are calculated as the average over the previous two year period.

Many facilities do not have the necessary records to support the calculation of the change in actual emissions since the applicable baseline date. Therefore, as a conservative approach, the DNR recommends that the first level of the increment analysis be accomplished using the actual emissions from the previous two years for all emission sources included in the analysis. If this approach results in predicted concentrations above the applicable PSD increment, then the difference in actual emissions can be determined for the emission unit(s) contributing to the exceedances and the model rerun. This approach eliminates the need to calculate the difference in actual emissions for all increment consuming sources.

If the change in actual emissions included a change in stack parameters, then the stack parameters and emission rates associated with both the baseline case and the current case are input into the same model run, with the baseline case modeled as negative emissions and the current case modeled as positive emissions, each with the appropriate stack parameters.

Additional guidance related to the calculation of emission rates for PSD increment modeling can be found in EPA's draft "New Source Review Workshop Manual," (October 1990) and "Guidance for Ozone and Fine Particulate Matter Permit Modeling[28]" (July 2022).

Secondary PM$_{2.5}$ and Ozone Impacts
PM$_{2.5}$ and ozone are formed within the atmosphere from precursor gases such as SO$_2$, NO$_x$ and organics through gas-phase photochemical reactions or through liquid phase reactions in clouds and fog droplets. For procedures to adequately assess secondary PM$_{2.5}$ and ozone refer to the Appendix W guidelines, EPA's "Guidance for Ozone and Fine Particulate Matter Permit Modeling,"and EPA's guidance on Modeled Emission Rates for Precursors (MERPs), including EPA's interactive MERPs View Qlik webpage[29].

Modeled Violations
A construction permit can be issued when predicted violations of the NAAQS or PSD increments are modeled by demonstrating that the project's contribution to each violation does not exceed the applicable SIL(s) [567 IAC 33.3(20)]. If the project is predicted to significantly contribute to a modeled violation it can still be permitted by modifying new or existing sources to reduce the combined impacts below the NAAQS and PSD increments. If existing sources will be modified they must be modeled at their potential, or proposed allowable, hourly rates.

Additional Impact Analysis
An additional impact analysis must be conducted for all PSD projects. The purpose of this analysis is to make the public aware of the impacts the proposed project will have on residential, commercial, and industrial growth in the area, and on soils, vegetation, and visibility in the vicinity of the proposed project location. Therefore, data from the additional

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[27] https://www.iowadnr.gov/portals/idnr/uploads/air/dispmodel/minor_source_baseline_areas.zip
[28] https://www.epa.gov/system/files/documents/2022-07/Guidance_for_O3_PM25_Permit_Modeling.pdf
[29] https://www.epa.gov/scram/merps-view-qlik

impacts analysis must be presented so that it is logical and understandable to the interested public.

Growth Analysis
This analysis is an estimate of the projected residential, commercial, and industrial growth that will occur as a result of the PSD project and an estimate of the air emissions associated with this growth. Air emissions associated with any new growth predicted to result from the proposed project and the air emissions from the proposed PSD project are modeled together. The applicable background values are added to the resulting modeled concentrations and the results compared with the applicable NAAQS and PSD increments.

Often the new residential, commercial, and industrial growth estimated to occur as a result of the PSD project is negligible. In this case, further modeling analyses for growth is not necessary.

Soils and Vegetation Analysis
This analysis must be conducted for all PSD projects. Based on guidance from EPA Region VII, stating that predicted concentrations from the modeling analyses are below the SILs or the NAAQS is not adequate.

The soils and vegetation analysis is based on an inventory of the soils and vegetation types found in the area. The inventory of vegetation should include all vegetation with any commercial or recreational value. Once an inventory of soils and vegetation has been completed, a literature search is conducted to determine the sensitivity of these soils and vegetation to each of the applicable pollutants that will be emitted in significant amounts. This information should be compared to the predicted concentrations determined from the modeling analyses.

A screening tool has been developed by the DNR to aid in evaluation of potential impacts on soils and vegetation. The tool is primarily based on the EPA document "A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals" (EPA 450/2-81-078, December 1980). This tool and the associated background document are available on the DNR's dispersion modeling webpage[30].

