CDPH
Chicago Department of Public Health

AIR QUALITY IMPACT EVALUATION

Interim Guidance

Chicago, Illinois | September 2021

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APPENDICES

1.0 PURPOSE

The purpose of this guidance is to assist site plan review applicants with the preparation of the air quality impact evaluation required by Section 17-9-0117-G of the Municipal Code of Chicago. A revised final guidance document will be released at the completion of three case studies, which will be included to provide further guidance.

Projects associated with the following uses are potentially subject to the requirement if the subject site's net area meets or exceed 10 contiguous acres or if the subject site is located within 660 feet of any Residential (R), Business (B), Commercial (C), or Parks and Open Space (POS) zoning district:

- **Waste-related uses,**
- **Recycling facilities,**
- **Intensive manufacturing,**
- **Production and industrial service uses,**
- **Warehousing,**
- **Wholesaling and freight movement,**
- **Container storage,**
- **Freight terminal,**
- **Outdoor storage of raw material as a principal use,**
- **Coke & coal bulk material uses,**
- **Windrow composting, or**
- **Manganese-bearing material operation uses.**

The air quality impact evaluation requirements specifically apply to projects with:

- **Newly-established uses, or**
- **Existing uses that change or increase their area, bulk, or function.**

This guidance describes procedures for preparing a complete air quality impact evaluation to be submitted to the Chicago Department of Public Health (CDPH) for review and approval. Emissions from both stationary and mobile sources are to be included in the analysis. The AERMOD dispersion model is to be used when evaluating a project's conformance with National Ambient Air Quality Standards.

A copy of the ordinance is provided in Appendix A.

2.0 EMISSIONS INVENTORY PREPARATION

This section provides guidance for the preparation of dispersion modeling emissions inventories for both stationary and mobile emissions sources. For those projects subject to the dispersion modeling requirements of the Illinois Environmental Protection Agency's (IEPA) preconstruction permitting requirements, the development of the stationary source emissions inventory will include all criteria pollutant emissions as required by IEPA. The stationary source emissions inventory developed for IEPA permitting purposes is expected to be satisfactory for CDPH permitting purposes, although there may be cases where CDPH will require fugitive dust inventories when IEPA does not. In cases where applicants identify discrepancies between IEPA and CDPH guidance, these should be brought to CDPH's attention in advance of modeling submittals so issues can be resolved in advance.

2.1 Pollutants

The air quality impact evaluations are to be performed for the following National Ambient Air Quality Standards (NAAQS):

- **Particulate matter with aerodynamic diameter less than 2.5 microns ($PM_{2.5}$), 24-Hour and Annual;**
- **Particulate matter with aerodynamic diameter less than 10 microns (PM_{10}), 24-Hour; and**
- **Nitrogen dioxide (NO_2), 1-Hour.**

Emissions of other criteria pollutants from mobile sources are not currently anticipated to contribute to nonattainment conditions in areas proximate to projects. For example, the sulfur and lead contents of transportation fuels are well-regulated and ambient air quality impacts of sulfur dioxide (SO_2) and lead are expected to remain well in compliance with the NAAQS.

Carbon monoxide (CO) has historically been included in U.S. Environmental Protection Agency (USEPA) transportation hot spot analyses, but Chicago attains the CO NAAQS and the projects being considered are not expected to result in CO attainment issues. While this is the case, guidance developed for CO hot spot analysis can be relevant to the 1-hour NO_2 air quality impact evaluations being required, and therefore are considered in this preliminary guidance.

Analysis of project emissions impacts on regional pollutant concerns are not required as these are addressed by the IEPA in cooperation with other agencies in meeting the federal Clean Air Act requirements for State Implementation Plan (SIP) submittals. Therefore, analysis of ozone formation and secondary $PM_{2.5}$ formation is beyond the scope of this preliminary guidance.

Analysis of federal Hazardous Air Pollutants (HAP) is not being required at this time. Nevertheless, CDPH may use its discretion to request analysis of HAP emissions and will provide applicants in those cases with ambient air guidelines to be met.

2.2 Stationary Sources

CDPH is requiring stationary source emissions from facility operation to be included in air quality impact evaluations. These sources include emissions generated by industrial and combustion processes, and also include fugitive dust sources.

2.2.1 Stack Sources

Stack (point) sources of air emissions are to be quantified in accordance with IEPA and USEPA guidance.

2.2.2 Fugitive Dust Sources

Fugitive emissions from a facility are those emissions that are not captured and released through a stack or active vent. A few examples of fugitive emission sources are material transfers, storage piles, and paved and unpaved roads. USEPA's AP-42 can be used in performing these emissions calculations. Alternative calculations will be reviewed on a case-by-case basis. All fugitive emission calculations and modeling assumptions should be discussed in detail and referenced in the modeling protocol.

2.3 Mobile Sources

CDPH is requiring quantification of emissions from on-road and nonroad mobile sources to perform the air quality impact evaluations. These emissions inventories will be based on USEPA's most recent version of its Motor Vehicle Emissions Simulator (MOVES), currently MOVES3 (Click here or visit rebrand.ly/MOVES_Simulator). CDPH has developed cross-reference tables to reduce the burden of quantifying these emissions. Instructions on how to use the tables is provided below.

2.3.1 Traffic Studies

Section 17-9-0117-G of the Municipal Code of Chicago requires traffic studies to be prepared. Traffic studies must meet the Chicago Department of Transportation (CDOT) Policies and Guidelines for Traffic Impact Studies (TIS).

