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**GUIDELINES FOR EVALUATING THE  
AIR QUALITY IMPACTS OF TOXIC  
POLLUTANTS IN MECKLENBURG  
COUNTY, NORTH CAROLINA**

**August 1, 2018**

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## **1.0 Mecklenburg County MODELING GUIDANCE**

### **1.1 Introduction**

The purpose of these Guidelines is to assist facility owners and air quality specialists in demonstrating to Mecklenburg County Air Quality (“MCAQ”) that any regulated toxic air pollutant emitted from the facility and listed in the Mecklenburg County Air Pollution Control Ordinance<sup>1</sup> (“MCAPCO”) Regulation 1.5711 – “Emission Rates Requiring a Permit,” will not result in ambient concentrations in excess of the Acceptable Ambient Levels (“AALs”) listed in MCAPCO Regulation 2.1104 – “Toxic Air Pollutant Guidelines.” In addition, the owner of any facility subject to Prevention of Significant Deterioration (“PSD”) is required by MCAQ to perform dispersion modeling for air toxics as part of the Best Available Control Technology (“BACT”) analysis. These guidelines should be followed for performing the dispersion modeling analysis.

All guidance discussed in this document adheres to EPA guidance<sup>2</sup> (documentation and policies) for determining the impact of any air pollutant. The guidelines presented in this document may change at any time as new guidance or new air quality modeling techniques become available. For the latest changes in MCAQ guidance, refer to the “Modeling Page” located on the MCAQ web site, which can be found at: <http://AirQuality.CharMeck.org>.

### **1.2 Modeling Policy-General**

The applicant is required to conduct dispersion modeling when the total facility-wide emissions of a regulated toxic air pollutant (“TAP”) exceed the emission rates listed in MCAPCO Regulation 1.5711 as a result of the addition of a new source, or modification of an existing source, unless exempted under MCPCO Regulation 1.5702. The modeling must demonstrate that the ambient concentrations of the affected TAP will not exceed the applicable AALs, listed in MCAPCO Regulation 2.1104.

The applicant is encouraged to submit a modeling protocol. If this is submitted with the modeling analysis, the submittal will be evaluated as a protocol that may be returned with comments. Requirements of a protocol are discussed in the following section.

Applicants may request that MCAQ conduct the initial screening modeling for them to determine compliance, but are encouraged to contact MCAQ before doing so. In order to perform requested modeling, MCAQ will require the completion of the Section M application forms. This information will be used by MCAQ to conduct a screening analysis. If the model results indicate that compliance with the AALs will not be demonstrated for one or more pollutants at the requested emission rates, the applicant will be required to perform a complete compliance demonstration. The application package will be considered “complete” while MCAQ performs the screening model; however, if compliance is not demonstrated, the permit application will be declared “incomplete” until a compliant modeling demonstration is submitted.

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### **1.3 Modeling Policy – Specific Industry**

In response to air quality issues associated with certain industrial operations, specific modeling approaches to protocols to be used for that industry to evaluate facility-wide pollutant emissions have been established. In addition, modeling has been conducted to establish operating thresholds for a limited number of industrial operations that will define when additional, or more refined modeling, is needed to establish compliance with the applicable AALs or NAAQs. These operating/capacity thresholds can be used in lieu of modeling.

## **2.0 MODELING PROTOCOL**

It is recommended that any permit application that requires a modeling compliance demonstration be preceded by a modeling protocol. A detailed protocol gives MCAQ the opportunity to review and comment on the proposed project and modeling methodology before the analysis is begun, and ensures that the final modeling analysis will be conducted in accordance with current regulations and modeling requirements. Although MCAQ will accept a protocol and completed modeling analysis together, a preapproved protocol could minimize overall modeling efforts, which may result in shorter total application review times. The information listed below should be discussed in the modeling protocol:

- a) A general discussion of plant processes and the types of emission sources under consideration;
- b) A detailed site map showing locations of property boundaries, emission sources (existing and proposed), existing and proposed facility buildings or structures [the map must show the dimensions (height, width, length) of all buildings and structures], and any public rights-of-way traversing the property (e.g. roads, railroad tracks, rivers, etc.). The site diagram also should provide a scale and true north indicator and should show UTM coordinates or the latitude/longitude of at least one point (e.g. source or building corner). If known, indicate the format or projection of the UTM coordinates (e.g. NAD83);
- c) A list of all the facility toxic air pollutants, their actual emission rates, and their respective NC toxic permitting emission rates (TPERs) as listed in MCAPCO 1.5711-“Emission Rates Requiring a Permit”;
- d) A list or table of stack parameters for all existing and proposed sources. Use the appropriate form M-2, or an equivalent form. List area or volume sources separately and include a short discussion on why these sources are represented as area or volume sources;
- e) A discussion of assumptions made and associated emission calculations used to derive source parameters and emission rates.;
- f) A short discussion of proposed receptor locations, resolution, and terrain considerations (from the USGS topographic map). Note: Any changes made to the topography, due to excavating, etc. should be reflected in the analysis for review;
- g) A preliminary Good Engineering Practice (GEP) analysis. All individual or combined structures (those within 1L of each other) with a region of influence (5L) extending to one or more sources must be included in the GEP analysis (where L is equal to the lesser of building height or horizontal projected width). As necessary, discuss techniques for calculating GEP stack height for each structure. (Also, please note that refined BPIP modeling output is generally accepted as a GEP analysis);

- h) A short discussion of urban/rural considerations. At this time, the majority of Mecklenburg County is designated as “rural” based on the parameters outlined in Appendix W, [https://www3.epa.gov/ttn/scram/guidance/guide/appw\\_17.pdf](https://www3.epa.gov/ttn/scram/guidance/guide/appw_17.pdf). The applicant may request MCAQ to make this determination prior to submitting the protocol;
- i) A short discussion of model(s) selection and version of model used;
- j) A discussion of meteorological data used;
- k) A table of the proposed emission rates that will be used in the model to demonstrate compliance. These are the emission rates that will be placed into the permit as permit limits. A short discussion should be included to describe if these emission rates are actual emissions, greater than actual, or are potential emissions.
- l) A table that will be used to display modeling results, comparing them with the appropriate standards. Model results should indicate in which data year the maximum concentration was identified.

If the submitted modeling protocol discussion is limited to screening modeling, and refined modeling becomes necessary to determine compliance, the modeling plan should be revised and resubmitted to MCAQ for approval prior to submitting the refined modeling analysis. MCAQ will accept the revised protocol together with the refined modeling, however, as noted above, this could increase application review times.

