DELAWARE DEPARTMENT OF
NATURAL RESOURCES AND
ENVIRONMENTAL CONTROL

Division of Air Quality
Stationary Source Impact Analysis

September 20, 2023

This document is being shared with the public to assist them in understanding some aspects of permitting within the Division of Air Quality. This document is only guidance and is not binding on either the applicant or the Division. Actual permitting outcomes will result from the application of all applicable law to specific factual circumstances.

Delaware Department of Natural Resources and Environmental Control
Division of Air Quality

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Stationary Source Impact Analysis

Introduction

The Clean Air Act requires the USEPA to set National Ambient Air Quality Standards (NAAQS) for pollutants that are considered harmful to the public and the environment. Air permit applicants, as represented in the air permit application, must demonstrate the proposed new or modified source will not cause or contribute to an exceedance of the NAAQS. Section 11.6 of 7 DE Admin Code 1102 also requires that a permit will not violate the NAAQS or cause a condition of air pollution. Modeling must demonstrate that a new or modified source will:

1. Not cause or significantly contribute to ambient concentrations in excess of either the federally mandated NAAQS or Prevention of Significant Deterioration (PSD) increments;
2. Not cause a condition of air pollution.

This document provides guidance to evaluate the impact of a new or modified Stationary Source.

When adding new equipment, or modifying existing equipment, both the emissions of the new or modified equipment and the facility-wide emissions must be considered in evaluating impact on the NAAQS and major source thresholds. Contact the Department for additional guidance in cases where you believe changes may exceed the major source threshold.

Modeling

There are two levels of modeling used in the air quality analysis: screening and refined. Modeling results from either level, as appropriate, may be used to demonstrate compliance with standards and guidelines.

AERSCREEN is the U.S. EPA recommended screening-level air quality model. AERSCREEN uses simple algorithms and conservative techniques and is used as the first level of modeling. The second level of modeling utilizes a more refined model (such as AERMOD) and requires more detailed and precise input data. The permit reviewer may determine that the second level of modeling (more refined) is necessary if the first level (screening) analysis indicates that the predicted concentration from the evaluated sources could exceed a standard or guideline. AERMOD is the preferred refined model for regulatory applications in all types of terrain and for aerodynamic building downwash using representative meteorological data in the regulatory default modes.

The document "AERSCREEN – Model Application Guidance" provides instructions on utilizing the AERSCREEN model.

Step 1 - Significant Impact Levels (SIL)

The Significant Impact Level (SIL) is "the level of ambient impact below which the EPA considers a source to have an insignificant effect on ambient air quality." A source may use air modeling for a particular pollutant and compare its Maximum Downwind Concentration (MDC) to the SIL for that pollutant. If the SIL Screening Threshold is not exceeded, then the source is not considered to have a significant or meaningful impact on air quality.

The impacts from two or more point sources can be conservatively estimated by modeling each point source independently and adding the maximum concentrations together, regardless of associated downwind distances.

Significant Impact Levels (SILs) – Screening Thresholds

Pollutant	Averaging Time	Significant Impact Levels ($\mu g/m^3$)
CO	1-hour	2000
	8-hour	500
NO_2	1-hour	4 ppb (7.5 $\mu g/m^3$)
	Annual	1.0
SO_2	1-hour	3 ppb (7.9 $\mu g/m^3$)
	3-hour	25
	24-hour	5
	Annual	1.0
PM_{10}	24-hour	5.0
	Annual	1.0
$PM_{2.5}$	24-hour	1.2
	Annual	0.3

If the source(s) do not make a significant impact of concern, as demonstrated by comparing the modeled concentration results to the SIL, then demonstration of compliance with NAAQS is complete and the applicant may proceed to Step 3, Evaluation of Other Pollutants. If a SIL is exceeded, the applicant must proceed to Step 2.

Step 2 - Comparison to NAAQS

If Step 1 results in exceedance of a specific SIL, then Step 2, Comparison to the NAAQS Concentrations, is required for each specific pollutant in exceedance.

The MDC for each pollutant and for each averaging time should be added to the representative background concentration identified in the table, ("NAAQS Background Concentrations in Delaware"). This result should be compared with the NAAQS concentrations, shown in the table, "NAAQS Concentrations", below. If the results are below the NAAQS

concentrations, the modeling demonstration of NAAQS compliance is satisfied, and the applicant may proceed to Step 3. If the results show output concentration above the NAAQS, the permit applicant shall perform an ambient air quality impact assessment using a refined air dispersion model (AERMOD) to determine whether the proposed source(s) could make a significant impact on air quality. Alternatively, the applicant may choose to apply additional controls, make source modifications, or consider permit restrictions to reduce the modeled concentrations to below the thresholds. The permit reviewer will contact the applicant to discuss resolution.

NAAQS Concentrations

Pollutant		Averaging Time	Level	Form
Carbon Monoxide (CO)		8 hours	9 ppm	Not to be exceeded more than once per year
		1 hour	35 ppm	
Nitrogen Dioxide (NO_2)		1 hour	100 ppb	98th percentile of 1-hour daily maximum concentration, averaged over 3 years
		1 year	53 ppb	Annual Mean
Ozone (O_3)		8 hours	0.070 ppb	Annual fourth-highest caily maximum 8-hour concentration, averaged over 3 years
Particulate Matter	$PM_{2.5}$	1 year	12.0 $\mu g/m^3$	Annual mean, averaged over 3 years
		24 hours	35 $\mu g/m^3$	98th percentile, averaged over 3 years
	PM_{10}	24 hours	150 µg/m3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		1 hour	75 ppb	99th percentile of 1-hour daily maximum concentration, averaged over 3 years
Lead (Pb)		Rolling 3 month average	0.15 µg/m3	Not to be exceeded

Step 3 - Evaluation of Other Pollutants

Emissions from all new or modified equipment must be modeled at the proposed emission rates (lb/hr), and the resulting Maximum Downwind Concentration (MDC) compared to 1/100 of the Threshold Limit Value (TLV). TLV/100 is a concentration screening value that contains a safety factor that DAQ believes will not cause significant adverse human health or environmental impact.

Compare MDC to TLV/100

Run the AERSCREEN model, using the new or modified emissions. If multiple emission units are being added or modified, evaluate each pollutant on a collective basis, not individually. Refer to the document "AERSCREEN – Model Application Guidance" for instructions. The model will estimate the MDC based on the inputs provided.

A TLV is an 8-hour time-weighted average (TWA) concentration for a conventional 8-hour workday and a 40-hour workweek, to which it is believed that nearly all workers may be repeatedly exposed, day after day, for a working lifetime without adverse effect. These values are obtained from the American Conference of Governmental Industrial Hygienists (ACGIH).

If a published value for a TLV is not available, contact DNREC for guidance.

Once the MDC and the TLV have been determined, compare the values. If the results are that the MDC is less than TLV/100, then the screening criteria is met. On the other hand, if a result is that the MDC is equal to or greater than the TLV/100, then contact DNREC for guidance.