



# **BREEZE AERMOD/ISC**



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## U.S. Environmental Protection Agency's Preferred Regulatory Model

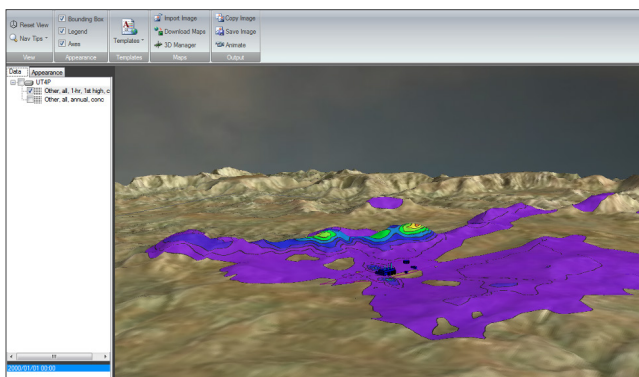
AERMOD is the state-of-the-science, steady-state Gaussian air dispersion model that is U.S. EPA-approved for most refined modeling scenarios. BREEZE AERMOD is an enhanced version of the U.S. EPA-approved AERMOD that provides modelers with the tools and functionality required to perform air quality analyses that help to address permitting, regulatory, and nuisance issues, perform academic research, and assist companies worldwide with capital planning. BREEZE AERMOD offers the most complete air quality modeling system available on the market today. No other application is used by more air quality professionals around the world.

## Software Overview

BREEZE AERMOD is a world-renowned air dispersion modeling program that incorporates the unmodified U.S. EPA AERMOD executable, while also providing users with a wealth of additional tools and capabilities. In addition to including all of the standard U.S. EPA source types and features, BREEZE AERMOD includes exclusive BREEZE features such as a flare source type, the ability to model multiple pollutants at the same time, and much more.

The purchase of BREEZE AERMOD also includes BREEZE 3D Analyst, which provides users with many ways to visualize and analyze results. From creating contour maps showing the concentrations overlaid on a basemap, to creating animations of results, to utilizing the many data manipulation tools within 3D Analyst to easily and quickly conduct tasks such as extracting exceedance counts, 3D Analyst makes analyzing modeling results a breeze!

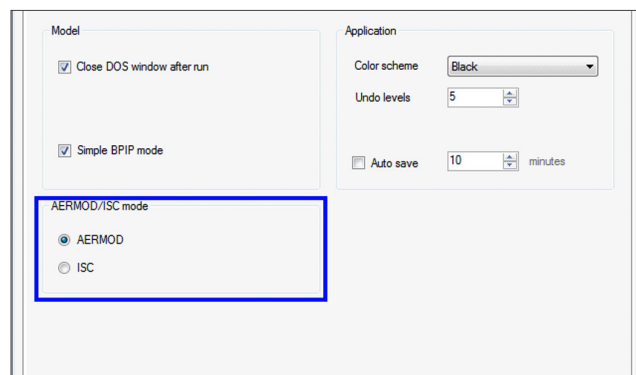
BREEZE AERMOD is available in two editions: Pro and Pro Plus. BREEZE AERMOD Pro Plus includes all of the features of the Pro edition, as well as additional features such as the ability to create animations, export results as shapefiles, and use additional source contribution analysis tools. Details about



the differences between these two editions can be found in the BREEZE AERMOD Editions and Pricing and What's Included sections of this brochure.

## ISC Model

In December 2006, AERMOD replaced the Industrial Source Complex (ISC) short-term model as the U.S. EPA recommended regulatory model. However, ISC is still widely used internationally so the BREEZE AERMOD suite conveniently includes ISC. ISC predicts pollutant concentrations from nearly any type of source emitting non-reactive pollutants. It allows you to define receptor grids and consider topographical features for each receptor location. You are also able to input above ground-level heights to simulate the impact at elevated or "flagpole" receptors. BREEZE ISC also predicts pollutant concentrations from: point, line, area, volume, and flare sources with variable emissions in all terrain regimes.