A modeling protocol only is valid for a period of 90 days from the date of the approval to ensure that any changes made in response to advancements made in the science of air quality dispersion modeling are valid; however, previously approved modeling protocols may be substituted for a new submittal if they are less than one year old, and a letter is submitted that requests that a previously approved protocol be used (specifying date of previous submittal). The letter should discuss in detail the proposed facility modifications, and any proposed changes to the methodologies (including model updates, etc.). If the modeling analysis is not expected to be submitted prior to the modeling plan expiration date, a protocol “approval extension request,” or a revised protocol should be submitted to MCAQ before the modeling analysis is submitted.

Generic modeling protocols for “multi-location” modeling will not be accepted (e.g. large “multi-site” industries submitting one protocol to model more than one facility at the same time). For proposed “multi-facility” evaluations, each individual facility must have an approved protocol, which is unique to that facility. The discussion of the facility (sources, buildings, receptors, terrain, etc.) should include every aspect of the “individual” facility. Generalizations will not be accepted.

### 3.0 GENERAL MODELING INFORMATION

New facilities are required to identify and evaluate emissions of air toxics from all sources. Existing facilities making modifications are required to identify and evaluate all sources of new air toxics and all existing sources that show a facility-wide “net” increase of air toxics as a result of the modifications.

Total facility emissions of those toxics listed in MCAPCO Regulation 1.5711 must be compared to the applicable toxic emission rates also listed in MCAPCO Regulation 1.5711. If the facility’s total emissions exceed these values, those toxics must be modeled to show compliance with the applicable AALs listed in MCAPCO Regulation 2.1104. **Note: Any changes in source characteristics previously modeled to show compliance will require a new modeling compliance demonstration.** Modeling requirements for proposed modifications that *do not* result in a facility-wide “net” increase of air toxic emissions will be evaluated by MCAQ on a case-by-case basis.

### 3.1 Source Types

This guideline document refers almost exclusively to point sources, since these are the most common continuous toxic emission sources. Other source types should be used where applicable.

Industrial pollutant emissions can be characterized in four different ways:

Point or Flare sources: examples include stacks, chimneys, exhaust fans, vents, or flares.

These sources can be modeled with most dispersion models including AERSCREEN and AERMOD, which are able to evaluate building downwash.

Area sources: examples include ponds, puddles, storage piles, and open pits. These sources can also be modeled with most dispersion models including AERSCREEN and AERMOD.

Volume sources: examples include open buildings and open storage tanks, building roof vents, and conveyor belts. These sources also can be modeled with most dispersion models including AERSCREEN and AERMOD. The model accounts for downwash using the entered horizontal and vertical dispersion parameters ( $\sigma_y$  and  $\sigma_z$ ) of the influencing structure, where:

$$\sigma_y = \text{length of side} / 4.3$$

$$\sigma_z = \text{vertical dimension of source} / 2.15 \text{ (for surface-based source)}$$

$$\sigma_z = \text{building height} / 2.15 \text{ (for elevated source on or adjacent to a building)}$$

$$\sigma_z = \text{vertical dimension of source} / 4.3 \text{ (for elevated source not on or adjacent to a building)}$$

To determine the lateral side for  $\sigma_y$  calculations, the correct method is to use volumes with square area footprints and use the side of the square. A non-square footprint should be divided up into two or more square ones. MCAQ will accept, as an alternative method, using the side of an equal area square footprint. In other words, use the square root of the



total footprint area of the volume source. To prevent delays and reworks, confer with MCAQ prior to completing the analysis, in order to reach agreement of volume source parameters.

The release height is generally equal to 50% of the source height.

Line Sources: examples include roadways and streets (mobile fugitive and combustion sources) or lines of roof vents or stacks. AERMOD can simulate line source emissions as multiple volume sources. Contact MCAQ before choosing this type of source.

### 3.2 Good Engineering Practice (GEP) Calculations

The atmospheric flow and turbulence around buildings and other obstacles determines how pollutants are dispersed. The height above the ground of undisturbed atmospheric flow,  $H_g$ , is called the *good engineering practice (GEP) height*. Determining the GEP height is the initial phase of the air quality modeling analysis. GEP stack height is defined as the height necessary to ensure that emissions from the stack will not result in excessive concentrations of any air pollutant in the immediate vicinity of the sources as a result of atmospheric downwash, eddies, or wakes, which may be created by the source itself, nearby structures, or nearby terrain obstacles.

Using the EPA Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations),<sup>3</sup> a GEP analysis should be conducted for all structures, combinations of structures (those within 1L of each other,) and terrain features that have a region of influence (5L) extending to one or more emission sources. These obstacles (buildings, structures, or terrain features) should not be limited to only those on the facility property. Any off-site structures should be evaluated if their region of influence encompasses one or more facility sources. Assessment of terrain elevations is on a case-by-case basis.

GEP stack height is calculated by using the following equation:

$$H_g = H + 1.5L$$

Where,

$H_g$  = good engineering practice stack height;

H = height of the adjacent structure or nearby structure;

L = lesser dimension (height or maximum projected width of the adjacent or nearby structure or terrain feature height).

The obstacle resulting in the largest GEP stack height ( $H_g$ ) for each source is identified as the critical structure for that source. The critical structure dimensions are used by the AERSCREEN model to assess cavity impacts and wake effects for each source modeled. On-site and off-site structures that are not identified as the critical structure, but which are close (within 3L) to the property boundaries and have a region of influence (5L) extending to one or more sources, should also be evaluated for cavity impacts.

Refined models, such as AERMOD, use direction-specific building dimension data, which can be obtained from the EPA Building Profile Input Program (BPIP-PRIME) or several vendor GEP-BPIP programs. For tiered structures, start with the largest “footprint” using the height of the shortest tier, and work down to the smallest “footprint” that has the tallest tier. More detailed information regarding combinations of structures (e.g. tiered or complex structures) can be obtained from the EPA GEP guidelines previously referenced. Refined BPIP modeling output is generally accepted by MCAQ as an acceptable GEP analysis, which limits the need for a detailed discussion of GEP rules and regulations. Also, unless otherwise exempted, a stack greater than GEP should be modeled at its calculated GEP height.

### **3.3 Merged Sources**

Merging stacks in a modeling analysis generally is not recommended. Since modeling uses actual hourly meteorological data, the representative stack closest to the property line may not result in the highest ambient concentrations. Similar stacks which are located close to one another and are a considerable distance from the property boundary may be merged; however, the user should discuss the proposed source merging first with MCAQ and in the modeling protocol.

