INTERSTATE POWER & LIGHT COMPANY

PSD Class II Air Dispersion Modeling Protocol

Morgan Valley Energy Center

PROJECT NO. 185510

REVISION 0

APRIL 20, 2026

Contents

Tables

List of Abbreviations

Abbreviation	Term/Phrase/Name
°F	degrees Fahrenheit
μg/m³	micrograms per cubic meter
AERMAP	AMS/EPA Regulatory Model's terrain pre-processor
AERMOD	AMS/EPA Regulatory Model
AQB	Air Quality Branch (AQB)
ARM2	Ambient Ratio Method 2
BPIPPRM	Building Profile Input Program – Plume Rise Model Enhancements
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
EMISFACT	emissions factor
EPA	U.S. Environmental Protection Agency
GEP	good engineering practice
H_2SO_4	sulfuric acid mist
HHV	Higher Heating Value
Iowa DNR	Iowa Department of Natural Resources
IPL	Iowa Power and Light Company
Linn County AQB	Linn County Health Department AQB
MECL	minimum emission compliance load
MERPs	Modeled Emission Rates for Precursors
MMBtu/hr	British thermal units per hour
NAAQS	National Ambient Air Quality Standards
NAD 83	North American Datum of 1983
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
OLM	Ozone Limiting Method
PM	particulate matter
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PSD	Prevention of Significant Deterioration

Abbreviation	Term/Phrase/Name
Project	Morgan Valley Energy Center
PVMRM	Plume Volume Molar Ratio Method
SIL	significant impact level
SO_2	sulfur dioxide
UTM	Universal Transverse Mercator
VOC	volatile organic compounds

Executive Summary

Interstate Power and Light Company (IPL) is proposing to install three (3) simple-cycle combustion turbines, to be called the Morgan Valley Energy Center, at a greenfield site located in Linn County, Iowa (Project). This Project is intended to help meet projected electrical demand for IPL's customers. Each turbine will have a maximum heat input of 2,270 million British thermal units per hour (MMBtu/hr) (Higher Heating Value, HHV) when firing natural gas, based on ambient conditions of -40 degrees Fahrenheit (°F) and 75 percent humidity. In addition to the turbines, four natural gas hot water boilers, an emergency diesel generator, an emergency diesel fire pump, two fuel oil belly tanks, comfort building heaters, haul road traffic fugitives, natural gas piping components, and circuit breakers will be part of this Project.

Submittal of this protocol will allow the Air Quality Branch (AQB) at Linn County Health Department (Linn County AQB) and Iowa Department of Natural Resources (Iowa DNR) to review and comment upon the methodology to be employed in the modeling analysis. This modeling protocol has been drafted in accordance with the U.S. Environmental Protection Agency (EPA) and Iowa DNR modeling guidelines (EPA, 2024; Iowa DNR, 2025).

1.0 Project Description

The Project is a listed source that exceeds the major source threshold; therefore, the Project will be a major source subject to PSD. The Project potential emissions have not been finalized; however, preliminary estimated air emissions indicate the PSD significance level will be exceeded for several pollutants, as shown in Table 1-1. Based on the preliminary estimated potential emissions shown in Table 1-1, it is expected that nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), total particulate matter (PM), particulate matter less than 10 microns and 2.5 microns in diameter (PM_{10} and $PM_{2.5}$), and carbon dioxide equivalent (CO_2e) will be subject to PSD review. Although Table 1-1 shows sulfur dioxide (SO_2) and sulfuric acid (H_2SO_4) mist emissions below their respective PSD significance thresholds, IPL intends to preserve optionality for its customers. Therefore, IPL is including SO_2 and H_2SO_4 mist in the pollutants subject to BACT review. As a result, air dispersion modeling will be required for NO_x, CO, SO_2, PM_{10}, and $PM_{2.5}$. Consistent with Iowa DNR and EPA guidance, modeling of PM, VOC, H_2SO_4 mist and CO_2e will not be conducted, since there are no ambient air quality standards for these pollutants.

The Project will be constructed in Linn County, which is in attainment or unclassifiable for all criteria pollutants.