Air quality impact evaluations will be required of projects that meet the following criteria:

- **Proposed projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;**
- **Proposed new facilities that have a significant number of diesel vehicles congregating at a single location; and**
- **Proposed expansion of existing facilities that significantly increase the number of diesel vehicles congregating at a single location.**

2.3.2 MOVES Emission Factor Lookup Tables

The CDPH is providing a set of emission factor lookup tables to be used by applicants in preparing emissions inventories for mobile equipment. The lookup tables are provided in Microsoft Excel® format and should be requested from CDPH. The key to use of the tables is Excel's data filter, which allows the user to quickly identify emissions factors to be used for their project.

The tables were created from the USEPA's most recent version of MOVES. Emission factors are based on default inputs available in MOVES as obtained directly from the USEPA as well as inputs prepared by Chicago Metropolitan Agency for Planning (CMAP).

CDPH expects use of the lookup tables to significantly reduce the burden of applicants in quantifying mobile source emissions. Nevertheless, CDPH will allow for project-specific emissions inventories to be calculated by performing MOVES3 modeling in lieu of using the lookup tables. Any MOVES3 analysis should be consistent with analysis performed by the CMAP, the IEPA, and the Illinois Department of Transportation (IDOT) in the preparation of nonattainment area SIP submittals.

CDPH is only requiring analysis of the following pollutants, and thus the lookup tables include emission factors for only these pollutants:

- **Particulate matter with aerodynamic diameter less than 2.5 microns (PM2.5);**
- **Particulate matter with aerodynamic diameter less than 10 microns (PM10); and**
- **Nitrogen dioxide (NO2).**

Analysis of other pollutants is not being required at this time. Nevertheless, CDPH may use its discretion to request analysis of other pollutant emissions, and will provide applicants in those cases with further instructions.

Two Excel® lookup table files are provided for the following:

- **On-road class mobile source emissions.**
- **Non-road class mobile source emissions.**

Each file provides two lookup tables. Instructions for obtaining emission factors from each lookup table are provided below.

2.3.3 Calculating In-Transit Emissions for On-Road Vehicle Classes

Emissions factors are provided to allow for project-specific emissions to be calculated for on-road class mobile sources while in transit on roads. The workbook tab named "On-Network 2021-2030" provides these emission factors. The following information is required to obtain the emission factors:

- **The year of the analysis, which would typically be the first year of operation of the project being permitted. Options are available to select any year between 2021 and 2030.**
- **The types of on-road motor vehicle to be evaluated in the air quality impact evaluation. The following motor vehicle classes are available for selection:**
  - *Passenger car*
  - *Passenger truck*
  - *Motorcycle*
  - *Light commercial truck*
  - *Single-unit short-haul truck*
  - *Single unit long-haul truck*
  - *Combination short-haul trucks*
  - *Combination long-haul trucks*
  - *Refuse truck*
  - *Intercity bus*
  - *Transit bus*
  - *School bus*
  - *Motor home*
- **The fuel used by the motor vehicles to be evaluated in the air quality impact evaluation. The following fuels are available for selection:**
  - Gasoline
  - Diesel
  - Ethanol (E-85)
  - Compressed natural gas (CNG)
- **The road type being evaluated in the air quality impact evaluation. The following road types are available for selection:**
  - Urban restricted access (interstate highways)
  - Urban unrestricted access (all other road types)

- **The vehicle speed being evaluated in the air quality impact evaluation. The following vehicle speed bins are available for selection and selection should be based on information available in the project traffic study:**
  - Speed < 2.5 miles per hour (mph)
  - 2.5 <= speed < 7.5 mph
  - 7.5 <= speed < 12.5 mph
  - 12.5 <= speed < 17.5 mph
  - 17.5 <= speed < 22.5 mph
  - 22.5 <= speed < 27.5 mph
  - 27.5 <= speed < 32.5 mph
  - 32.5 <= speed < 37.5 mph
  - 37.5 <= speed < 42.5 mph
  - 42.5 <= speed < 47.5 mph
  - 47.5 <= speed < 52.5 mph
  - 52.5 <= speed < 57.5 mph
  - 57.5 <= speed < 62.5 mph
  - 62.5 <= speed < 67.5 mph
  - 67.5 <= speed < 72.5 mph

Emission factors can be readily identified by employing Excel's data filter on the top row of the spreadsheet. Click on the dropdown in each column to select a year, motor vehicle class, fuel, and road type. The emission factors for NO_X, PM_{10}, and $PM_{2.5}$ can then be readily obtained for use in preparing the emissions inventory. For example, if the emission factors for a diesel-fueled combination long-haul truck are needed for a project commencing operation in 2022 that will be served by an unrestricted access roadway with expected average travel speed of 35 mph, select each of these items in the relevant filter dropdowns. The resulting emission factors to be used are 6.687 g/mi (NO_X), 0.196 g/mi (PM_{10}), and 0.180 g/mi ($PM_{2.5}$).

The emission factors provided in this lookup table are expressed in units of grams per vehicle-mile traveled (g/VMT). To prepare an inventory of emissions from this lookup table, the user will need to consult the traffic study prepared for the project. CDPH expects in most cases that the first calendar year of operation of the project will be used and the road type will be urban unrestricted access. The traffic study should provide the expected percentages of the motor vehicle classes associated with the project. Because the air quality impact evaluation may assess the emissions resulting from congested signalized intersections, users are advised to use the motor vehicle class percentages at the intersection that incorporate project-generated traffic into the existing traffic.