### **3.4 Receptors**

Receptors are points, defined by the modeler, that represent physical locations at which the air dispersion models will predict ambient pollutant concentrations. Groups of Cartesian or polar receptors usually are defined as “receptor grids.” Deciding which type to use is largely a function of the type of modeling being performed (screening or refined), the size and number of emission sources, or the site location (including topography), and should be selected to provide the best “coverage” for the facility being modeled.

A Cartesian receptor grid consists of receptors identified by their x (east-west) and y (north-south) coordinates, and is generally the easiest with which to work. A polar receptor grid consists of receptors identified by their distance and direction (angle) from a user defined origin (e.g. main boiler stack). Discrete receptors are used to identify specific locations of interest (e.g. school, church, etc.) and can be expressed in Cartesian or polar coordinates. All types of receptors may include terrain heights (z) for evaluation of terrain.

A modeling receptor grid may consist of any combination of discrete, polar, or Cartesian receptors, but must provide sufficient detail and resolution to identify the maximum impact. Additional comments regarding receptor types, placement, and terrain considerations are given in the screening and refined modeling sections.

### **3.5 Land Use Classification**

Land use classification determines the type of area to be modeled. The different classifications, urban or rural, incorporate distinct pollutant dispersion characteristics and will affect the estimation of downwind concentrations when used in the model. With few exceptions (e.g. uptown Charlotte), all of Mecklenburg County should be considered rural. When notified

that modeling may be required, MCAQ, with the assistance of Mecklenburg County’s GIS group, will perform a land usage analysis for the identified facility.

Land use classification is determined by examining the area within three kilometers (9900 feet) of the facility being modeled. The following characteristics are considered “rural:”

- Woods/Brush
- >2 acre residential/Open space
- 0.5 – 2 acre residential
- 0.25 – 0.5 acre residential
- Standing water

The following characteristics are considered “urban:”

- <0.25 acre residential/Apartment
- Institutional (Hospitals/Schools)
- Industrial – light
- Industrial – heavy
- Commercial – light
- Commercial – heavy
- Transportation (Roads)

### 3.6 Recommended Models

The dispersion models recommended in this guidance are consistent with the EPA model recommendations given in the 40 CFR 51 Appendix W, which can be found on EPA’s Support Center for Regulatory Air Models (“SCRAM”) web site. Although there are a number of technical and non-technical factors to be considered when deciding which dispersion models should be used, model selection generally can be defined based on level of modeling desired (screening or refined). A modeling exercise may be limited to a specific model, or may require more than one model. Table 1 summarizes the more commonly used models.

**TABLE 1  
Recommended Models**

Model Application	Screening Models	Refined Models
Flat, Rolling, or Complex Terrain	AERSCREEN	AERMOD

The models listed in Table 1 and other EPA Guideline models can be downloaded from the EPA Technology Transfer Network's ("TTN") SCRAM web site. Addresses for EPA and SCRAM, as well as other useful sites are listed below:

- US EPA – <http://www.epa.gov/>
- EPA Support Center for Regulatory Air Models - <https://www.epa.gov/scram>
- EPA Region 4 (Atlanta) – <https://www.epa.gov/aboutepa/about-epa-region-4-southeast>
- MCAQ - <http://AirQuality.CharMeck.org>

### **3.7 Modeling Reporting Requirements**

The modeling reports submitted to MCAQ should be complete, and include an introduction and detailed discussion of the modeling compliance demonstration. Although the length and complexity of the modeling report will be dictated by the complexity of the modeling, each report should contain the following items:

- a) A general discussion of plant processes and the types of emission sources under consideration;
- b) A detailed site map showing locations of property boundaries, emission sources (existing and proposed), existing and proposed facility buildings or structures [the map must show the dimensions (height, width, length) of all buildings and structures], and any public rights-of-way traversing the property (e.g. roads, railroad tracks, rivers, etc.). The site diagram should also provide a scale and true north indicator and should show UTM coordinates or the latitude/longitude of at least one point (e.g. source or building corner). If known, indicate the format or projection of the UTM coordinates (e.g. NAD83);
- c) A list of all the facility toxic air pollutants, their actual emission rates, and their respective NC toxic permitting emission rates (TPERs) as listed in MCAPCO 1.5711- "Emission Rates Requiring a Permit";
- d) A list or table of stack parameters for all existing and proposed sources. Use the appropriate Form M-2 or an equivalent form. All fugitive emissions should be identified and quantified;
- e) A Good Engineering Practice (GEP) analysis. All individual or combined structures (those within 1L of each other) with a region of influence (5L) extending to one or more sources must be included in the GEP analysis. Use form M-1 or an equivalent for this. As necessary, discuss techniques for calculating GEP stack height for each structure;
- f) All emission calculations used to derive source parameters (e.g.  $\sigma_y$  and  $\sigma_z$  calculations);
- g) A short discussion of the proposed meteorological data (e.g. stations and years selected), if not using the MCAQ-provided data;

- h) A short discussion of proposed receptor locations, resolution, and terrain considerations (from the USGS topographic map). Note: Any changes in topography due to excavating, etc. should be reflected in modeling analysis for review;
- i) A short discussion of urban/rural considerations if not using a MCAQ-provided land usage analysis;
- j) A short discussion of model selection and version of model used.
- k) A table of the final emission rates that were used in the model to demonstrate compliance. These are the final emission rates that will be placed into the permit as permit limits; and,
- l) A table summarizing modeling results and comparing them with the appropriate standards. Model results should also indicate in which meteorological data year the maximum concentration was identified.
- m) Electronic input and output files and associated data files as necessary for MCAQ to complete our review. Note: Most electronic modeling files are too large to be submitted via email. MCAQ can only accept these files using Microsoft OneDrive file-hosting service.

The forms referenced below and shown in Appendix A may be photocopied and used in the modeling report. The applicant is free to develop and use alternate forms, but all information must be included. The appropriate forms or combination of forms to be submitted to MCAQ will depend on the complexity of the modeling compliance demonstration. The following forms are recommended for submission for a simple screening or refined modeling analysis.

- Form M-1 – Screening Model Parameters
- Form M-2 – Source Parameters
- Form M-3 – Toxic Air Pollutant Emission Rates
- Form M-4 – Toxic Air Pollutant Off-Site Concentrations

## 4.0 SCREENING MODELING

Applicants proposing to modify an existing facility, or construct a new facility, are required to identify and evaluate the new air toxic emissions, or net increases in existing toxics, at their facility. If the applicant is required to perform dispersion modeling to demonstrate compliance with the applicable Acceptable Ambient Levels (AALs) for identified regulated toxics, MCAQ recommends the use of screening models as a first approach to the compliance demonstration. The latest screening models available will estimate pollutant concentrations in cavity regions, and simple, rolling, and complex terrain environments. These screening models also are generally faster and easier to use because they require less detailed data than refined models. They also are preferred because they are designed to provide conservative estimates of pollutant concentrations. The following discussion will mainly reference the EPA AERSCREEN model since this is the MCAQ preferred screening model.