Table 1-1: Preliminary Estimated Potential Emissions and PSD Significance Levels for the Project

Pollutant[a]	Preliminary Estimated Potential Emissions[b] (tons per year)	PSD Significance Level[c] (tons per year)
NO_x	**319**	40
CO	**1,152**	100
SO_2	18.0	40
VOC	**105**	40
PM	**61.6**	25
PM_{10}[d]	**61.6**	15
$PM_{2.5}$[d]	**61.6**	10
CO_2e	**1,516,388**	75,000[e]
H_2SO_4 mist	2.7	7
Lead	5.2×10^{-5}	0.6

(a) NO_x = nitrogen oxide, CO = carbon monoxide, SO_2 = sulfur dioxide, VOC = volatile organic compounds, PM = particulate matter, PM_{10} = particulate matter less than 10 microns in diameter, $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter, CO_2e = carbon dioxide equivalent, H_2SO_4 mist = sulfuric acid mist
(b) Numbers in **bold** indicate potential emissions greater than PSD significant emission rate (SER)
(c) 40 CFR 52.21(b)(23)(i)
(d) Filterable plus condensable
(e) 40 CFR 52.21(b)(49)(iv)(a)

2.0 Modeling Methodology

IPL proposes to use the most current version of the AMS/EPA Regulatory Model (AERMOD) for the air quality analysis (Version 24142). The AERMOD model is an EPA-approved, steady-state Gaussian air dispersion model that is designed to estimate downwind ground-level concentrations from single or multiple sources using detailed meteorological data.

The following model options will be used:

- Elevated Terrain Algorithms
- Stack-tip Downwash
- Gradual Plume Rise
- Buoyancy-induced Dispersion
- Calms and Missing Data Processing Routine
- Calculate Wind Profiles
- Default Vertical Potential Temperature Gradient
- Rural Dispersion

Details of the AERMOD modeling options may be found in the User's Guide for AERMOD (EPA, 2024). The regulatory default option will be selected for this analysis.

2.1 Model Parameters

It is expected that NO_x, CO, PM, PM_{10}, $PM_{2.5}$, VOC, SO_2, H2SO4 mist and CO_2e will be subject to PSD review, and air dispersion modeling will be performed for NO_x, CO, SO_2, PM_{10}, and $PM_{2.5}$. Consistent with EPA guidance, modeling of PM, VOC, H_2SO_4 mist and CO_2e will not be conducted since there are no ambient air quality standards for these pollutants.

Modeling runs will be conducted at full load and partial loads of the combustion turbines when firing natural gas along with other Project sources to confirm that operation of the Project will not result in impacts greater than the National Ambient Air Quality Standards (NAAQS) and PSD Class II Increments. The combustion turbine emission rates will represent projected worst-case ambient conditions at 100%, 70%, and minimum emission compliance (MECL) load (MECL = 50% load) and include start-up and shutdown emissions. The annual emissions will be based on worst-case annual emissions and will be calculated using the methodology outlined in Table 8-2 of Appendix W to 40 CFR Part 51.

The following preliminary Project equipment will be included in the modeling analysis:

- Three natural gas-fired simple-cycle combustion turbines
- Four natural gas-fired hot water boilers
- One emergency diesel generator
- One emergency diesel fire pump
- Haul road traffic fugitive emissions
- Natural gas comfort building heaters

2.2 Intermittent Emissions

IPL proposes to only model sources with continuous operation for the 1-hour standard for nitrogen dioxide (NO_2) and 1-hour SO_2 modeling analyses. Emission units that do not have a set operating schedule, operate for short periods of time during the year, and do not contribute to the normal operation of the facility will not be included in the 1-hour NO_2 and 1-hour SO_2 modeling analysis.

The emergency diesel generator and emergency diesel fire pump will be limited to 500 hours per year and will operate on a random schedule (including testing and maintenance). Therefore, the emergency diesel generator and emergency diesel fire pump will be considered intermittent sources and will not be included in the 1-hour NO_2 and 1-hour SO_2 modeling analysis.