Because the fuel information is unlikely to be known for most projects, CDPH advises selection of a fuel most likely to be associated with a motor vehicle type. The following default fuel selections can be used in preparing the emissions inventory:

Table 1. Default Fuels by Motor Vehicle Class

MOTOR VEHICLE CLASS	DEFAULT FUEL
Passenger cars	Gasoline
Passenger trucks	
Motorcycles	
Light commercial trucks	
Single unit short-haul trucks	Diesel
Single unit long-haul trucks	
Combination short-haul trucks	
Combination long-haul trucks	
Refuse trucks	
Intercity buses	
Transit buses	
School buses	
Motor homes	Gasoline

The percentage of fuel use within each motor vehicle class can be used as a refinement in preparing the emissions inventory. Applicants will need to provide justification for non-default fuel selections.

The traffic study will also provide information to quantify the VMT associated with the project as well as for existing traffic approaching an intersection. The VMT is required to calculate emissions from the emission factors.

2.3.4 Calculating Off-Network Idling Emissions for On-Road Vehicle Classes

Emissions factors are provided to allow for project-specific emissions to be calculated for on-road class mobile sources while idling off-network (e.g., motor vehicles idling for cargo deliveries, school pick-ups and drop-offs, drive-through restaurant queues). The workbook tab named “Off-Network Idle 2021-2030” provides these emission factors. The following information is required to obtain emission factors:

- **The year of the analysis, which would typically be the first year of operation of the project being permitted. Options are available to select any year between 2021 and 2030.**
- **The types of on-road motor vehicle to be evaluated in the air quality impact evaluation. The following motor vehicle classes are available for selection (note that MOVES does not provide idling emissions for motorcycles):**
  - *Passenger car*
  - *Passenger truck*
  - *Light commercial truck*
  - *Single-unit short-haul truck*
  - *Single unit long-haul truck*
  - *Combination short-haul trucks*
  - *Combination long-haul trucks*
  - *Refuse truck*
  - *Intercity bus*
  - *Transit bus*
  - *School bus*
  - *Motor home*
- **The fuel used by the motor vehicles to be evaluated in the air quality impact evaluation. The following fuels are available for selection:**
  - Gasoline
  - Diesel
  - Ethanol (E-85)
  - Compressed natural gas (CNG)

Emission factors can be readily identified by employing Excel's data filter on the top row of the spreadsheet. Click on the dropdown in each column to select a year, motor vehicle class, and fuel. The emission factors for NO_X, PM_{10}, and $PM_{2.5}$ can then be readily obtained for use in preparing the emissions inventory. For example, if the emission factors for a diesel-fueled combination long-haul truck idling for a project commencing operation in 2022, select the items in the relevant filter dropdowns on that tab. The emission factors to be used are 58.555 g/hr (NO_X), 1.680 g/hr (PM_{10}), and 1.545 g/hr ($PM_{2.5}$).

The emission factors provided in this lookup table are expressed in units of grams per vehicle-hour (g/hr). To prepare an inventory of emissions from this lookup table, the user will need to consult the traffic study prepared for the project. CDPH expects in most cases that the first calendar year of operation of the project will be used. The traffic study should provide the expected percentages of the motor vehicle classes associated with the project.

Because the fuel information is unlikely to be known for most projects, CDPH advises selection of a fuel most likely to be associated with a motor vehicle type. The default fuel selections provided previously in Table 1 can be used in preparing the emissions inventory. The percentage of fuel use within each motor vehicle class can be used as a refinement in preparing the emissions inventory. Applicants will need to provide justification for non-default fuel selections.

2.3.5 Calculating Emissions for Non-Road Vehicle Classes

Emissions factors are provided to allow for project-specific emissions to be calculated for non-road class mobile sources. Two tabs are provided in the workbook. Applicants should generally start with the "Project Year Emission Factors" tab in the workbook. If the project has a specified equipment roster where the equipment model years are known or if emissions mitigation is required, the "Tier-Level Emission Factors" tab should be used.

General Approach

Most applicants are expected to use the "Project Year Emission Factors" tab in the workbook. The following information is required to obtain emission factors when using this tab:

- **The year of the analysis, which would typically be the first year of operation of the project being permitted. Options are available to select any year between 2021 and 2030.**
- **The types of non-road equipment to be evaluated in the air quality impact evaluation. A total of 86 non-road equipment types are provided and for brevity are not itemized here.**
- **The fuel used by the non-road equipment to be evaluated. The following fuels are available for selection:**
  - Gasoline
  - Diesel
  - Compressed natural gas (CNG)
  - Liquefied petroleum gas (LPG)
  - Marine diesel
- **Engine power ranges expressed in units of horsepower (hp):**
  - Between 2,000 and 3,000 hp
  - Between 1,200 and 2,000 hp
  - Between 1,000 and 1,200 hp
  - Between 750 and 1,000 hp
  - Between 600 and 750 hp
  - Between 300 and 600 hp
  - Between 175 and 300 hp
  - Between 100 and 175 hp
  - Between 75 and 100 hp
  - Between 50 and 75 hp
  - Between 40 and 50 hp
  - Between 25 and 40 hp
  - Between 16 and 25 hp
  - Between 11 and 16 hp
  - Between 6 and 11 hp
  - Between 3 and 6 hp
  - Between 1 and 3 hp
  - Less than or equal to 1 hp

Emission factors can be readily identified by employing Excel's data filter on the top row of the spreadsheet. Click on the dropdown in each column to select a year, equipment type, and engine horsepower. The emission factors for NO_X, PM_{10}, and $PM_{2.5}$ can then be readily obtained for use in preparing the emissions inventory. For example, if the emission factors for a 250 hp diesel-fueled rubber-wheeled front end loader are needed for a project commencing operation in 2022, select each of the items in the relevant filter dropdowns on that tab. The emission factors to be used are 0.5354 g/hp-hr (NO_X), 0.0357 g/hp-hr (PM_{10}), and 0.0346 g/hp-hr ($PM_{2.5}$).