### 4.1 AERSCREEN

AERSCREEN is a screening-level model based on AERMOD. AERSCREEN includes state-of-the-art dispersion science and enhanced terrain capabilities. The data input requirements for AERSCREEN are source-specific and are described in detail in the AERSCREEN User's Guide<sup>4</sup>, 454/B-16-004. This document can be downloaded from the EPA SCRAM website. The data required to perform simple point source screening modeling are: stack height, exit velocity, stack diameter, exit temperature, individual pollutant emission rates for each stack, distances from stacks to the property/fence line, and detailed information about any structure within one half (1/2) mile of each stack. For facilities located in elevated and rolling terrain, a National Elevation Dataset (NED) file for the area surrounding the source can be obtained from the Multi-Resolution Land Characteristics Consortium (MRLC) at: <http://www.mrlc.gov/viewerjs/>, or you can use the NED file available on MCAQ's website, which covers the entire land area of Mecklenburg County.

The following are the recommended model options:

- a) Stack exit velocity: If the stack has a non-vertical exit, the following equation should be used to calculate an appropriate exit velocity:

$$V_s = V_{s0} \sin(\text{angle of stack from horizontal})$$

Where;

$V_s$  = exit velocity to input to model,

$V_{s0}$  = exit velocity as reported

The greater of  $V_s$  or 0.01m/s should be used in the dispersion model. In cases where there are fugitive emissions, stacks with rain caps, and horizontal or downward-pointing exits, use 0.01 m/s.

- b) Stack exit temperature - Use actual stack exit temperature or ambient temperature as presented in the AERSCREEN User's Guide: "If a stack temperature of zero (Fahrenheit or Kelvin) or negative stack temperature is entered, the entered temperature will be used as a difference between the stack and ambient temperature. A negative number, such as -10, implies that the stack is 10 degrees warmer than the ambient temperature."

- c) Receptor height (flag pole) = 0 m, unless considering impacts on nearby buildings, balconies, highway overpasses, etc. The distance to flag pole receptors should be identified using the discrete receptor option (i.e. do not use the automated distance receptor array for flag pole receptor heights).
- d) Ambient air temperature = 298.15 ° K (77° F as specified in MCAPCO Regulation 2.1104).
- e) Urban/rural options (described in Section 3.5).
- f) Building downwash: For building downwash effects, the user can use either a pre-existing BPIP file or enter certain information about nearby buildings directly. The parameters required if entering the building information directly into the model are: 1) building height, 2) maximum horizontal building dimension, 3) minimum horizontal building dimension, 4) the maximum horizontal building dimension angle from true north (0-179 degrees), 5) direction of the stack from the building center (0-360 degrees), 6) distance between the stack and building center. If several buildings exist within the vicinity of the modeled source and a pre-existing BPIP input file is not used, the buildings should be evaluated through a GEP analysis to determine the controlling structure to be used for screening model input.
- g) Meteorology: Default values should be used for minimum/maximum temperature (250 – 310 K), minimum windspeed (0.5 m/s) and anemometer height (10.0 m). Select the appropriate generic land use type for surface characteristics (water, deciduous forest, coniferous forest, swamp, cultivated land, grassland, urban, desert shrub land) and surface moisture (average, dry, or wet). The most applicable for Mecklenburg County would be deciduous forest, coniferous forest, cultivated land, or urban land use type, and wet or average surface moisture. Visual interpretation using a 1000-meter diameter aerial image is recommended for selection of the surface characteristics type. Notify MCAQ if assistance is needed in determining this parameter.
- h) Automated receptor array: Recommended and must begin at the nearest location of contiguous property line from the source. It should extend far enough to ensure that the maximum concentration is calculated, usually 2000 m. Extend the receptor array out to 20 km for taller stacks (height greater than 50 m). If the terrain heights exceed the stack base elevation within 5 km (~3 miles) of the modeled stack, include terrain features.
- i) Discrete receptors: Use at nearby critical locations, including residences, schools, rest homes, businesses, etc., on property not owned by the facility, and on public rights-of-way (e.g. train tracks, highways, rivers, etc.) which traverse the facility property. **Note: Annual and 24-hour toxics modeling demonstrations do not require receptors to be located on public rights-of-way traversing facility property boundaries.**
- j) When using NED elevation data files (recommended), select the NAD 1983 dataset option.
- k) The source location can be entered in either Lat/Lon or UTM coordinates.

## 4.2 Screening Meteorology

The meteorological data used in the dispersion models determines the transport and dispersion of the source emissions. The AERSCREEN model interfaces with the MAKEMET program to generate a matrix of meteorological conditions based on ambient temperatures, minimum wind speed, anemometer height, and user-specified surface characteristics (user-entered, AERMET land use type tables, or surface characteristics listed in an external file, The user has the option of uploading an external AERSURFACE output or AERMET stage 3 input file.

## 4.3 Terrain Data

The AERSCREEN model interfaces with the AERMAP and BPIPFRM to automate the processing of terrain information. Users have the option of importing an external terrain data file into AERSCREEN. If terrain heights exceed the elevation of the modeled stack base, a terrain data file should be included in the AERSCREEN model run.

## 4.4 Conversion Factors

AERSCREEN automatically converts the 1-hour concentrations to 3-hour, 8-hour, 24-hour, or annual concentrations, by applying the following conversion factors shown in Table 2.

**Table 2**  
**AERSCREEN Conversion Factors**

<b>Averaging Period</b>	<b>Point Source Conversion Factors</b>	<b>Area Source Conversion Factors</b>
3-hour	1.00	1.00
8-hour	0.90	1.00
24-hour	0.60	1.00
Annual	0.10	Not Calculated <sup>a</sup>

<sup>a</sup>Previous MCAQ modeling guidance states that an annual concentration can be calculated by multiplying the maximum 1-hour concentration by a conversion factor of 0.08. This was guidance for previous screening model: Screen3.

## 4.5 Acceptable Ambient Levels (AALs)

After modeling is completed, sum the predicted concentrations for each source for each pollutant. Compare the maximum predicted concentrations for each averaging period to the AALs listed in MCAPCO Regulation 2.1104 "Toxic Air Pollutant Guidelines." Use the following when comparing to the AALs to determine compliance:

- a) If the 1-hour modeled concentrations are greater than 95% of the appropriate AAL, refined modeling (see Section 5) must be conducted to demonstrate compliance. Alternatively, the applicant may choose to apply additional controls, make source modifications, or consider



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permit restrictions to reduce the modeled concentrations to 95% or less of the appropriate AAL.