Potentially sensitive vegetation species (such as soybeans) may require a more careful examination. Some species may be harmed by long-term exposure to low concentrations of pollutants. The analysis should evaluate predicted concentrations for the averaging periods addressed in the applicable vegetation impact studies. Since multiple pollutants may impact soils and vegetation synergistically, the combined impacts of NO_x and SO_2 (if applicable) should be evaluated. One reference for information on the relative sensitivities of plants to NO_2 is Table 9-6 of EPA's "Air Quality Criteria for Oxides of Nitrogen, Summary of Vegetation Impacts" Volume II, August 1993 (EPA 600/8-91/049bF). This document is also available at the website listed above.

Visibility Analysis
The applicant shall perform a visibility analysis to determine the impacts that the PSD project will have on sensitive areas such as state parks, wilderness areas, airports, scenic sites and overlooks. The DNR should be consulted prior to completing the visibility analysis to ensure that acceptable sensitive areas are considered.

The visibility analysis shall be conducted according to EPA's "Workbook for Plume Visual Screening and Analysis (Revised)" October 1992 (EPA-454/R-92-023). This analysis should be completed using the EPA's VISCREEN model. The purpose of the analysis is to determine the expected number of days in a year when a plume might be visible at the selected sensitive areas. For most sensitive areas in Iowa it is appropriate to limit the review to the maximum visual impacts for a SKY background from INSIDE the sensitive location. The VISCREEN model input and output files, and a summary of the expected number of days a plume might be visible at each sensitive area should be submitted to the DNR.

While a visibility analysis is required for all projects subject to PSD, only emissions of particulate matter and nitrogen oxides need be considered. A visibility analysis must still be conducted for PSD projects that do not exceed the significant

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[30] http://www.iowadnr.gov/Environmental-Protection/Air-Quality/Modeling

emission rates for particulate matter or nitrogen oxides. However, for projects with negligible emissions of both particulate matter and oxides of nitrogen, a simple statement of this fact will be sufficient to fulfill the visibility requirements of the additional impact analysis.

Screening Analysis for New Facilities
Level-1 Screening Analysis
The Level-1 screening analysis conducted with the VISCREEN model is conservative and relatively simple to run. The required inputs for performing the analysis are emission rates, distances, and the background visual range.

The facility-wide allowable short-term emissions of PM (including soot and primary sulfate) and NO_x (including primary NO_2) should be used. Both PM and NOx need to be accounted for in the visibility regardless of which pollutant triggered PSD. A visibility analysis is required for any PSD project if PM or NOx have any increase in emissions, even if neither pollutant triggered PSD. Alternatively, the emission rates used in the analysis can be limited to only those emission sources that are likely to cause a visible plume in the vicinity of the selected sensitive areas with prior approval from the DNR.

The required distances are: 1) the distance between the source and the area being observed and 2) the distance between the source and the observer location. These two distances may or may not be the same. The background visual range for Iowa is 40 kilometers.

From these inputs the VISCREEN model calculates visibility variables that can be compared to the standardized screening values. If the results of the Level-1 screening analysis exceed any of the applicable screening values, then a Level-2 screening analysis should be conducted.

Level-2 Screening Analysis
The Level-2 analysis is less conservative but is also more complex to perform. More specific information regarding the source, topography, regional visual range and meteorology is required for the Level-2 analysis. The worst-case plume conditions are determined by developing a joint frequency distribution. A tool for developing a joint frequency distribution is available on the DNR's [dispersion modeling webpage](http://www.iowadnr.gov/Environmental-Protection/Air-Quality/Modeling)[31].

Like the Level-1 screening analysis, the facility-wide allowable short-term emissions should be used, or, with prior approval from the DNR, the emissions can be limited to only those emission sources that are likely to cause a visible plume in the vicinity of the selected sensitive areas.

Screening Analysis for Modifications at Existing Major Facilities
If the analysis is being conducted for a modification to an existing major source, a net increase (or decrease) in the number of days with a visible plume at each sensitive area should be determined. Note that the thresholds used in VISCREEN are indications of whether or not a plume is perceptible, not the magnitude of change in perceptibility. In order to account for this, the analysis needs to be executed twice: once for the existing short-term (lb/hr) facility-wide emissions, and again for the proposed short-term facility-wide emissions. Using the joint-frequency distribution in the DNR's VISCREEN tool, the number of days with a visible plume before and after the project can be determined and the difference between the two can be calculated. This change in number of days with a visible plume should be summarized in the modeling report. Refer to the Information tab in the DNR's VISCREEN tool for additional instructions.