The emission factors provided in this lookup table are expressed in units of grams per vehicle horsepower-hour (g/hp-hr). To prepare an inventory of emissions from this lookup table, the user will need to prepare a non-road equipment roster for the project. The roster should identify the make, model, fuel type and engine horsepower of each piece of equipment, and the number of such units to be operated by the project. The roster should also include the MOVES non-road equipment type to which each unit is assumed to be assigned.

CDPH expects in most cases that the first calendar year of operation of the project will be used.

Refined Approach

If applicants have a specified equipment roster where the equipment model years are known or if emissions mitigation is required, the "Tier-Level Emission Factors" tab should be used.. The following information is required to obtain emission factors when using this tab:

- **The types of non-road equipment to be evaluated in the air quality impact evaluation. A total of 86 non-road equipment types are provided and for brevity are not itemized here.**
- **The fuel used by the non-road equipment to be evaluated. The following fuels are available for selection:**
  - Gasoline
  - Diesel
  - Compressed natural gas (CNG)
  - Liquefied petroleum gas (LPG)
  - Marine diesel
- **Engine power ranges expressed in units of horsepower (hp):**
  - Between 2,000 and 3,000 hp
  - Between 1,200 and 2,000 hp
  - Between 1,000 and 1,200 hp
  - Between 750 and 1,000 hp
  - Between 600 and 750 hp
  - Between 300 and 600 hp
  - Between 175 and 300 hp
  - Between 100 and 175 hp
  - Between 75 and 100 hp
  - Between 50 and 75 hp
  - Between 40 and 50 hp
  - Between 25 and 40 hp
  - Between 16 and 25 hp
  - Between 11 and 16 hp
  - Between 6 and 11 hp
  - Between 3 and 6 hp
  - Between 1 and 3 hp
  - Less than or equal to 1 hp

- **The engine tier emissions control classification which ranges from Tier 0 through Tier 4. Be sure the engine tier description matches the level of control desired.**

Emission factors can be readily identified by employing Excel's data filter on the top row of the spreadsheet. Click on the dropdown in each column to select a year, equipment type, and engine horsepower. The emission factors for NO_X, PM_{10}, and $PM_{2.5}$ can then be readily obtained for use in preparing the emissions inventory. For example, if the emission factors for a 250 hp diesel-fueled rubber-wheeled front end loader equipped with Interim Tier 4 technology which includes a diesel particulate filter (DPF) and no selective catalytic reduction (SCR), select each of the items in the relevant filter dropdowns on that tab. The emission factors to be used are 0.663 g/hp-hr (NO_X), 0.000 g/hp-hr (PM_{10}), and 0.000 g/hp-hr ($PM_{2.5}$).

The emission factors provided in this lookup table are expressed in units of grams per vehicle horsepower-hour (g/hp-hr). To prepare an inventory of emissions from this lookup table, the user will need to prepare a non-road equipment roster for the project. The roster should identify the make, model, fuel type and engine horsepower of each piece of equipment, and the number of such units to be operated by the project. The roster should also include the MOVES non-road equipment type to which each unit is assumed to be assigned.

3.0 DISPERSION MODELING GUIDELINE

CDPH is requiring quantification of estimated ambient air quality concentrations resulting from the Project's stationary source and associated mobile source emissions. The AERMOD dispersion model is required to be used for these analyses. Meteorological data for Chicago O'Hare, Chicago Midway, and other sources of meteorological data must be used, and the selection of the meteorological data set must be representative of the meteorology of the area of the Project locale within the City of Chicago. CDPH is considering other meteorological data sources to be used and intends to make AERMOD-ready meteorological data sets available to applicants in the future.

The dispersion modeling must demonstrate conformance with the NAAQS. Depending on the results of project-specific dispersion modeling analysis, CDPH may use its discretion to require submittal of a cumulative dispersion modeling analysis that incorporates the emissions of other projects. Comparison of predicted project concentrations to Significant Impact Levels (SILs) may be used to demonstrate that cumulative dispersion modeling analysis is not required.

For those projects subject to the dispersion modeling requirements of the IEPA's preconstruction permitting requirements, the guidelines presented herein are intended to be consistent with IEPA guidance. In cases where applicants identify discrepancies between IEPA and CDPH guidance, these should be brought to CDPH's attention in advance of modeling submittals so issues can be resolved in advance.

3.1 Preferred Dispersion Model

CDPH prefers the use of USEPA's most recent version of the AERMOD dispersion model, currently Version 21112 (Click here or visit rebrand.ly/DispersionModel). AERMOD is a steady-state plume dispersion model for assessment of pollutant concentrations from a variety of sources. AERMOD simulates transport and dispersion from multiple point, area, or volume sources based on an up-to-date characterization of the atmospheric boundary layer. Sources may be located in rural or urban areas, and receptors may be located in simple or complex terrain. AERMOD accounts for building wake effects (i.e., plume downwash) based on the PRIME building downwash algorithms. The model employs hourly sequential preprocessed meteorological data to estimate concentrations for averaging times from 1-hour to 1-year (also multiple years). AERMOD can be used to estimate the concentrations of nonreactive pollutants from highway traffic. AERMOD also handles unique modeling problems associated with aluminum reduction plants, and other industrial sources where plume rise and downwash effects from stationary buoyant line sources are important. AERMOD is designed to operate in concert with two pre-processor codes: AERMET processes meteorological data for input to AERMOD, and AERMAP processes terrain elevation data and generates receptor and hill height information for input to AERMOD.