2.3 Ancillary Sources

The emergency diesel generator and emergency diesel fire pump will only be operated when Morgan Valley Energy Center is offline, except for testing and maintenance purposes. The emergency diesel generator and emergency diesel fire pump will be included in a separate PSD NAAQS evaluation and jointly modeled to demonstrate compliance with all applicable short-term NAAQS, including the 1-hour and 8-hour CO, 24-hour $PM_{2.5}$, 24-hour PM_{10}, and 3-hour SO_2 averaging periods.

2.4 Haul Roads

Fugitive emissions from haul road traffic will be minimal. To mitigate onsite road emissions from miscellaneous deliveries, IPL will pave the primary facility roads. The haul roads included in the model will be laid out using the guidance outlined in the March 2, 2012 EPA memo: *Haul Road Workgroup Final Report* (EPA, 2012). The following parameters will be used:

- Vehicle height of 12 feet
- Road width of 20 feet
- Top of plume height = 1.7 x vehicle height = 20.40 feet or 6.22 meters
- Volume source release height = 0.5 x top of plume height = 10.20 feet or 3.11 meters
- Width of plume = road width + 6 meters for two lane roadways = 39.69 feet or 12.10 meters
- Initial sigma z = top of plume / 2.15 = 9.49 feet or 2.89 meters
- Initial sigma y = width of plume / 2.15 = 18.46 feet or 5.63 meters
- Adjacent volume source spacing = sigma y x 2.15 = 39.69 feet or 12.10 meters

2.5 Scaling Factors

Emissions factor (EMISFACT) modeling options in AERMOD allow a user to model emissions only when certain criteria are met. EMISFACT will be used to model the appropriate hourly restrictions on any equipment activities that only occur over a certain number of hours per day or seasons per year. If this option is utilized, a more detailed breakdown of operation times will be presented with the final modeling analysis. IPL understands that hourly restrictions in the modeling will likely result in corresponding permit limitations.

2.6 Rain Caps and Horizontal Stacks

If horizontal stacks or rain caps are present at the site, the restriction of vertical flow is accounted for through the use of the POINTCAP or POINTHOR keywords within the AERMOD input file. Any stack that is equipped with a rain cap or vents horizontally will be identified in the air permit application submittal.

2.7 Building Wake Effect (Downwash)

Sources are subject to good engineering practice (GEP) stack height requirements outlined in 40 Code of Federal Regulations (CFR) Part 51, Sections 51.100 and 51.118. As defined by the regulations, GEP height is calculated as the greater of 65 meters (measured from the ground level elevation at the base of the stack) or the height resulting from the following formula:

$$GEP = H + 1.5L$$

Where,

H = the building height; and

L = the lesser of the building height or the greatest crosswind distance of the building, also known as maximum projected width.

To meet stack height requirements, the point sources will be evaluated in terms of their proximity to nearby structures. The purpose of this evaluation is to determine if the discharge from each stack will become caught in the turbulent wake of a building or other structure, resulting in downwash of the plume. Downwash of the plume can result in elevated ground-level concentrations. In EPA's 1985 Guideline for Determination of Good Engineering Practice Stack Height, EPA provides guidance for determining whether building downwash will occur. The downwash analysis will be performed consistent with the methods prescribed in this guidance document.

Calculations for determining the direction-specific downwash parameters will be performed using the most current version of the EPA's Building Profile Input Program – Plume Rise Model Enhancements, otherwise referred to as the BPIPPRM downwash algorithm (Version 04274). Structures that are not considered to be solid (and therefore would not cause downwash effects) will not be included in the model. The BPIPPRM files will be submitted to Iowa DNR as part of the final modeling submittal.

2.8 Receptor Grid

The modeling runs will be conducted using the AERMOD model in simple terrain mode within a 10- by 10-kilometer Cartesian grid. Based on Iowa DNR guidelines, the grid will incorporate the receptor spacing specified in Table 2-1. Receptors will also be placed along the fence line boundary at a spacing of 50 meters.