## Product Features and Tools

BREEZE AERMOD includes a wealth of features and tools that facilitate the model setup and results analysis process by expediting the model run setup, facilitating file management, and improving results display and post-processing capabilities. These tools are available free of charge to BREEZE AERMOD users and are conveniently integrated and accessed through the BREEZE AERMOD interface, making it easier than ever to setup, run, and analyze a dispersion modeling assessment. The following are only some of these features and tools:

### Basic Features

- ▶ Includes the latest U.S. EPA AERMOD executable and U.S. EPA BPIP/PRM executable
- ▶ Preserves compatibility with previous U.S. EPA AERMOD versions, back to executable 07026

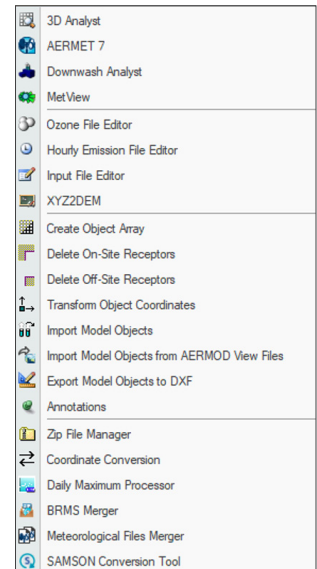
- ▶ Includes a basic, merge-only version of [BREEZE AERMET](#) and a basic version of [BREEZE MetView](#) with the purchase
- ▶ Includes a streamlined graphical user interface for more intuitive and easier dispersion modeling
- ▶ Generates an aligned or geo-referenced file after manually importing a basemap and geo-referencing it
- ▶ Imports 2D and 3D geometric data with AutoCAD's .dwg/.dxf file formats
- ▶ Simplifies the setup of pre-modeling objects with a variety of utilities
- ▶ Analyzes modeling results using [BREEZE 3D Analyst](#), tables for sensitive receptors, and 3D visuals for surface terrain
- ▶ Organizes model scenarios using a skeleton and neat file structure for better file management
- ▶ Uses inputs that are consistent and compatible with U.S. EPA AERMOD inputs, including test cases from the U.S. EPA SCRAM website

## Technical Features

- ▶ Streamlines NO<sub>2</sub>, SO<sub>2</sub> and PM<sub>2.5</sub> modeling for U.S. NAAQS
- ▶ Adds a feature to allow applying an in-stack NO<sub>2</sub>/NO<sub>x</sub> ratio to multiple sources all at once for all source types
- ▶ Incorporates the Ambient Ratio Method (ARM) and ARM2 for NO<sub>2</sub> modeling
- ▶ Adds a new tool to facilitate users to calculate buoyancy parameters for buoyant line sources
- ▶ Models an unlimited number of sources and receptors
- ▶ Models numerous source types including point/stack (vertical, horizontal and capped), area, circular area, polygon area, volume, open pit, flare, BREEZE area line, U.S. EPA area line, RLINE Roadway, RLINEXT Roadway, and Buoyant line
- ▶ Models numerous receptor types including discrete Cartesian grid, polar grid, and variable density grid
- ▶ Models multiple emission scenarios simultaneously
- ▶ Models an unlimited number of buildings with integrated BPIP analysis and downwash
- ▶ Utilizes CAD drawing tools
- ▶ Supports 7.5 DEM, 1-minute DEM, XYZ, and NED terrain data files
- ▶ Uses historical, hourly meteorological data with single or multiple hours (available for purchase separately)
- ▶ Includes the ISC model
- ▶ Includes BREEZE AERMOD Parallel 2-CPU, and users [have the ability to purchase additional cores](#) as desired
- ▶ Includes seamless integration with the [BREEZE Remote Modeling System](#) (available for purchase separately)

## Powerful Model Setup and Post-Processing Tools

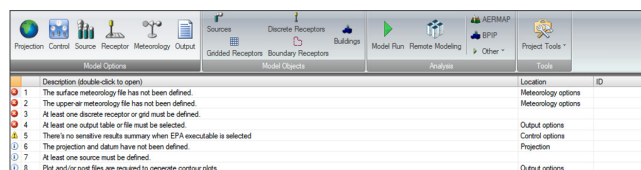
- ▶ Data Tab that provides a means of viewing project data in a spreadsheet view, allowing users to copy and paste directly from Excel, sort data, change model IDs, and filter objects by data types
- ▶ Map Tab which allows users to import DXF files, shapefiles, and base map images as well as visualize and graphically edit model objects
- ▶ The ability to download high-resolution base maps for any location in the world by simply entering the desired coordinates
- ▶ The post-processing program [BREEZE 3D Analyst](#), which is used to make graphical displays of AERMOD results
- ▶ The basic version of [BREEZE MetView](#) and the basic, merge-only version of [BREEZE AERMET](#)
- ▶ XYZ2DEM tool to convert XYZ terrain files to digital elevation model (DEM) format
- ▶ Coordinate Converter to convert model coordinates between hundreds of coordinate systems
- ▶ SAMSON Conversion Tool that enables users to convert surface meteorological data to a SAMSON file format, which can then be used to process AERMOD-ready meteorological data using AERMET
- ▶ Hourly Emission File Editor to create, view, and edit hourly emission rate files for modeled sources
- ▶ Ozone file, hourly emission file, and AERMOD input file editors
- ▶ Tool to import model objects from existing BREEZE AERMOD scenarios or other commercial/non-commercial AERMOD scenarios, thereby expediting the model setup process
- ▶ Export tool to export model objects to DXF files
- ▶ 3D window to view buildings and terrain
- ▶ Delete On-Site or Off-Site Receptors tool to quickly remove all onsite or offsite receptors, depending on the modelers needs
- ▶ Variable Density Grid, Polygon Grid, and other drawing tools to quickly create receptor grids and other model objects



- ▶ U.S. EPA BPIP Prime program integration to automatically process building information
- ▶ Source grouping tools to quickly assign source groups
- ▶ And more!