CDPH anticipates AERMOD will be appropriate for all applicant. However, other dispersion models are available and applicants may request CDPH approval for the use of those models. CDPH will rely on USEPA's Guideline on Air Quality Models (40 CFR Part 51 Appendix W) in evaluating the use of alternative models. Applicants are advised the process is rigorous and thus applicants are strongly encouraged to use AERMOD in performing the air quality impact evaluation.

3.2 Land Use

Applicants are to use urban dispersion coefficients. The population of the Chicago Metropolitan Statistical Area (MSA) is to be used. As of the 2020 census, the MSA population is 9,618,502. If applicants believe rural dispersion coefficients are more appropriate for their evaluation, the Auer procedure identified in USEPA's Guideline on Air Quality Models (40 CFR Part 51 Appendix W) is to be used to justify the use.

3.3 Emissions Source Inputs

Guidance for creating emissions source inputs for stationary and mobile sources is provided in the following sections.

3.3.1 Stationary Sources

Modeling techniques involving stationary sources should follow IEPA and USEPA guidance. Building downwash must be considered in dispersion modeling analyses.

3.3.2 Mobile Sources

Modeling techniques involving mobile sources and fugitive dust emissions from roads should follow the guidance provided by USEPA and its Haul Road work group. Volume sources should be used to represent roads in most cases with the following considerations:

- *Top of Plume Height = 1.7 × (vehicle height)*
- *Release Height = 0.5 × (top of plume height)*
- *Plume Width = (vehicle width) + (6 meters for single lane)*
- *σyo = (width of plume)/2.15*
- *σzo = (top of plume height)/2.15*
- *Locations = Series of volume sources centered on the road centerline, spaced adjacent or side-by-side.*

Roads may be modeled as area sources where ambient receptors are located within source dimensions or where other mechanical sources are emitting in the general vicinity of the road. As area sources alone, roads should be modeled:

- *Length = length of roadway*
- *Adjusted road width = (vehicle width) + (6 meters for a single lane) or (road width + 6 meters for two-lane)*
- *Top of Plume Height = 1.7 × (vehicle height)*
- *Release Height = 0.5 × (top of plume height)*
- σ_{zo} *= (top of plume height)/2.15*
- *Locations = Area source centered on coordinates of the road*

Parking lots or other open areas upon which mobile sources operate may be modeled as area sources using the same area source techniques.

3.4 Meteorological Inputs

Five years of representative National Weather Service (NWS) meteorological data, at least three complete years of prognostic meteorological data, or at least one year of on-site meteorological data should be used when estimating concentrations with an air quality model. When using NWS data for air modeling, CDPH prefers consecutive years from the most recent, readily available 5-year period.

CDPH is in the process of preparing meteorological data sets for use by permit applicants when performing air dispersion modeling analyses. The use of standardized meteorological data sets eliminates the need for each applicant to undertake the resource-intensive effort of generating this meteorological data on their own.

Meteorological conditions in Chicago depend on a project's proximity to the lakeshore. The following table provides CDPH's preferred meteorological data sets along with their respective base elevations to be used in AERMOD.

Table 2. Meteorological Data to be Used in Air Quality Impact Evaluations

PROJECT LOCATTION	SURFACE METEOROLOGICAL DATA	BASE ELEVATION (METERS)
4 miles or greater from the lakeshore and south of the Eisenhower Expressway	Midway Airport WBAN 14819	188
4 miles or greater from the lakeshore and north of the Eisenhower Expressway	O'Hare Airport WBAN 94846	
Within 4 miles of the lakeshore and south of East and West 63rd Street	Hammond Indiana DEM	179
Within 4 miles of the lakeshore and north of East and West 63rd Street	TBD	

Alternative meteorological data sets will be considered on a case-by-case basis.

3.5 Receptor Inputs

Receptor locations should be of sufficient density to assure the identification of the highest predicted concentrations. The design of a receptor network should emphasize the receptor resolution and location, not the total number of receptors. The selection of receptor locations should take into consideration the topography, the climatology, and the proximity of emissions sources. Receptor grids are to employ the following or better:

- ***Nested Cartesian receptor grids should be used.***
- ***Fenceline receptors should be spaced no more than 25 meters apart.***
- ***Gridded receptors should be spaced no more than 50 meters apart out to a distance of 0.5 kilometers (km).***
- ***Gridded receptors should be spaced no more than 100 meters apart between 0.5 km and 1.5 km.***
- ***Gridded receptors should be spaced no more than 250 meters apart between 1.5 km and 3 km.***
- ***Gridded receptors should be spaced no more than 500 meters apart between 3 km and 5 km.***

Applicants must ensure that receptors appropriately include all publicly accessible locations (i.e., ambient air). If concentrations are not decreasing clearly near the edge of the receptor grid, additional receptors should be added. Fine grids (50 m) should be placed over the area(s) of maximum concentration to ensure that the true maximum concentration is identified. Tall buildings with balconies or other elevated open-air locations that could be occupied for extended periods must also be included in the AAQS analysis. These locations should be modeled as “flag pole” receptors.