- b) If the total predicted 24-hour and annual concentrations are less than the AALs, no further modeling is necessary.

## **5.0 REFINED MODELING**

If the screening modeling evaluation results in pollutant concentrations that exceed 95% of the 1-hour AAL, and source modifications or permit restrictions are not acceptable alternatives, the source emissions can be modeled using an acceptable refined dispersion model. The refined model is more complex than the screening model and will require more extensive computer hardware and software resources, more detailed input data, and a greater level of modeling proficiency; however, the refined model is more accurate and generally will predict lower ambient pollutant concentrations. The guidance in this section is intended to provide an introduction to refined modeling techniques. The user may wish to review the material in the individual refined model user's guides specified in 40 CFR 51 Appendix W, which can be found on EPA's Support Center for Regulatory Air Models ("SCRAM") web site.

AERMOD is the preferred model for most refined modeling applications.

### **5.1 AERMOD**

The AERMOD model is a refined model designed to estimate average pollutant concentrations for multiple sources, at one or more receptor locations over the averaging period(s) of concern using actual hourly meteorological data.

The AERMOD model is capable of evaluating ambient impacts at receptors in all types of terrain. AERMOD may be executed with complex and intermediate terrain receptors in the same manner as with simple terrain receptors. For each source evaluated, the AERMOD model will determine the appropriate terrain classification (i.e. simple, intermediate, or complex) for all receptors and apply the appropriate algorithm.

The following settings should be used when running the AERMOD model:

- a) The model should be executed with all regulatory default options.
- b) Stack exit velocity: For stacks with raincaps use the POINTCAP source type, and for stacks with horizontal discharge use the POINTHOR source type. POINTCAP or POINTHOR source types require knowledge of stack actual flow rate, exit temperature, and stack diameter. If stack actual flow rate, exit temperature, and stack diameter are uncertain or unknown, use an exit velocity of 0.01 m/s.
- c) Stack exit temperature: use actual stack exit temperature associated with modeled actual flow rate and based on reliable engineering data.
- d) Use 0 ° K for discharges at ambient temperature. AERMOD will apply the hourly temperature to the stack parameter if absolute zero (0° K) is entered.
- e) All facility buildings, including separate tiers, should be modeled in the analysis.
- f) Always use the highest impact concentration for comparison to the AAL.

- g) Urban/Rural Land Use - Use correct urban or rural land use setting. MCAQ, with the assistance of Mecklenburg County's GIS group, will perform a land usage analysis for the identified facility upon request.

The data input requirements for AERMOD are source-specific and are described in detail in the User's Guide for the AMS/EPA Regulatory Model - AERMOD<sup>5</sup>, EPA- 454/B-16-011, any addenda to this Guide, and the AERMOD Implementation Guide. These documents can be downloaded from the EPA SCRAM web site.

## **5.2 Receptor Grids**

The AERMOD model uses a combination of coarse and refined receptor grids to determine the maximum concentration for each pollutant and pollutant averaging period evaluated. The number and placement of these receptors will vary depending on the modeling scenario, but in all cases, should provide sufficient resolution to identify the maximum pollutant impact.

In designing the receptor grid, emphasis should be placed on resolution and location and not on the total number of receptors. For most facility modeling, the receptor grids should extend as appropriate 3-10 km; generally, larger stacks (>50 meters) require larger receptor grids. The receptor grid also should include terrain elevations when terrain heights exceed source base elevations. Terrain elevations should be processed from USGS National Elevation Dataset (NED) data by the AERMAP program.

Although coarse and refined receptor grids can be used in the same model run, the coarse receptor grid generally is used to identify the general area of maximum impact for each pollutant for each averaging period. The refined receptor grid then is developed and centered on the coarse grid maximum impact and used to identify the maximum pollutant concentrations.

### **5.2.1 Coarse Grid Array**

The coarse receptor grid can be discrete, Cartesian, polar, or any combination thereof, and is used to identify the general area of maximum impact for each pollutant for each averaging period. The polar receptor grid consists of 36 radials extending out from a centralized location with receptors placed along each radial at selected distances from the origin. Due to the nature of the polar grid, receptor resolution quickly diminishes as radial distance increases. This characteristic often can result in a receptor grid that provides insufficient detail to define the area of maximum impact. For this reason, MCAQ discourages the use of polar receptor grids and strongly recommends the use of Cartesian and/or discrete receptor grids.

The coarse Cartesian receptor grid is a rectangular pattern of receptors placed no more than 100 meters from each other. In addition, property line receptors should be placed at a maximum of ten (10) meter intervals along the facility property boundary. For toxic pollutants, discrete receptors along the public rights-of-way traversing the facility property are required only for the 1-hour averaging period evaluation. Discrete receptors also are placed at critical or sensitive areas such as hospitals, schools, and nearby residences.

## 5.2.2 Refined Grid Array

The refined receptor grid is used to ensure the maximum impact for each pollutant for each averaging period has been identified. The refined grid is a Cartesian and/or discrete receptor grid, and can be developed based on the coarse receptor grid analysis, or can be developed and used in lieu of the coarse receptor grid.

If the coarse receptor grid initially is used to identify the area of maximum impact, the refined receptor grid, with 10-meter resolution, is centered on the coarse grid receptor of maximum impact for each pollutant for each averaging period. The refined grid should extend from the point (-x, -y) to (+x, +y) where x and y are 50% of the distance between the receptors in the rough grid (*i.e.*, if a rough grid has receptors spaced every 100 meters, the refined grid should start at the point {-50, -50} and extend to the point {+50, +50} relative to the peak receptor of the rough grid) to ensure that the refined receptor indicating the maximum predicted concentration has at least one receptor on all sides showing a lower concentration. The location of maximum coarse grid impact may vary depending on the pollutant and averaging period; subsequently, the refined modeling analyses may require more than one refined receptor grid.

## 5.3 AERMAP

Terrain elevations for receptors should be processed from USGS National Elevation Dataset (NED) data by the AERMAP program. The NED data can currently be retrieved from the Multi-Resolution Land Use Characteristics Consortium website at: <http://www.mrlc.gov>, or you can use the NED file available on MCAQ's website, which covers the entire land area of Mecklenburg County.