## Streamlined Data Entry User-Friendly Interface

The intuitive and user-friendly interface of BREEZE AERMOD is designed similar to Microsoft® software interfaces. As a result BREEZE AERMOD seamlessly guides users through setting up their modeling scenarios in a quick and efficient manner, saving users time and money. The interface also provides modelers with several options for entering data, allowing modelers to choose the option that works best for them thereby further streamlining the model setup process. Furthermore, the interface alerts users of potential issues that might affect their model run. On the Project Tab, error messages (which will prevent AERMOD from running), warning messages, and informational messages appear to let the user know what potential issues might exist during the model setup so they can resolve them. The user can simply double click on the message line item in the interface and BREEZE AERMOD will take them directly to the window where they can look into the matter and resolve it if needed. This unique feature serves as a convenient QA/QC step during the model setup and saves users time and money.



## Meteorology

Assigning model-ready meteorological data in BREEZE AERMOD is easy. Simply select the files to use with a particular scenario. BREEZE AERMOD will automatically identify the period that the data set is valid for and display the station ID so that there are no mistakes setting up the input file.

A number of options are available in BREEZE AERMOD to refine the period of meteorological data to process in the model run, such as 'Start/End period' option, 'Day range' option, and 'All hours' option, so users do not need to split the meteorological files when performing modeling for a particular period.

For users who want to create wind roses or view the AERMOD-ready meteorological data in a tabular view, the basic version of [BREEZE MetView](#) is included with every BREEZE AERMOD purchase and can be seamlessly accessed from the BREEZE AERMOD interface. The basic version can be used to display the model-ready meteorological data in both tabular and chart

format and enables users to create wind roses for user-defined periods, allowing users to simultaneously view and interpret model results using corresponding meteorological data. For more information about BREEZE MetView, please [click here](#).

**Note:** Model-ready meteorological data for AERMOD is not included with the purchase of BREEZE AERMOD. Users can either process the data on their own, or [purchase model-ready meteorological data from our Data Team](#).

## Sources

BREEZE AERMOD allows users to model the standard U.S. EPA sources (i.e., point, area, volume, open pit, U.S. EPA area line, RLINE roadway, RLINEXT roadway, Buoyant line) and exclusive BREEZE sources such as flare and BREEZE area line sources. In addition, BREEZE offers object array generators that create user-defined arrays (e.g., polylines, polygons, and Cartesian grids) of the model object type. Another perk of the BREEZE-enhanced version - it enables users to model multiple emission scenarios in the same amount of time it takes to model a single pollutant! The U.S. EPA AERMAP program is also seamlessly embedded within BREEZE AERMOD so source elevations can be processed with the simply click of the mouse.

### Multiple Methods to Add Sources

BREEZE AERMOD provides users with multiple ways to enter source data making it easier than ever to setup a model run scenario:

- ▶ **Project Tab:** Users can manually enter source data one source at a time.
- ▶ **Data Tab:** Users can use this spreadsheet style tab to manually enter the source data, or copy and paste the data from an Excel file. The columns in this tab can be easily moved and units can be changed to match the layout and format of the data in the Excel spreadsheet that the user is copying from.
- ▶ **Map Tab:** This tab is a true Geographic Information System (GIS) that displays model objects and maps in a user-specified projection and datum. Using this tab, modelers can add the source(s) by placing them at the correct coordinate location, or by using a basemap as a guide and placing them where they should be with respect to the basemap.