Table 2-1: Receptor Spacing from Fence Line Boundary

Distance from Fence Line Boundary (kilometers)	Receptor Spacing (meters)
0 – 0.5	50
0.5 – 1.5	100
1.5 – 3	250
3 - 5	500

Source: Iowa DNR, *Air Dispersion Modeling Guidelines for PSD Projects*, 2025

Terrain elevations will be incorporated into the model using data available on Iowa DNR's elevation data website. North American Datum of 1983 (NAD 83) will be used to develop the Universal Transverse Mercator (UTM) coordinates.

AERMOD has a terrain preprocessor (AERMAP) which uses gridded terrain data for the modeling domain to calculate not only a XYZ coordinate, but a representative terrain-influence height associated with each receptor location selected. This terrain-influenced height is called the height scale and is separate for each individual receptor. AERMAP (Version 24142) will utilize the electronic elevation data to populate the model with receptor elevations.

2.9 Meteorological Data

AERMOD requires a preprocessor called AERMET to process meteorological data for 5 years from offsite locations to estimate the boundary layer parameters for the dispersion calculations. AERMET requires the input of surface roughness length, albedo, and Bowen ratio to define land surface characteristics for its calculations. Iowa DNR provides AERMOD-ready processed meteorological data sets; therefore, the site characteristics (Bowen ratio, albedo, surface roughness) were completed by Iowa DNR.

Surface air meteorological data from Cedar Rapids (Station ID 14990) and upper air data from Davenport (Station ID 94982) will be used in the analysis. The most recent 5-year data set available covers the period of 2020 to 2024. A profile base elevation of 256 meters will be used in the model. The meteorological data used to develop these data sets has been analyzed by Iowa DNR for data completeness, and these data sets have good data quality.

2.10 Selection of Dispersion Option (Land Use)

Per Iowa DNR's *Air Dispersion Modeling Guidelines for PSD Projects*, there are currently no portions of the state for which the urban modeling option should be used. Therefore, the rural dispersion coefficients option in the AERMOD model will be selected.

2.11 Ambient Monitoring

The modeling analysis for emission sources for the Project will also address the pre-construction monitoring provision of the PSD regulations (EPA, 1987). The regulations specify monitoring *de minimis* levels for each PSD pollutant that, if exceeded, trigger the requirement to perform one year of pre-construction ambient air monitoring. If modeled values exceed their respective monitoring *de minimis* values, IPL will request a waiver to use local ambient monitoring data to fulfill the pre-construction monitoring provisions of the PSD regulations or develop an acceptable monitoring plan at that time. For any impacts predicted to be below the monitoring *de minimis* levels, IPL will request an exemption from pre-construction ambient air monitoring.

PM_{10}, $PM_{2.5}$, NO_2 and CO preliminary modeling results indicate that maximum Project modeled impacts will be greater than their respective monitoring *de minimis* levels. IPL is requesting that existing monitoring sites be considered representative of the site conditions to fulfill the pre-construction monitoring provisions for PM_{10}, $PM_{2.5}$, NO_2 and CO.

In accordance with EPA documentation (EPA, 1987), three criteria are considered when selecting a representative existing ambient air monitor to represent ambient air concentrations for a Project. These three criteria are:

- Monitor location
- Use of current data
- Data quality

Further discussion on these three criteria is presented below.

2.11.1 PM_{10} and $PM_{2.5}$ Pre-construction Monitoring

The most representative monitor for the PM_{10} and $PM_{2.5}$ background concentrations is the Public Health monitor located in Cedar Rapids. This monitor is one of the closest operating PM_{10} and $PM_{2.5}$ monitors to the Project site and has been selected based on proximity, data quality, and land-use comparability. The PM_{10} and $PM_{2.5}$ 24-hour and annual background concentration for the Public Health monitor is listed in Table 2-2.

2.11.1.1 Identification and Distance Review of PM_{10} and $PM_{2.5}$ Monitors

Per the distance review, there are two $PM_{2.5}$ monitors and one PM_{10} monitor within 50 kilometers of the Project site:

- PM_{10} and $PM_{2.5}$ monitor: Public Health monitor (19-113-0040), Cedar Rapids, Iowa – 12 kilometers northwest
- $PM_{2.5}$ monitor: Hoover School monitor (19-103-2001), Iowa City, Iowa – 43 kilometers

The selected Public Health monitor is in the vicinity of the Project site and provides both PM_{10} and $PM_{2.5}$ data.

