

SC-BAQ AERMOD Guidance

(updated February 27, 2017)

1. Scope

The topics mentioned here are ones that have required frequent clarification from BAQ in the past, or address specific BAQ expectations for AERMOD modeling analyses in SC. These guidelines are not intended to be a comprehensive source about AERMOD, its usage or refined modeling in general. This document will be updated as needed.

More comprehensive documentation about AERMOD and related programs is available at the EPA SCRAM website (http://www.epa.gov/scram001/dispersion_prefrec.htm#aermod). The *AERMOD Implementation Guide*, at the same link, provides information on the recommended use of AERMOD for a range of issues and types of applications.

All permit compliance demonstrations based on refined modeling for facilities in SC should employ the latest version of AERMOD, unless other arrangements are approved by BAQ.

2. Information to submit to BAQ

In general, a summary of all model inputs, methodology and results relative to the applicable standards and guidance should be included in the permit application.

This should include, but not be limited to, the following:

- Datum upon which geographical coordinates are based, e.g., NAD27 or NAD83;
- If elevations for sources, receptors, or buildings are from a source other than digital elevation files (i.e., extracted from National Elevation Data (NED) via AERMAP), the elevations and their source should be explicitly stated. For more information about NED, see section 4 ("Terrain Data") below;
- Justification for background concentrations used (for Standard No. 2 pollutants)

In addition, AERMOD and BPIP-Prime input and output files should be submitted in digital format (via CD, DVD or email). It is not necessary, however, to submit the AERMET or NED files that were used.

3. Meteorological Data

BAQ maintains a collection of 5-year data sets for use in AERMOD modeling in SC. Each data set has been deemed by BAQ to be the most representative for a defined geographic area – one of 12 across the state – and should be used as the default data set for all facilities within that area. [These current data-area associations supersede the ones shown in Table 5.1, page 34 of the [Air Quality Modeling Guidelines](#) of July 2001.] These data sets were prepared using AERMET with inputs from AERSURFACE, precluding the need for the user to utilize these programs. The data are AERMOD-ready and should be imported directly into AERMOD.

The data can be downloaded from the BAQ website at <http://www.scdhec.gov/Environment/AirQuality/ComplianceandReporting/AirDispersionModeling/ModelingData/>. These data are periodically updated, so the user should ensure that the latest available data are used for a particular modeling project.

4. Terrain Data

Digital terrain data should be included in all AERMOD modeling analyses. The data are imported via AERMAP.

The National Elevation Dataset (NED) from the United States Geological Survey (USGS) should be used. It is available at the USGS website (<https://lta.cr.usgs.gov/NED>), or can be downloaded from BAQ (<http://www.scdhec.gov/Environment/AirQuality/ComplianceandReporting/AirDispersionModeling/ModelingData/#dtd>) in county divisions at 1 arc-second (approximately 30-meter) horizontal resolution.

Elevations for all objects (sources, receptors, buildings and tanks) should be extracted from the NED. However, it is encouraged to use elevations from an alternate source, preferably a site survey, if available, especially for cases where actual elevations may deviate substantially from those in the NED (for example, when a facility site has been leveled in hilly terrain). If alternate elevations are used, it should be explicitly stated in the application, and the elevation source cited.

5. Receptors

The receptor grid should be configured to ensure capture of the maximum off-site modeled concentration. Discrete receptors should be placed along the property line at a maximum spacing of 50 meters. Discrete receptors at 50-meter spacing should also be placed along property not owned by the facility that crosses plant property (for example, public roads, rivers, and railroad tracks). Beyond the property line, a receptor grid with 100-meter spacing extending to a minimum range of 1500 meters beyond the property line should be used. A Cartesian grid is preferred by BAQ, but a polar grid is acceptable as long as receptor spacing does not exceed 100 meters within the 1500-meter range. A range greater than 1500 meters should be used if concentrations are not decreasing near the grid edge. It is the responsibility of the applicant to ensure that the maximum modeled concentration occurs within the domain of the receptor grid.

6. Downwash effects

BPIP-Prime should be used to incorporate downwash effects of buildings, tanks, etc.

Any off-site structures that may produce a downwash effect should be included as well.

If the modeling project was divided into different runs (per pollutant, for example), all the buildings should be included in a comprehensive run of BPIP-Prime, and the output of that run used in each of the individual AERMOD runs.

7. A few SOURCE reminders:

a) Rain-Capped and Horizontal Stacks:

If not subject to downwash (GEP stack):

- set exit velocity to 0.001 m/s
- stack diameter may be adjusted (increased) to maintain flow rate, and hence buoyancy (as long as exit temperature is greater than ambient temperature)
- stack tip downwash should be turned off
- if rain-capped, reduce height by 3 stack diameters
- if horizontal, use actual height

If subject to downwash (non-GEP stack):

- set exit velocity to 0.001 m/s
- no additional adjustments should be made

b) **Sources emitting at ambient temperature:** Use actual hourly temperatures from the meteorological data rather than an assumed constant temperature (unless the source is a vent that actually does emit at a steady temperature close to that inside the facility). To do this, set the exit temperature to 0 (zero) Kelvin. This triggers AERMOD to use the actual temperatures.

Questions or comments ? Please direct them to John Glass, Manager of BAQ's Air Modeling Section (803-898-4074, glassjp@dhec.sc.gov).

