

AERSCREEN Guidance for evaluation of ambient air quality impacts

What is this document for?

This document is a companion document for form CH-20 and describes the necessary steps to acquire, install, and utilize AERSCREEN for submittal to MPCA in support of a permit amendment. Specifically, the MPCA is allowing an “off ramp” to more comprehensive NAAQS demonstrations if the applicant adheres to the prescribed methodology in this document. In the event that the project proposer cannot demonstrate compliance while utilizing this methodology, other analyses will be necessary.

What is AERSCREEN?

AERSCREEN is a screening version of AERMOD, EPA’s regulatory air dispersion model. AERSCREEN uses a constrained set of inputs to quickly determine if further analysis is required of the proposed project.

Acquiring AERSCREEN






AERSCREEN is publicly available through EPA on their “SCRAM” website, <https://www.epa.gov/scram>. Navigate to “Dispersion Modeling” and then “Screening Tools” (<https://www.epa.gov/scram/air-quality-dispersion-modeling-screening-models>). A download of AERSCREEN’s Model Code, for either 32-bit or 64-bit systems, is available on this page. Download the Model Code zip folder appropriate for your computer system. Users will also need to download the MAKEMET code and executables that are on the same page. To run AERSCREEN, users will also need to download the AERMOD executable, the AERMAP terrain processor, and the BPIPPRM executables. All of these programs are available on the EPA SCRAM website.

Note: AERMOD and AERSCREEN are regularly updated by EPA. When preparing to use AERSCREEN for a modeling analysis, check that you are using the most current version. As of this writing the current version of AERSCREEN is v21112.

Installing AERSCREEN

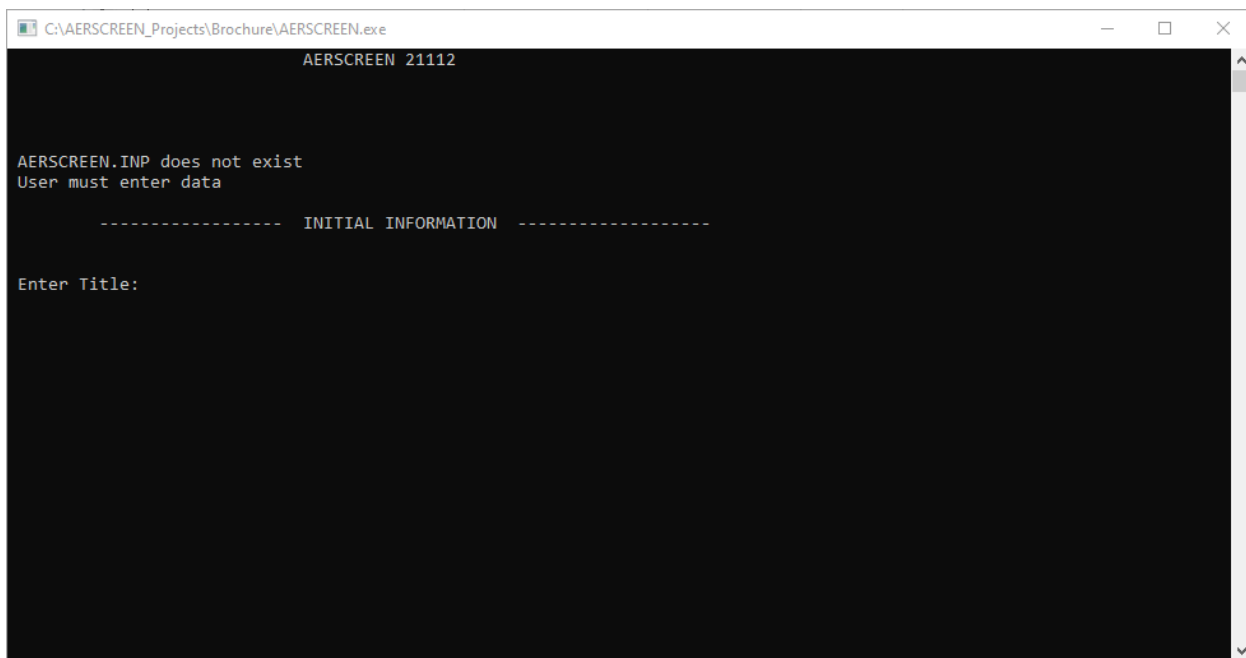
Once the required files have been acquired on your local computer, they need to be setup to run the program. Unzip the folders for the different executables downloaded in the previous step. It is useful to create a separate folder for each screening exercise, for instance one for each pollutant assessed. In each of these folders, place a copy of the five executables.

Example of what the folder will look like:

Name	Type
 MAKEMET	Application
 Bpipprm	Application
 aermod	Application
 aermap	Application
 AERSCREEN	Application

Setting up your project

You can initiate the AERSCREEN project by double-clicking on the AERSCREEN executable file that you downloaded previously and placed in your project folder. This will initialize the program and you will be presented with a window, pictured in Figure 1, that will prompt you for your project's inputs.