2.11.1.2 Data Quality

Data quality was a factor in the selection of the proposed PM_{10} and $PM_{2.5}$ monitor. Per 40 CFR Part 50 Appendix K (for PM_{10}) and Appendix N (for $PM_{2.5}$), a year meets data completeness criteria when quarterly data capture rates for all four quarters are at least 75 percent. The Public Health monitor was reviewed for completeness and has been confirmed that all data years for PM_{10} and $PM_{2.5}$ are more than 75 percent complete. Therefore, the selected monitor meets the completeness requirement.

2.11.1.3 Land Use

Land use was considered in the selection of the representative monitor. Monitored concentrations should represent the land use within the immediate vicinity of the site, as much as practicable. The Public Health monitor is located within a developed industrial/urban area in downtown Cedar Rapids. The Project site will be located directly west of Cedar Rapids, just outside of the city limits, within an area characterized primarily by agricultural and rural residential land uses. The selection of the Public Health monitor is conservative and due to the Project site's proximity to the broader Cedar Rapids urban/industrial corridor, the Public Health monitor is the most representative monitor for PM_{10} and $PM_{2.5}$ concentrations for the Project site.

2.11.2 NO_2 Pre-construction Monitoring

The most representative monitor for the NO_2 background concentration is Lake Sugema State Park (AQS ID 19-177-0006) monitor located in Keosauqua, Iowa. This section summarizes the selection of this monitor as the most representative of the Project site. The NO_2 1-hour and annual background concentration for the Lake Sugema monitor is listed in Table 2-2.

2.11.2.1 Identification and Distance Review of NO_2 Monitors

Per the distance review, there are two NO_2 monitors within 200 kilometers of the Project site:

- Lake Sugema State Park II (19-177-0006), Keosauqua, Iowa – 142 kilometers
- Davenport monitor (19-163-0015), Davenport, Iowa – 113 kilometers

Although the Davenport monitor is geographically closer to the Project site, the Lake Sugema monitor was selected because its location and surrounding land use characteristics are more representative of the Project area. The Lake Sugema monitor better reflects the regional background air quality conditions relevant to the Project, while the Davenport monitor is influenced by urban emission sources not characteristic of the Project setting.

2.11.2.2 Data Quality

Data quality was a factor in the selection of the proposed NO_2 monitor. Per 40 CFR Part 50 Appendix S, a year meets data completeness criteria when quarterly data capture rates for all four quarters are at least 75 percent. The selected monitor was reviewed for completeness and has been confirmed that all data years for NO_2 are more than 75 percent complete. Therefore, the selected Lake Sugema monitor meets the completeness requirement.

2.11.2.3 Land Use

Land use was considered in the selection of the representative monitor. Monitored concentrations should represent the land use within the immediate vicinity of the site, as much as practicable. The Lake Sugema monitor more accurately reflects the area surrounding the Project Site compared to the Davenport monitor, which is situated in a urbanized area. Based on Iowa DNR's urban/rural analysis using CAMx, Lake Sugema is more representative of Cedar Rapids. Therefore, the use of the Lake Sugema monitor is representative of the Project site.

2.11.3 CO Pre-construction Monitoring

The most representative monitor for the CO background concentrations is the Davenport monitor. This monitor is one of the closest operating CO monitors to the Project site and has been selected based on proximity, data quality, and land-use comparability. The CO 1-hour and 8-hour background concentration for the Davenport monitor is listed in Table 2-2.

2.11.3.1 Identification and Distance Review of CO Monitors

A review of nearby ambient air monitors indicates that the Davenport monitor is located approximately 113 kilometers from the site.

2.11.3.2 Data Quality

Data quality was a factor in the selection of the proposed CO monitor. Per 40 CFR Part 58 Appendix D, a year meets data completeness criteria when quarterly data capture rates for all four quarters are at least 75 percent. The Davenport monitor was reviewed for completeness and has been confirmed that all data years for CO are more than 75 percent complete. Therefore, the selected monitor meets the completeness requirement.