Use of the old DEM quads is strongly discouraged because of documented problems with some of the data and lack of updates; the NED data set is improved, better maintained, and more frequently updated. AERMAP should also be used to assign initial base elevations for sources and structures from the same NED data. These onsite elevations, whether from NED or another source, may need to be adjusted manually to account for site grading and to ensure that the data values are consistent with surrounding receptor elevations. Different sources of elevation data may have different absolute values for the same point and it is important that an accurate assessment of the actual elevations be made before the information is input to the model.

The data input requirements for AERMAP are described in detail in the User's Guide for the AERMOD Terrain Preprocessor (AERMAP)<sup>6</sup>, EPA-454/B-03-003 and the addendum. This document can be downloaded from the EPA SCRAM web site.

## **5.4 Meteorological Data/AERMET**

Refined models, such as AERMOD, use actual meteorological data, hourly or averaged, collected from a pre-determined, representative, National Weather Service (NWS) station, or as part of an on-site data collection program, and can use up to five (5) years of data. In some cases, with MCAQ approval, data collected at local universities, FAA sites, military bases, industries, or pollution control agencies may be used. Meteorological data should be selected based on climatological representativeness, and the ability of the data to accurately characterize atmospheric transport and dispersion in the location of the facility. For Mecklenburg County, the Charlotte-Douglas International Airport should be used for surface data, and the Piedmont-Triad International Airport should be used for upper atmospheric data. This data, already processed for AERMOD, is available from the MCAQ web site.

Any use of on-site or other meteorological data that has not been processed by MCAQ will require prior approval. MCAQ will assist in the selection of surface characteristics to be used in the AERMET meteorological data processing. The data input requirements for AERMET are described in detail in the User's Guide for the AERMOD Meteorological Preprocessor (AERMET)<sup>7</sup>, EPA- 454/B-0316-00210. This document can be downloaded from the EPA SCRAM web site.

## **5.5 Comparison to AAL**

The maximum modeled concentrations for each pollutant are compared to the applicable AAL for each appropriate averaging period. No further modeling is necessary if the most recent year of meteorological data is used and the modeling results are below 50% of the applicable AAL. If the predicted concentrations exceed 50% of the applicable AAL, but are less than 100%, the latest five years of appropriate meteorological data must be used. If the modeling results indicate that ambient concentrations exceed the applicable AAL, permit restrictions and/or source modifications and remodeling will be required to demonstrate compliance.

## 6.0 REFERENCES

1. Mecklenburg County Air Pollution Control Ordinance (“MCAPCO”), Mecklenburg County Air Quality, Charlotte, NC, as amended.
2. U.S. Environmental Protection Agency, Guidelines on Air Quality Models – Appendix W to Part 51, U.S. EPA, Research Triangle Park, NC, as amended.
3. U.S. Environmental Protection Agency, Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations) (Revised), EPA 450/4-80-023R, U.S. EPA, Research Triangle Park, NC, 1985.
4. U.S. Environmental Protection Agency, AERSCREEN User’s Guide, EPA 454/B-16-004, U.S. EPA, Research Triangle Park, NC, 2016.
5. U.S. Environmental Protection Agency, User’s Guide for the AMS/EPA Regulatory Model – AERMOD EPA 454/B-16-011, U.S. EPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 2016.
6. U.S. Environmental Protection Agency, User’s Guide for the AERMOD Terrain Preprocessor (AERMAP) EPA 454/B-03-003, U.S. EPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC, October 2004 and Addendum, December, 2006.
7. U.S. Environmental Protection Agency, User’s Guide for the AERMOD Meteorological Preprocessor (AERMET) EPA 454/B-16-010, U.S. EPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December, 2016.
8. Scire, Joseph S., David G. Strimaitis, & Robert J. Yamartino, A User’s Guide for the CALPUFF Dispersion Model, Earth Tech, Inc., Concord, MA, 2000.

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Appendix A  
Modeling Report Forms

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# SCREENING MODEL Parameters

## Instructions for Form M-1

*Form M-1 should be completed for each facility submitting a screening model or when requesting that MCAQ conduct a screening model for a toxics review. A toxics review may be required due to a permit application, MACT applicability determination, or call by the Director.*

---

**SITE NAME** - Identify the name of the facility.

---

**PREMISE #** - New and/or previously unpermitted facilities may leave this blank.

---

**SITE ADDRESS** - Identify the legal address at which this facility is located.

---

**CITY** - Identify the city, town, or postal jurisdiction in which the facility is located.

---

**ZIPCODE** - Identify the postal zip code for the area in which the facility is located.

---

**EMISSION POINT ID** - On this row, enter the identification for each point. These are column headings for the next nine (9) rows of data.

---

**GEP Stack Height** – For emission sources having stacks or “point sources”, Good Engineering Practice (GEP) stack height is the height above ground of undisturbed atmospheric flow,  $H_g$ . This is the minimum height needed to prevent the stack exhaust plume from being entrained in the wake of nearby structures. The equation to determine GEP stack height is:  $H_g = H + 1.5L$ , where,  $H_g$  = good engineering practice stack height,  $H$  = height of adjacent or nearby structure,  $L$  = lesser dimension (of the *projected width* or the *height* of the adjacent structure).

Structures within  $5L$  of the emission source are considered adjacent or nearby and should be evaluated for determining GEP stack height. The structure resulting in the largest GEP stack height ( $H_g$ ) for each source is identified as the critical structure for that source. Provide parameters for the critical structure in the building parameters section of Form M-1.

---

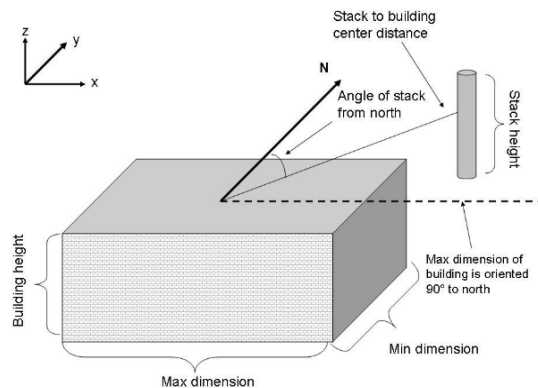
### **BUILDING PARAMETERS:**

**For downwash effects, use dimensions for the structure with the largest GEP for each stack modeled (i.e. the critical structure).**

- **Building ID/Name** - This would be a method of identifying the building, or land mass that causes the significant downwash for an emission point.
- **Building Width** - This is the minimum dimension of the building or land mass that causes the significant downwash for this emission point. The first column is for the units of measurements selected (feet/meters/yards/inches/etc.)
- **Building Length** - This is the maximum dimension of the building or land mass that causes the significant downwash for this emission point.
- **Building Projected Width** - This is the hypotenuse of the length and width of the building or land mass that causes the significant downwash for this emission point. To calculate this, take the square root ( $\sqrt{\quad}$ ) of the sum of the width squared and the length squared.
- **Building Height** - This is the height (relative to the ground level of the emission point) of the building or land mass that causes the significant downwash for this emission point.