The air quality modeling analysis must be performed in all locations of “ambient air”, which has been defined by USEPA as “that portion of the atmosphere, external to buildings, to which the general public has access” [40 CFR 50.1(e)]. Public access to the facility’s property must be restricted by a physical barrier such as a fence or river with signage along the riverbank. If no physical barrier exists, receptors shall be placed both on and off the facility’s property when conducting an air quality impact analysis. If a physical barrier exists, receptors shall be placed along and outside of the physical barrier when conducting an air quality impact analysis.

Receptors should be assigned with terrain elevations and hill height scales using USEPA’s AERMAP terrain processing tool. AERMAP requires either Digital Elevation Model (DEM) data or National Elevation Dataset (NED) to process the terrain. CDPH requires the use of 10-meter or 30-meter resolution data.

4.0 ADDITIONAL GUIDANCE

The following available guidance documents may provide additional guidance for applicants:

- USEPA, 2015. Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas. EPA-420-B-15-084. USEPA, Office of Transportation and Air Quality, Transportation and Climate Division. November 2015.
- 40 CFR 51 Appendix W. Guideline on Air Quality Models.
- USEPA, 1992. Guideline for Modeling Carbon Monoxide from Roadway Intersections. EPA-454/R-92-005. USEPA, Office of Air Quality Planning and Standards. November 1992.
- USEPA, 2019. Guidance on New R-LINE Additions to AERMOD 19191 for Refined Transportation Project Analyses. EPA-420-B-19-042. USEPA, Office of Transportation and Air Quality, Transportation and Climate Division, et al. September 2019.

APPENDIX A: SECTION 17-9-0117-G OF THE MUNICIPAL CODE OF CHICAGO

CHAPTER 17-9 *USE REGULATIONS*

17-9-0117 Waste-related Uses, Recycling Facilities, Intensive Manufacturing, Production and Industrial Service Uses, Warehousing, Wholesaling and Freight Movement, Container Storage, Freight Terminal, Outdoor Storage of Raw Material as a Principal Use, Coke & Coal Bulk Material Uses, Windrow Composting and Manganese-bearing Material Operation Uses.

17-9-0117-A Waste-Related Uses, Recycling Facilities, Container Storage, Freight Terminal, Outdoor Storage of Raw Material as a Principal Use, Windrow Composting and Manganese-bearing Material Operation Uses. Buildings, storage areas and work areas on the site of all **(a)** windrow ***composting*** facilities, **(b)** ***container storage***, **(c)** ***freight terminal,*** **(d)** outdoor storage of raw material as a principal use, **(e)** ***waste-related uses,*** **(f)** ***Class III, Class IVA, Class IVB and Class V recycling facilities,*** or **(g)** ***manganese-bearing material operation uses*** must be established pursuant to the planned development standards of Section 17-13-0600 if the subject site›s net site area meets or exceeds 10 contiguous acres or if the subject site is located within 660› of any R, B, C or POS zoning district.

17-9-0117-B Coke & Coal Bulk Material Uses.

1. Neither the storage, placement, retention, loading, unloading, stockpiling, or processing of ***coke and coal bulk material,*** nor the undertaking of any improvements or development associated therewith (collectively, "***coke and coal bulk material uses***"), shall be permitted in any zoning district, with the exception that this prohibition does not apply to any material used in manufacturing cement at any location for which a construction permit and new source review approval from the Illinois Environmental Protection Agency has been obtained prior to the effective date of this subsection 17-9-0117-B, which cement manufacturing may commence and continue as a non-conforming use.

2. Nothwithstanding subsection 17-9-0117-B(1), ***coke and coal bulk material uses*** that have been in continuous operation in accordance with lawfully established zoning requirements for at least one year prior to the effective date of this subsection 17-9-0117-B shall be deemed nonconforming and may be continued. Suspension of any such operation before, on, or after the effective date of this subsection 17-9-0117-B in order to obtain any non-zoning governmental approvals (legislative, judicial, regulatory, or other) required to operate a ***coke and coal bulk material*** use shall not affect the operation›s status as a continuous use. In the event of such a suspension, subsections 17-15-0304-A1 and 17-15-0304-A3 of this zoning ordinance shall not apply so long as the operator of the suspended ***coke and coal bulk material use*** is actively engaged in obtaining the aforesaid approvals.

3. Notwithstanding subsection 17-15-0302-B of this zoning ordinance, no nonconforming use may be changed to, or substituted with, any coke and ***coal bulk***

material use.

4. No expansion of any ***coke and coal bulk material use*** shall be permitted. For purposes of this subsection 17-9-0117-B(4), "expansion" means any extension or increase in the boundaries of the land upon which any existing ***coke and coal bulk material use*** is located, based on the lawful boundaries in existence as of the effective date of this subsection 17-9-0117-B.

5. Owners and operators of ***coke and coal bulk material uses*** allowed under this subsection 17-9-0117-B shall report and certify, under penalty of perjury, the following data, expressed in both tons and cubic yards, in quarterly reports submitted to the department of planning and development, pursuant to a form, format, and schedule set by that department:

a) the total monthly amount of ***coke and coal*** received;

b) the total monthly amount of ***coke and coal l***eaving the facility by truck, barge, boat, railcar, or other means of conveyance;

c) the maximum daily amount of ***coke and coal*** present at the facility in each calendar month; and

d) the monthly ***coke and coal*** throughput, i.e., the amount of ***coke and coal*** received at a facility in a given calendar month, plus the amount of coke and coal leaving the facility in that same month, divided by 2.