2.11.3.3 Land Use

Land use was considered in the selection of the representative monitor. Monitored concentrations should represent the land use within the immediate vicinity of the site, as much as practicable. The Davenport monitor is located in a developed industrial/urban area, while the proposed Project will be in Linn County, a smaller urban center with rural surroundings. Although Davenport is more urbanized, both locations share industrial characteristics. Given the proximity and land-use similarities, the Davenport monitor is most representative monitor for CO concentrations at the Project site.

2.12 NAAQS and PSD Class II Increment Analysis

When the maximum impacts exceed the significant impact level (SIL) for any pollutant and averaging time, then a refined modeling analysis is required. The inventories of sources within the radius of impact will be developed in accordance with applicable EPA guidance and obtained from Linn County AQB. For the NAAQS and PSD Class II Increment analysis, all stationary sources identified by Linn County AQB that emit pollutants subject to this analysis and are located within the radius of impact will be addressed.

Background air quality concentrations will be added to model-predicted concentrations for comparison to the NAAQS. If the refined analysis does not result in any concentrations above the NAAQS or PSD Class II Increments, no further modeling will be conducted.

2.13 Background Air Quality

If any pollutant exceeds its respective significance level, a refined analysis (cumulative analysis) will be performed for that pollutant and averaging period. This analysis will be used to determine compliance with the PSD Class II Increments and NAAQS. The NAAQS are set up to protect the air quality for all sensitive populations, and attainment is determined by the comparison to the NAAQS thresholds. As such, the existing concentrations of each criteria pollutant present in ambient air must be included in an analysis to account for items such as mobile source emissions that are not accounted for in the model. Ambient monitor emission levels will be added to the modeled ground level impacts to account for these sources.

Selected background values for the NO_2 annual and 1-hour averaging periods, CO 8-hour and 1-hour averaging periods, PM_{10} 24-hour averaging period, and $PM_{2.5}$ annual and 24-hour averaging periods are based on Iowa DNR site-specific concentration data (Iowa DNR, 2025). The background values listed in Table 2-2 will be added to the modeled impacts for each pollutant if NAAQS modeling is required.

Table 2-2: Background Concentrations

Pollutant	Averaging Period	Background Concentration[a] (micrograms per cubic meter)
NO_2	Annual	4
	1-hour	13
CO	8-hour	1,300
	1-hour	1,500
PM_{10}	24-hour	49
$PM_{2.5}$	Annual	7.4
	24-hour	16

(a) Iowa DNR, Site-Specific Background Concentration Data, 2025

2.14 NO_2 Modeling – Multi-Tiered Screening Analysis

The AERMOD model predicts ambient concentrations for all modeled pollutants, including NO_x; however, NO_2 concentrations must be evaluated for comparison to the NAAQS, PSD Class II Increments, and significance values. The EPA has a three-tier approach to modeling NO_2 concentrations:

- Tier I – total conversion, or all $NO_x = NO_2$
- Tier II – use the Ambient Ratio Method 2 (ARM2)
- Tier III – case-by-case detailed screening methods, such as the Ozone Limiting Method (OLM) or Plume Volume Molar Ratio Method (PVMRM)

At this time, it is expected that the Tier II approach will be used for the 1-hour and annual NO_2 analyses. Tier II of the Ambient Ratio Method (ARM2) uses a minimum and maximum ratio that varies based on the modeled level of NO_x. For the 1-hour and annual modeled results, the default minimum and maximum ratios of 0.5 and 0.9, respectively, will be applied to determine the predicted ground-level concentration of NO_2. Due to the ARM2 modeling algorithm limitation to grouped sources, each source group will be modeled in a separate AERMOD run for the NO_2 analysis. It is not expected that Tier III methodologies will be necessary for this air quality analysis. If a Tier III method is used, IPL will consult with Iowa DNR to receive concurrence on the methodologies, and a revised protocol will be submitted that includes the methodology proposed along with full documentation and technical justification for the associated model input parameters.

3.0 Modeling Thresholds

The modeling results will be presented in the final air permit application submittal. The modeled impacts will be compared to the applicable NAAQS, significant monitoring concentration, SILs, and PSD Class II Increment thresholds shown in Table 3-1.