- **Distance from Stack** - This is the distance of the building or land mass that causes the significant downwash for this emission point from the emission point. This distance should be less than five (5) times the lesser of the projected width or the height.
- **Degrees from North of Maximum Building Horizontal Dimension** – angle of the maximum dimension relative to North (0-179 degrees).
- **Degrees from North of Stack Location Relative to Building Center** – angle relative to North of the stack (0-360 degrees).
- **Distance between the Stack and Building Center.**



**TERRAIN DATA:**

AERSCREEN provides the option for incorporating terrain impacts on the screening analysis. Terrain processing is allowed for all sources except rectangular area sources.

The following input parameters are needed for AERSCREEN:

- Terrain flag (Y=use terrain, N=do not use terrain)
- UTM X coordinate
- UTM Y coordinate
- UTM Zone
- Source Elevation (ft or m)
- NAD datum of source location
- Probe distance in meters

Users also have the option of importing an external terrain data file into AERSCREEN. If terrain heights exceed the elevation of the modeled stack base within 5 km, a terrain data file should be included. Terrain elevations should be processed from USGS National Elevation Dataset (NED) data by the AERMAP program. The NED data can be retrieved from the Multi Resolution Land Use Characteristics Consortium website at <http://www.mrlc.gov>, or you can use the NED file available on MCAQ’s website, which covers the entire land area of Mecklenburg County.

**Notes:**

- Mecklenburg County is located in UTM Zone 17
- MCAQ recommends the use of NAD 83 datum
- If terrain is included: Maximum distance to Probe (Probe distance) default value is 10,000 m
- If terrain is not included: Maximum distance to Probe default value is 5,000 m

**LAND USAGE** - Indicate the appropriate land usage for the area within three (3 km) kilometers of the facility. This would be equal to 9900 feet. Due to the urbanization of Mecklenburg County, there no longer is a “default” classification. MCAQ will coordinate a land usage classification for the site when informed that modeling is to be done for a facility.

**REQUEST FOR MCAQ TO PERFORM SCREENING MODELING** - Complete this section to request that **MCAQ** conduct screening modeling using the data provided in the application.

**SUPPLEMENTAL INFORMATION:**

- **Site/Facility Diagram** - A site plan, or sketch, showing dimensions of on-site structures, a north arrow, emission points, and distance from emission points to nearest property line. Dimensions and distances may

reference data provided in this section of the application package.

- **Topographic Map** - A map showing topographic information a minimum of three (3) kilometers [1.875 miles] from the center of the facility must be submitted if there is terrain higher than 50% of the shortest stack height. Maps of this kind may be found at the United States Geological Survey (USGS) or Mecklenburg County GIS Group.

*Note: Refined modeling must be performed if the initial/screening model results in a maximum off-site concentration greater than **95%** for a pollutant with a 1-hour screening level, or greater than **100%** for any other pollutant of the AAL. For refined modeling, no further modeling is necessary if the most recent year of met data is used and modeling results are below 50% of AAL. If concentrations exceed 50%, the latest 5 years of met data must be used.*



# SECTION M SCREENING MODEL Parameters

M-1

SITE NAME:	PREMISE #:
SITE ADDRESS:	
CITY:	ZIPCODE:

<b>Downwash Factors</b>
-------------------------

Emission Point ID									
-------------------	--	--	--	--	--	--	--	--	--

<b>GEP Stack Height (Indicate units, ft or m)</b>
---

$H_g = H + 1.5L$									
------------------	--	--	--	--	--	--	--	--	--

<b>Building Parameters (Indicate units, ft or m or degrees)</b>
---

Building ID/Name									
Width									
Length									
Projected Width									
Height									
Distance from Stack									
Degrees from North of maximum building horizontal dimension (0-179 degrees)									
Degrees from North of stack location relative to building center (0-360 degrees)									
Distance between stack and building center									

<b>Terrain Data (Indicate units, ft or m)</b>
---

Terrain Data File Included	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Source Elevation		
UTM Coordinates		
<b>Land Usage</b>	<input type="checkbox"/> Urban	<input type="checkbox"/> Rural



# SECTION M SCREENING MODEL Parameters

M-1

## Request for Mecklenburg County Air Quality ("MCAQ") to Perform Screening Modeling

In accordance with the Mecklenburg County Air Pollution Control Ordinance ("MCAPCO") Regulation 2.1106 - "Determination of Ambient Air Concentrations," I request that MCAQ perform **screening modeling** based on the submitted information. Should the model demonstrate an exceedance of the applicable acceptable ambient levels ("AALs") for any pollutant, the permit application will be considered "incomplete" until such time as a model demonstrating compliance is submitted.

Printed Name and Title of Company Official

Signature

Date

### Supplemental Information

Please provide the following supplemental information:

- Site/Facility Diagram
- Topographic Map (If there is terrain higher than 50% of the shortest stack height within 3 kilometers of the facility)

## Source Parameters

## Instructions for Form M-2

Form M-2 should be completed for each facility when a toxics review is required. A toxics review may be required due to a permit application, MACT applicability determination, or call by the Director.

---

### POINT SOURCE PARAMETERS:

- **Stack Height - AGL** – This is the height of each emission point above ground level. Provide the units of measurement (feet or meters).
  - **Stack Temperature** - This is the *minimum* temperature of the discharge from the stack.  
Screening Models - Use 298.15 °K for discharges at ambient temperature (77°F as specified in MCAPCO Regulation 2.1104).  
  