The owners and operators shall include in each quarterly report the method used for determining the values of subsections 17-9-0117-B(5)(a), (b), and (c), and shall maintain for inspection all documents used in preparing the reports for a period of at least 3 years. Violators of this subsection 17-9-0117-B(5) shall be subject to a fine of not less than $1,000 nor more than $5,000. Each day that a violation continues shall constitute a separate and distinct offense. Utilizing these reports and other relevant data, the commissioner of planning and development shall determine what limitations on (1) coke and coal throughput, and (2) the maximum daily amount of coke and coal present at the facility in each calendar month, are necessary to abate the negative impact on the community resulting from the secondary effects of ***coke and coal bulk material uses*** (including impaired enjoyment of real and personal property in neighborhoods located near such uses), and shall, no later than March 31, 2015, issue one or more administrative orders setting throughput limitations and maximum daily amount limitations for all owners and operators of coke and coal bulk material uses subject to this subsection 17-9-0117-B(5).

6. All ***coke and coal bulk material uses*** are subject to all applicable sections of the Municipal Code of Chicago, including, but not limited to, sections 11-4-760 and 11-4-770 of that Code, as amended; and to the Rules and Regulations for Control of Emissions from the Handling and Storage of Bulk Material Piles, as well as all other applicable rules and regulations promulgated under any applicable sections of the Municipal Code of Chicago (collectively, "bulk material regulations").

7. Nothing in this subsection 17-9-0117-B shall preclude a finding by the City that ***coke and coal bulk material uses*** are also ***waste-related uses*** and thus subject to the regulations applicable to such uses as well.

8. Nothing in this subsection 17-9-0117-B shall prohibit or impair the construction or installation of any improvements, nor the undertaking of any operations or maintenance that is required or provided for by the ***bulk material*** regulations, with the exception of compliance with subsection 17-9-0117-B(4), the prohibition on expansion of land boundaries.

9. In the event of any conflict between this subsection 17-9-0117-B and any other provision of this zoning ordinance, the former shall govern.

17-9-0117-C Urban Farm Accessory Composting Operations.

Composting areas in an outdoor urban farm accessory composting operation must be located at least 150 feet from all R zoning district boundaries or at the farthest distance from all R zoning district boundaries, whichever is greater. This section does not apply to an urban farm accessory composting operation conducted within a completely enclosed building. For purposes of an outdoor urban farm accessory composting operation that composts landscape waste only and, otherwise operates in compliance with Section 415 ILCS 5/21(q)(2.5) (A) to (D) of the Illinois Environmental Protection Act, the setback requirement specified in this section is established pursuant to Section 415 ILCS 5/21(q)(2.5)(E) of the Illinois Environmental Protection Act.

17-9-0117-D Manganese-bearing Material Operation Uses.

10. Neither the storing, loading, unloading, stockpiling, handling on-site, blending, mixing, crushing, screening, breaking, wet or dry cleaning, thermal drying, chemically treating or any other processing of ***manganese-bearing material***, nor the undertaking of any improvements or development associated therewith (collectively, "***manganese-bearing material operation uses***"), shall be permitted in any zoning district. This section shall not apply to any licensed manufacturing establishment if the manufacturing establishment: (i) uses or processes ***manganese-bearing materials*** for the purpose of manufacturing of finished or unfinished products at the site of the manufacturing establishment; (ii) has obtained applicable air permits, if any, required by City, State of Illinois or federal; and (iii) does not store non- packaged ***manganese-bearing material*** outdoors and is not subject to the Rules and Regulations for Control of Emissions from the Handling and Storage of Bulk Material Piles.

11. Notwithstanding subsection 17-9-0117-D(1), ***manganese-bearing material operation uses*** that have been in continuous operation in accordance with lawfully established zoning requirements for at least one year prior to the effective date of this subsection 17-9-0117-D shall be deemed nonconforming and may be continued. Suspension of any such operation before, on, or after the effective date of this subsection 17-9-0117-D in order to obtain any non-zoning governmental approvals (legislative, judicial, regulatory, or other) required to operate a ***manganese-bearing***

material operation use shall not affect the operation›s status as a continuous use. In the event of such a suspension, subsections 17-15-0304-A1 and 17-15-0304-A3 of this Zoning Ordinance shall not apply so long as the operator of the suspended ***manganese-bearing material operation use*** is actively engaged in obtaining the aforesaid approvals.

12. Notwithstanding subsection 17-15-0302-B of this Zoning Ordinance, no nonconforming use may be changed to, or substituted with, any ***manganese-bearing material operation use***.

13. No expansion of any ***manganese- bearing material operation use*** shall be permitted. For purposes of this subsection 17-9-0117-D(4), "expansion" means any extension or increase in the boundaries of the land upon which any existing ***manganese-bearing material operation use*** is located, based on the lawful boundaries in existence as of the effective date of this subsection 17-9-0117-D.

14. Owners and operators of ***manganese-bearing material operation uses*** allowed under this subsection 17-9-0117-D shall report and certify, under penalty of perjury, the following data, expressed in both tons and cubic yards, in quarterly reports, due within thirty days of the end of each quarter, submitted to the department of planning and development, pursuant to a form and format set by that department:

a) the total monthly amount of ***non-packaged manganese-bearing material*** received;

b) the total monthly amount of ***non-packaged manganese-bearing material*** leaving the facility by truck, barge, boat, railcar, or other means of conveyance;

c) the maximum daily amount of ***non-packaged manganese-bearing material*** present at the facility in each calendar month; and

d) the monthly ***non-packaged manganese-bearing material*** throughput, i.e., the amount of ***manganese-bearing material*** received at a facility in a given calendar month, plus the amount of ***non-packaged manganese-bearing material*** leaving the facility in that same month, divided by 2.