Table 3-1: NAAQS, Modeling and Monitoring Significance Levels, and PSD Class II Increment

Pollutant	Averaging Period	Significant Impact Level[a]	Significant Monitoring Concentration[b]	PSD Class II Increment[c]	NAAQS[d]
		micrograms per cubic meter (μg/m³)			
NO_2	Annual	1	14	25	100
	1-hour	7.5	NA	NA	188
CO	8-hour	500	575	NA	10,000
	1-hour	2,000	NA	NA	40,000
PM_{10}	Annual	1	NA	17	NA
	24-hour	5	10	30	150
$PM_{2.5}$	Annual	0.3[e]	0	4	9
	24-hour	1.2[e]	0	9	35
SO_2	24-hour	NA	13	91	NA
	3-hour	25	NA	512	1,300
	1-hour	7.9	NA	20	196

(a) Title 40 CFR 51.165(b)(2)
(b) Title 40 CFR 52.21(i)(5)(i)
(c) Title 40 CFR 52.21(c)
(d) Title 40 CFR Part 50
(e) EPA suggests a lower annual $PM_{2.5}$ SIL (0.13 μg/m³) in EPA Memorandum, 2024, *Updates to the Guidance for Ozone and Fine Particulate Matter Permit Modeling*. Iowa statue 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 μg/m³ until such a time that the federal regulation is changed.

The Project emissions will be modeled using the appropriate form of the standard for each pollutant and averaging period. For significance modeling, all short-term and annual averaging periods will be modeled and compared to the modeling significance levels in Table 3-2. For PSD Class II Increment, the short-term averaging periods will be compared to the high second highest impacts, and the annual standards will be compared to the first highest impacts. The NAAQS thresholds will be modeled using the highs shown in Table 3-2 for each averaging period.

Table 3-2: Modeled Highs

Pollutant	Averaging Period	Significant Impact Level High[a]	NAAQS Modeled High[b]
NO_2	Annual	1st highest	1st highest
	1-hour	5-year average 1st high hour day	5-year average 8th high hour day
CO	8-hour	1st highest	High 2nd highest
	1-hour	1st highest	High 2nd highest
PM_{10}	Annual	1st highest	NA
	24-hour	1st highest	6th highest in 5 years
$PM_{2.5}$	Annual	5-year average year	5-year average year
	24-hour	1st highest	5-year average 8th high day
SO_2	3-hour	1st highest	High 2nd highest
	1-hour	5-year average 1st high hour day	5-year average 4th high hour day

(a) Title 40 CFR 51.21(b)(2)
(b) Title 40 CFR 50

4.0 Secondary Formation Analysis

An analysis of the impact of secondary formation of ozone (NO_x and VOC) and $PM_{2.5}$ (NO_x and SO_2) will be performed. The Modeled Emission Rates for Precursors (MERPs) methodology will be used to satisfy the compliance demonstration requirements for both ozone and secondary $PM_{2.5}$ for PSD purposes. The demonstration will follow the methodology outlined in Clarification on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier I Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program (MERPs Guidance) (EPA, 2024). The Tier 1 assessment in the MERPs Guidance uses existing empirical relationships between precursors and secondary impacts based on modeling performed by the EPA. MERPs will be used to describe an emission rate of a precursor that is expected to result in a change in ambient ozone or $PM_{2.5}$ that would be less than a specific air quality concentration threshold for ozone or $PM_{2.5}$ to determine whether an impact causes or contributes to a violation of the NAAQS for ozone or $PM_{2.5}$. The MERPs Guidance will be followed to determine ozone and secondary $PM_{2.5}$ impacts and presented in the air permit application submittal.

5.0 Additional Impact Analysis

The additional impacts analysis requirement under PSD will include the ambient air quality impact analysis, soils and vegetation impacts, visibility impairment, and growth analysis on Class II areas. This analysis will follow EPA's guidance provided in the New Source Review Workshop Manual (EPA, 1990).