There are a series of prompts that will follow in the program that must be answered. A list of the prompts is presented in Appendix A of this document. Also included in the appendix are default parameters that the MPCA will insist be used if you are using this methodology to provide evidence as a part of your permit application. (Alternatively, you may create a text “input” file and feed that filename at the appropriate prompt, for further information refer to the [AERSCREEN User guide](#)).

Running AERSCREEN

```
*** AERSCREEN Run is Ready to Begin - Choose Option to Proceed ***

1 - Change Source Data;
2 - Change Building Data;
3 - Change Terrain Data;
4 - Change Meteorology Data;
5 - Change Fumigation Data;
6 - Change Title;
7 - Change Debug Option;
8 - Change Output Filename;
   - or -
Hit <Enter> to Start Run
```

Using the results

Once AERSCREEN has finished processing, a number of files will be generated containing both the inputs and results. For purposes of your submittal to the MPCA two files are of particular importance: “filename”.inp (input) and “filename.out” (output). (Note: you may enter whatever title for your project that you find appropriate, in this instance “filename” is merely a place holder). The agency will review the input file to ensure appropriate selections were made for the analysis and may decide to run the analysis again from the input file to verify the results. The output file contains the modeled impacts that will be compared against the allowable threshold.

Files for submission

- bpiprm.inp is generated and should be submitted to MPCA
- “filename”.inp is generated and should be submitted to MPCA
- “filename”.out is generated and should be submitted to MPCA
- aerscen.plt is generated and should be submitted to MPCA
- Max_conc_distance.txt is generated and should be submitted to MPCA

Maximum impacts

Within the “filename.out” output file, a table is included that will list the maximum impact summary from your analysis. This table may be useful in understanding the results of your analysis, a sample is pictured below. To compare against the significant impact level you would select the value corresponding to the appropriate averaging period for each pollutant. That is, if you were evaluating the 1-Hr NO₂ you would use the value listed under the “MAXIMUM 1-HOUR CONC (ug/m3)” heading.

***** AERSCREEN MAXIMUM IMPACT SUMMARY *****					
CALCULATION PROCEDURE	MAXIMUM 1-HOUR CONC (ug/m3)	SCALED 3-HOUR CONC (ug/m3)	SCALED 8-HOUR CONC (ug/m3)	SCALED 24-HOUR CONC (ug/m3)	SCALED ANNUAL CONC (ug/m3)
FLAT TERRAIN	1904.	1904.	1714.	1143.	190.4
DISTANCE FROM SOURCE	25.00 meters directed toward 220 degrees				
IMPACT AT THE AMBIENT BOUNDARY	1645.	1645.	1481.	987.2	164.5
DISTANCE FROM SOURCE	6.10 meters directed toward 20 degrees				

Quick links:

AERSCREEN Executable: <https://www.epa.gov/scram/air-quality-dispersion-modeling-screening-models>

AERMOD Executable: <https://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models#aermod>

AERMAP Executable: <https://www.epa.gov/scram/air-quality-dispersion-modeling-related-model-support-programs#aermap>

BPPIPRM Executable: <https://www.epa.gov/scram/air-quality-dispersion-modeling-related-model-support-programs#bpipprm>

AERMOD User's Guide:

https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/aermod_userguide.pdf

3rd Party software

While AERSCREEN can be run directly from the previously mentioned executable files, some users find it helpful to employ 3rd party, non-government software, to execute their AERSCREEN analyses. When submitting your analysis, the MPCA requires that the input and output files be submitted and usable with the AERSCREEN executables independent of any 3rd party software that may have been utilized.

Appendix A

List of prompts

Initial information

Title:

Optional title for your analysis.

English or metric units:

Either can be chosen. For this example document, metric was used.

POINT, VOLUME, AREA, AREACIRC, FLARE, POINTCAP, or POINTHOR source:

For a description of these different source types please refer to the [AERMOD User's Guide](#). For the purposes of this approach, the allowable source types are: POINT, FLARE, POINTCAP, or POINTHOR.

Source information

Emission Rate (g/s):

The emissions of your emission source represented in grams per second. Only include your emissions increases.

Stack height (meters):

If using a point source, the point of emissions to the atmosphere represented in meters above ground level.

Stack Diameter (meters)

If using a point source, the diameter of the source represented in meters.

Stack Temperature (Kelvin):

Enter the stack temperature. Alternatively, enter 0 for ambient temperature or a negative number for temperature difference (in K) between stack temperature and ambient temperature. Note: this temperature difference is above ambient temperature. AERMOD is unable to model releases that are below ambient temperature.

Option for Flow Rate or Exit Velocity:

AERSCREEN will allow 3 different ways to input the information: Exit Velocity in m/s, Exit Velocity in ft/s, or Flow Rate in actual cubic feet per min (ACFM). Choose your preferred method and enter the value.

Rural or Urban:

For the purposes of this screening analysis, rural should be selected. Minimum Distance to Ambient Air: Enter the distance from your source to the nearest property boundary of the facility.