The owners and operators shall include in each quarterly report the method used for determining the values of subsections 17-9-0117-D(5)(a), (b), and (c), and shall maintain for inspection all documents used in preparing the reports for a period of at least 3 years. Violators of this subsection 17-9-0117-D(5) shall be subject to a fine of not less than $1,000 nor more than $5,000. Each day that a violation continues shall constitute a separate and distinct offense. Utilizing these reports and other relevant data, the commissioner of planning and development, in consultation with the commissioner of health, is authorized to determine limitations on: (1) ***non-packaged manganese-bearing material*** throughput, and (2) the maximum daily amount of ***non-packaged manganese-bearing material*** present at the facility in each calendar month, that are necessary to abate the negative impact on the community resulting from the secondary effects of ***manganese-bearing material operation uses*** (including impaired enjoyment of real and personal property in neighborhoods located near such operations). The commissioner of health

shall, on at least a quarterly basis, compare the reports with any complaints, inspection reports, monitoring data, and other relevant information, and provide recommendations to the commissioner of planning and development. The commissioner of planning and development is also authorized to issue one or more administrative orders setting throughput limitations and maximum daily amount limitations for all ***manganese- bearing material operation uses***.

15. All ***manganese-bearing material operation uses*** are subject to all applicable sections of the Municipal Code of Chicago, including, but not limited to, sections 11-4-760 and 11-4-770 of that Code, as amended; and to the Rules and Regulations for Control of Emissions from the Handling and Storage of Bulk Material Piles, as well as all other applicable rules promulgated under any applicable sections of the Municipal Code of Chicago (collectively, "***bulk material rules***").

16. Nothing in this subsection 17-9-0117-D shall preclude a finding by the City that ***manganese-bearing material operation uses*** are also ***waste-related uses*** and thus subject to the regulations applicable to such uses as well.

17. Nothing in this subsection 17-9-0117-D shall prohibit or impair the construction or installation of any improvements, nor the undertaking of any operations or maintenance that is required or provided for by the ***bulk material rules***, with the exception of compliance with subsection 17-9-0117-D(4), the prohibition on expansion of land boundaries.

18. In the event of any conflict between this subsection 17-9-0117-D and any other provision of this Zoning Ordinance, the former shall govern.

17-9-0117-E Intensive Manufacturing and Production and Industrial Service Uses. Storage areas and work areas on the site of all ***intensive manufacturing and production and industrial service uses*** must be conducted within ***completely enclosed buildings*** or structures; and, if the subject site›s net site area meets or exceeds 10 contiguous acres or if the subject site is located within 660› of any R, B, C or POS zoning district, such uses must be established pursuant to the ***planned development*** standards of Section 17-13-0600.

17-9-0117-F Warehousing, Wholesaling and Freight Movement Uses. Storage areas and work areas on the site of all ***warehousing, wholesaling and freight movement uses*** must be conducted within completely enclosed buildings or structures; and, if the subject site›s net site area meets or exceeds 10 contiguous acres, such use must be established pursuant to the ***planned development*** standards of Section 17-13-0600.

17-9-0117-G Waste-Related Uses, Recycling Facilities, Intensive Manufacturing, Production and Industrial Service Uses, Warehousing, Wholesaling and Freight Movement, Container Storage, Freight Terminal, Outdoor Storage of Raw Material as a Principal Use, Coke & Coal Bulk Material Uses, Windrow Composting and Manganese-bearing Material Operation Uses. All such newly-established uses or existing uses that change or increase their area, bulk, or function are subject to the following site plan review

criteria, in addition to the requirements of Section 17-13-0800:

17-9-0117-G.1 The site plan review application must include a traffic study and an air quality impact evaluation, and the Commissioner of the Chicago Department of Transportation must review each traffic study and the Commissioner of the Chicago Department of Public Health must review each air impact evaluation, and the Commissioners shall provide an opportunity for public review and comment on each traffic study and air impact evaluation, and forward their joint written recommendation on the proposal to the Zoning Administrator before a zoning certification may be issued.

17-9-0117-G.2 All such uses are subject to compliance with the applicable landscape regulations of Chapter 17-11, expressly including the ***vehicular use area and screening*** standards.

17-9-0117-G.3 All lighting must be directed downward and shielded to prevent illumination of adjoining properties.

17-9-0117-G.4 Before filing an application for site plan review, but after submitting for City review the traffic study and air impact evaluation required under Section 17-9-0117-G.1, the applicant must hold at least one community meeting in the ward in which the use is proposed to be located for the purpose of explaining the proposal, including the traffic study and air impact evaluation, and soliciting comments on it. Such community meeting must be held no later than two weeks prior to the date of filing the application; notice for such community meeting must be issued, pursuant to this Section, no later than two weeks prior to such community meeting. The Zoning Administrator is authorized to review and approve the day, time, location and format of the community meeting to promote public access. The applicant must notify the Zoning Administrator and the Alderman of the ward in which the use is proposed to be located in writing of the time, place and purpose of the community meeting. The applicant must publish notice of the community meeting in a newspaper of general circulation within the ward and the applicant must send written notice by USPS first class mail to the ***property owner*** of the subject property and to all ***property owners*** within 250 feet of the property lines of the subject property. Such applicant shall furnish a complete list of the names and last known addresses of the persons provided with such written notice as well as a written affidavit certifying compliance with such written notice to the Zoning Administrator in a form prescribed by the Commissioner of the Department of Planning and Development on or before the date of filing of an application for site plan review.

17-9-0117-G.5 All such uses are subject to compliance with the Department of Planning and Development›s sustainable development policy.

APPENDIX B: RESERVED