The growth analysis will quantify the number of employees, the availability of housing in the area, and associated commercial and industrial growth, and construction related activities and mobile sources. The number of employees is not envisioned to be large enough to result in a quantifiable increase in emissions from residential, commercial, or industrial growth.

The soils and vegetation analysis will be based on an inventory of the soils and vegetation types found in the area. Iowa DNR's screening tool will be utilized to aid in the evaluation of potential impacts on soils and vegetation.

A visibility analysis will be performed to determine the impacts the Project may have on sensitive areas such as state parks, wilderness areas, airports, scenic sites, and overlooks. EPA's VISCREEN model will be used to complete this analysis, and the analysis will be performed according to EPA's "Workbook for Plume Visual Screening and Analysis (Revised)" October 1992 (EPA-454/R-92-023). A visibility analysis will be performed for the four sites listed below:

- Pleasant Creek State Park
- Wickiup Hill Learning Center
- Morgan Creek Park
- Eastern Iowa Airport

There are several refinement levels of VISCREEN described in EPA's guidance. The first-level VISCREEN analysis uses worst-case meteorological conditions (F-class stability, one meter per second wind speed). This level of screening results in the most conservative (worst-case) visibility results. If the plume visibility against the sky and terrain is below a level perceivable to the human eye, the visibility modeling is complete. If the plume is above this level, a second-level VISCREEN analysis that uses actual meteorological data and refined particle characteristics will be performed

6.0 Class I Area Impacts

Federal Land Manager guidance requires that a proposed major source, in the course of a PSD application, perform an assessment of air quality impacts at Class I areas if these areas are located within approximately 300 kilometers of the proposed facility. There are no Class I areas that are within 300 kilometers of the proposed Project; therefore, no assessment of air quality impacts at Class I areas will be performed for this Project.

7.0 References

Iowa Department of Natural Resources. Default Background Concentration. https://www.iowadnr.gov/environmental-protection/air-quality/modeling/background-data#default-background-concentration. Accessed February 2026.

Iowa Department of Natural Resources. Environmental Services Division, Air Quality Bureau. *Air Dispersion Modeling Guidelines for PSD Projects*. July 28, 2025.

Iowa Department of Natural Resources. Environmental Services Division, Air Quality Bureau. *Air Dispersion Modeling Guidelines for non-PSD, Pre-Construction Permit Applications*. July 28, 2025.

Iowa Department of Natural Resources. Pre-Processed Meteorological Data for AERMOD. *2020 - 2024 AERMOD Meteorological Data –Cedar Rapids (data set kcid_20_24).* Acquired at https://www.iowadnr.gov/Environmental-Protection/Air-Quality/Modeling/Dispersion-Modeling/Meteorological-Data. Accessed February 2026.

Iowa Department of Natural Resources. *Site-Specific Background Concentration Data*. 2025.

U.S. Environmental Protection Agency. *Clarification on the Development of Modeled Emission Rates for Precursors (MERPS) as a Tier I Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program.* (Memorandum from Tyler Fox). April 30, 2024.

U.S. Environmental Protection Agency. *Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for Stack Height Regulations).* EPA-450/4-80-023LR. North Carolina: Office of Air Quality Planning and Standards, 1985.

U.S. Environmental Protection Agency. *Haul Road Workgroup Final Report Submission to EPA-OAQPS*. Memo from Tyler Fox. March 2, 2012.

U.S. Environmental Protection Agency. *New Source Review Workshop Manual – Draft*. North Carolina: Office of Air Quality Planning and Standards, 1990.

U.S. Environmental Protection Agency. *Guideline on Air Quality Models: Enhancements to the AERMOD Dispersion Modeling System*. EPA-HQ-OAR-2022-0872. North Carolina: Office of Air Quality Planning and Standards, November 29, 2024. [89 FR 95034]

U.S. Environmental Protection Agency. *Updates to the Guidance for Ozone and Fine Particulate Matter Permit Modeling* (Memorandum from Tyler Fox). April 30, 2024.

U.S. Environmental Protection Agency. User's Guide for the AMS/EPA Regulatory Model –AERMOD. EPA-454/B-24-007. North Carolina: Office of Air Quality Planning and Standards, November 2024.

BURNS McDONNELL®