AERMOD - Use 0° K for discharges at ambient temperature. AERMOD will apply the hourly ambient temperature to the stack parameter if absolute zero is entered.
  - **Stack Velocity** - This is the exit velocity of the discharge from the stack. An exit velocity of 0.01 m/s is entered if the stack is horizontal, or if it has a raincap.
  - **Stack Flow Rate** - This is the volumetric exit discharge from the stack. A flowrate is required for facilities using a screening model to evaluate toxics.
  - **Stack Diameter** - This is the cross sectional area of stack reduced to a diameter. For a non-circular stack, the diameter can be determined using the following equation:  $\sqrt{4 * (\text{cross sectional area}) / \pi}$
  - **Source Base Elevation** – List the elevation, above mean sea level, of the stack (in feet).
  - **Stack UTM Coordinates** – Provide either the UTM coordinates (in meters) or latitude and longitude (in degrees) for each stack. Indicate what type of terrain data was used in the model (NAD23, NAD83, or NED).
  - **Rain Cap** - This is a **Yes** or **No** question.
  - **Vertical Stack** - This is the direction of the stack (vertical stacks point toward the sky). **Yes** or **No** question
- 

### AREA SOURCE PARAMETERS:

- **Area Source Height** - This is the height of each emission point above ground level. Provide the units of measurement (feet or meters).
  - **Area Source Width** - This is the minimum distance of which the area source consists.
  - **Area Source Length** - This is the maximum distance of which the area source consists.
  - **Source Base Elevation** – List the elevation, above mean sea level, of the area source (in feet).
  - **Stack UTM Coordinates** – Provide either the UTM coordinates (in meters) or latitude and longitude (in degrees) for each area source. Indicate what type of terrain data was used in the model (NAD23, NAD83, or NED).
- 

### VOULME SOURCE PARAMETERS:

- **Volume Source Height** - This is the height of each emission point above ground level. Provide the units of measurement (feet or meters).
  - **Volume Source Width** - This is the minimum distance of the building of which the volume source consists (sigma Y).
  - **Volume Source Length** - This is the maximum distance of the building of which the volume source consists (sigma Z).
  - **Source Base Elevation** – List the elevation, above mean sea level, of the volume source (in feet).
  - **Stack UTM Coordinates** – Provide either the UTM coordinates (in meters) or latitude and longitude (in degrees) for each volume Source. Indicate what type of terrain data was used in the model (NAD23, NAD83, or NED).
-



# SECTION M Source Parameters

Point Source	Stack Data				
Emission Point ID					
Stack Description					
Stack Height (ft or m) - AGL					
Stack Temperature (°F or °K)					
Stack Exit Velocity (ft/s or m/s)					
Stack Flowrate (acfm or m <sup>3</sup> /s)					
Stack Diameter (ft or m)					
Stack Base Elevation (ft) - MSL					
Stack UTM Coordinates (m):	E				
	N				
Circle Datum: NAD27, NAD83, or WGS84	Zone				
<b>OR</b>					
Latitude	° N				
Longitude	° W				
Rain Cap? (Y/N)					
Vertical Stack? (Y/N)					

Area Source	Area Source Data				
Emission Point ID					
Source Description					
Area Source Height (ft or m) - AGL					
Area Source Length (ft or m)					
Area Source Width (ft or m)					
Stack Base Elevation (ft) - MSL					
Area Source UTM Coordinates (m):	E				
	N				
Circle Datum: NAD27, NAD83, or WGS84	Zone				
<b>OR</b>					
Latitude	° N				
Longitude	° W				

Volume Source	Volume Source Data				
Emission Point ID					
Source Description					
Volume Source Height (ft or m) - AGL					
Volume Source Length (ft or m)					
Volume Source Bldg. Height (ft or m)					
Stack Base Elevation (ft) - MSL					
Volume Source UTM Coordinates (m):	E				
	N				
Circle Datum: NAD27, NAD83, or WGS84	Zone				
<b>OR</b>					
Latitude	° N				
Longitude	° W				

ft - feet	AGL – Above Ground Level	m/s – meters per second	K° = 273+(°F-32) x 5/9)
m - meters	UTM – Universal Transverse Mercator	MSL – Mean Sea Level	acfm – actual cubic feet per minute



# SECTION M Source Parameters

Line Source	Line Source Data				
Emission Point ID					
Source Description					
Release Height (ft or m) - AGL					
X Length (ft or m)					
Y Length (ft or m)					
Angle					
Initial Vertical Dimension					
Stack Base Elevation (ft) - MSL					
Line Source UTM Coordinates (m):	E				
	N				
Circle Datum: NAD27, NAD83, or WGS84	Zone				
<b>OR</b>					
Latitude	° N				
Longitude	° W				
ft - feet	AGL – Above Ground Level	m/s – meters per second	K° = 273+((°F-32) x 5/9)		
m - meters	UTM – Universal Transverse Mercator	MSL – Mean Sea Level	acfm – actual cubic feet per minute		

## Toxic Air Pollutant Emission Rates

## Instructions for Form M-3

*Form M-3 should be completed for each facility when a toxics review is required. A toxics review may be required due to a permit application, MACT applicability determination, or call by the Director.*

---

**SITE NAME** - Identify the name of the facility.

---

**PREMISE #** - New and/or previously unpermitted facilities may leave this blank.

---

**SITE ADDRESS** - Identify the legal address at which this facility is located.

---

**CITY** - Identify the city, town, or postal jurisdiction in which the facility is located.

---

**ZIPCODE** - Identify the postal zip code for the area in which the facility is located.

---

**EMISSION POINT ID** - On this row, enter the identification for each point. These are column headings.

---

**POLLUTANT EMISSION DATA** - This section lists the pollutants involved in this review, their Chemical Abstract Service (ACAS@) number, and the averaging period. The first column is for the units of measurements selected (pounds per hour/pounds per day/pounds per year/tons per year/grams per second/kilograms per day/etc.). For pollutants with an annual averaging period, a maximum annual emission rate may be used with that being divided into 8760 hours to get the hourly emission rate for the model. For pollutants with a daily averaging period, a maximum daily emission rate may be used with that being divided into 24 hours to get the hourly emission rate for the model. For pollutants with an hourly averaging period, the maximum hourly emission rate must be used. Because of the different averaging periods, the same pollutant being discharged from the same emission point may have different hourly emission rates.





## Toxic Air Pollutant Off-Site Concentrations

## Instructions for Form M-4

*Form M-4 should be completed for each facility when a toxics review is required. A toxics review may be required due to a permit application, MACT applicability determination, or call by the Director.*

---

**SITE NAME** - Identify the name of the facility.

---

**PREMISE #** - New and/or previously unpermitted facilities may leave this blank.

---

**SITE ADDRESS** - Identify the legal address at which this facility is located.

---

**CITY** - Identify the city, town, or postal jurisdiction in which the facility is located.

---

**ZIPCODE** - Identify the postal zip code for the area in which the facility is located.

---

**EMISSION POINT ID** - On this row, enter the identification for each point. These are column headings.

---

**POLLUTANT OFF-SITE CONCENTRATIONS** - This section lists the pollutants involved in this review, their Chemical Abstract Service (ACAS@) number, and the averaging period. The first column is for the units of measurements selected (micrograms per cubic meter/milligrams per cubic meter/etc.). A TOTAL can be added as the last emission point and used as a summation for each pollutant. These are the results of each dispersion model.