Option for modeling NO₂ chemistry:

If your project does not include NO_x or you are modeling total conversion, then enter 1. Otherwise, there are two options for modeling NO₂ chemistry: Ozone Limiting Method (OLM) or Plume Volume Molar Ratio Method (PVMRM). For both the OLM and PVMRM methods an in-stack NO₂/NO_x ratio of 0.5 should be used. Use an ozone concentration of 68 PPB.

Include Building Downwash (y/n):

For most MPCA AERSCREEN submittals building downwash should be included as default. If running building downwash AERSCREEN will prompt you for an existing BPIPPRM input file. For this methodology do not use a BPIPPRM input file. AERSCREEN will run through a series of prompts asking for the building dimensions. Approximate the stack location relative to the approximate dimensions of your building.

Building Height, Maximum Horizontal Building Dimension, Minimum Horizontal Building Dimension, Maximum Building Dimension Angle to True North, Direction of Stack from Building Center, Distance Between Stack and Building Center.

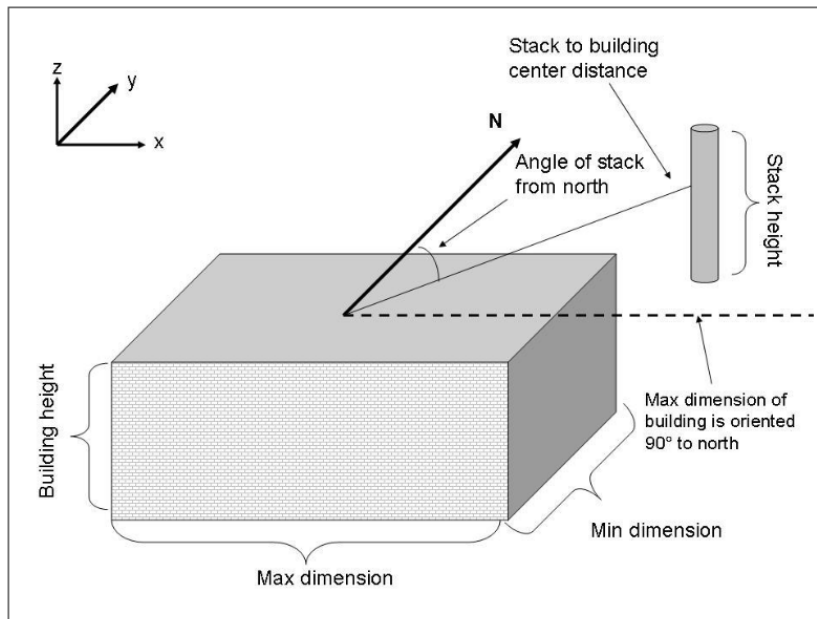


Figure 11. Stack and building orientation for a building oriented 90 degrees to north and stack oriented 45 degrees to north.

Include Terrain Heights (y/n):

By default your project need not include terrain heights.

Maximum Distance to probe:

You should select the default maximum of 5,000 meters.

Include up to 10 discrete receptors (y/n):

Discrete receptors are not required for this analysis.

Use Flagpole Receptors (y/n):

No is acceptable by default.

Source Elevation (m):

Enter 0.

Minimum Temperature (K):

Enter the source region's minimum ambient temperature. For Minnesota, a default of -20 degrees Fahrenheit (244K) should be used.

Maximum Temperature (K):

Enter the source region's maximum ambient temperature. For Minnesota, a default of 100 degrees Fahrenheit (310K) should be used.

Minimum Wind Speed:

Enter the default of 0.5 m/s, by pressing Enter.

Anemometer Height:

Enter the default of 10.0 meters, by pressing Enter.

Enter Surface Characteristics Option:

Use option 2 (AERMET Seasonal Tables) to approximate the surface characteristics in the vicinity of your source. See Section 3.1 of the AERMOD Implementation Guide for more information.

Enter Dominant Surface Profile:

Pick the relevant Dominant Surface Profile category.

Enter Dominant Climate Profile:

Enter "1" for Average Moisture.

Enter Y for adjust u^* :

As default your AERSCREEN project should utilize adjusted u^* .

Debug Option:

You may select the debug option but it is not required as a part of your submittal. For more information reference the AERSCREEN Users Guide.

Apply Inversion Break-up Fumigation (y/n):

Select no (n) and do not include fumigation in your screening analysis.

Execution

File Name:

Enter the name you want for the output file. If you press Enter, AERSCREEN will create a default file name, "aerscreen.out". If you type in a unique file name, be sure to include ".out". If you include spaces in the file name, surround the name in quotes "".

Data Validation:

AERSCREEN will present a summary of the entered information above the run prompt.

Ready to run:

AERSCREEN is now ready to run your project and you will be prompted to choose one of 9 options. You may edit any of your previous input by selecting the corresponding number associated with that data, or hit 'enter' to execute AERSCREEN. The output files should appear in the directory in which you run the AERSCREEN executable.