Condensation Plumes
Possible impairments to visibility on off-site roads adjacent to a facility due to the condensation of plumes will be considered on a case-by-case basis. Sources of condensation plumes that could impair visibility include, but are not limited to, cooling towers and scrubber exhausts.

Class I Area Impact Analysis

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[31] http://www.iowadnr.gov/Environmental-Protection/Air-Quality/Modeling

All PSD projects for facilities that propose to locate within 100 kilometers of a Class I area must conduct a Class I area impact analysis. In addition, PSD projects for facilities proposing to locate at a distance greater than 100 kilometers that are large enough that they may have an impact on a Class I area, must conduct a Class I area impact analysis. There are currently no Class I areas located within the state of Iowa or within 100 kilometers of Iowa's borders. During review of the submitted modeling protocol, the DNR will determine if the PSD project is large enough to require a Class I area impact analysis.

The closest Class I areas to Iowa are the Boundary Waters National Wilderness Area and Voyageurs National Park in Minnesota, Badlands National Park in South Dakota, and Hercules-Glades and Mingo National Wilderness Areas in Missouri.

Modeling Data Submittal Requirements
Modeling Report and Source Summary
A modeling report should be included that summarizes the air dispersion model inputs, methodology, and results relative to all applicable standards and guidelines. The modeling report should include a summary of the source emission rates and parameters for all new and existing sources:
- Hourly emission rates for all applicable pollutants
- Stack height
- Diameter (or dimensions if rectangular)
- Flow rate (specify acfm or scfm)
- Temperature
- Exhaust type (vertical, obstructed, horizontal, etc.)
- Dimensions of fugitive sources (if applicable)
- Any enforceable operating restrictions

The summary must include all sources that were included in the modeling analysis, not just those that are a part of the project. The summary must contain enough detail so that the modeling team can easily verify every emission rate and source parameter used in the analysis. The modeling report must also indicate the reference(s) from which the emission rates and source parameters were obtained (i.e. permit numbers, etc.).

Site Plan
A site plan must be submitted with any construction permit application that will require a modeling analysis. The site plan MUST contain ALL of the following:
- A North arrow oriented with true north, not plant north.
- A graphical scale (a printed bar on the map with tick marks indicating the true scale of the plot plan). A simple statement of "1 inch equals 10 feet" is not adequate by itself. The reason for this is that, when the map is enlarged or reduced, the true scale is no longer evident. When a graphical scale bar is printed on the map, it is resized along with the map if reduced in size for shipping, etc.
- All solid structures (buildings) on the facility property and the surrounding area (if they could influence plume downwash at the facility in question) must be shown along with the peak height of each building and/or tier. Lattice-type structures, such as substations, should not be included on the site plan.
- All emission points should be shown on the plot plan and must be labeled, including internal emissions and fugitive emissions (storage piles, haul roads, etc.).
- The property line, the fence line, and any other boundary that would preclude the public access, must be shown on the map. If necessary, a separate, smaller scale map may be included with the submittal to show the full extent of the boundaries.

The site plan may be submitted in either hard copy or electronic format. If submitted electronically it should be in AutoCAD's DWG or DXF formats. Alternatively, the site plan may be converted into a PDF file (Adobe Acrobat) or any type of image file (BMP, JPG, TIF, etc.). Site plans that are submitted electronically allow the modeling team to import them directly into the modeling software, which tends to simplify and shorten the review process.

Modeling Files
All dispersion model, BPIP-PRIME, and AERMAP input and output files should be submitted to the DNR for review. Data obtained from the DNR, such as terrain or meteorological files, do not need to be submitted.

Electronic File Media
Electronic files can be compressed and attached to the permit application within Iowa EASY Air as a ".zip" file. They may also be emailed to the modeler assigned to the project, if known. Email attachments must be limited to 10 MB, and may not contain an ".exe" or ".zip" file extension. Alternatively they can be submitted on a CD, DVD, or flash drive.