### Flare Sources

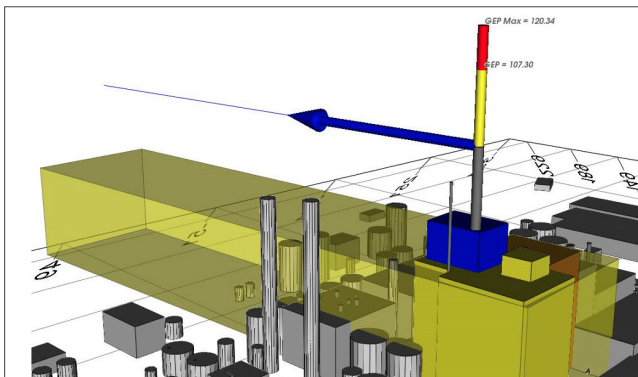
BREEZE AERMOD processes flare sources as equivalent point sources according to [U.S. EPA modeling guidance](#). It calculates the equivalent source diameter internally according to user defined parameters, such as hear release, radiation loss, and exit velocity. More information about this can be found in the BREEZE AERMOD user manual. If you have any questions before making your purchase though, please contact our Support Team at [support@trinityconsultants.com](mailto:support@trinityconsultants.com) or +1 972.661.8881 option 4.

## Buildings

AERMOD takes into account the obstruction of wind flow from structures, such as buildings and point sources (i.e., stacks), so including nearby buildings in an AERMOD modeling scenario is an important step when setting up the model run. BREEZE AERMOD offers users the ability to add rectangular, circular, and polygon buildings in a variety of ways. Like any other model object in BREEZE AERMOD, buildings can be manually entered in the Project Tab, copied and pasted into the Data Tab, or drawn into the 2D display using the Map Tab. A simple building mode is an exclusive feature of BREEZE AERMOD that eliminates the error prone requirement of assigning “tier levels” to each and every structure. Additionally, building information can be easily processed with the embedded U.S. EPA BPIP Prime program, and the building elevations can be quickly processed using the embedded U.S. EPA AERMAP program.

### *BREEZE Downwash Analyst*

BREEZE Downwash Analyst is a companion program to BREEZE AERMOD (available for purchase separately) that takes the cryptic numerical results of AERMOD's BPIP building pre-processor and displays them in the clearest way possible. BREEZE Downwash Analyst takes the mystery out of building downwash and gives you a deeper understanding of your model results, making it an essential tool for any serious AERMOD user. For more information about BREEZE Downwash Analyst, please [click here](#).



## Receptors

Receptors are locations where BREEZE AERMOD will compute a concentration or deposition value. At least one receptor must be defined in order to run the AERMOD model, and BREEZE AERMOD allows users to enter the receptors in several different ways, from entering the data manually one at a time in the Project Tab, to copying and pasting data from a spreadsheet into the Data Tab, to placing the receptors directly where they're located on a base map in the Map Tab. BREEZE AERMOD also provides users with the ability to create discrete, gridded, and polygon arrays of receptors, as well as variable density and 3D gridded networks. Receptor elevations can be quickly processed using the U.S. EPA AERMAP program which is conveniently embedded in the BREEZE AERMOD interface.

## High-Speed Parallel Processing Solutions

To combat the increased runtimes observed with US EPA's AERMOD, we created a parallel processing version to slash runtimes through the use of a distributed computer network (cluster) or multi-CPU environment. Our high performance applications produce pollutant concentration estimates identical to U.S. EPA's Fortran executable. The only code changes to the application are additions to implement parallel features. The applications run the exact algorithms but on multiple different processors.

There are two high-speed solutions available for BREEZE AERMOD users who are interested in parallel processing: local and remote resources. Note: A two-core local parallel processing version is included with the purchase of BREEZE AERMOD.

- ▶ **Local:** The local approach involves purchasing BREEZE AERMOD Parallel and determining how many processors are desired to run the software application. Improvements in the product's performance enhancements are based directly on the number of CPUs (or cores) utilized.
- ▶ **Remote:** Alternatively, the BREEZE Remote Modeling System requires no proprietary software and runs on a massively parallel computer cluster managed by BREEZE Software. Users upload input files anytime (24/7), receive email notifications when model results are completed, and slash model runtimes. Runs that would take weeks on a single-core computer are typically completed in days, and runs that would take hours are typically completed in minutes using the BREEZE Remote Modeling System.

Trinity developed AERMOD Parallel to significantly improve performance across multiple processors. As part of the product development process, equivalency testing was performed with hundreds of AERMOD model runs using both the AERMOD Fortran executable and the BREEZE AERMOD Parallel executables. Based



on all completed test cases, modeling results generated by the BREEZE AERMOD Parallel are identical to those generated by the U.S. EPA AERMOD executables.

## BREEZE AERMOD Editions

BREEZE AERMOD is available for purchase as two editions – Pro and Pro Plus. Both editions incorporate the latest U.S. EPA AERMOD executable as well as the ISC model, preserve back-compatibility with previous model versions, enable users to download high-resolution base maps for any location around the world, integrate 3D Analyst for post-processing model results, and more. The main differences between these editions come down to the post-processing capabilities. For example, while both editions enable users to display graphical results overlaid on a basemap using 3D Analyst, only users with the Pro Plus edition have the ability to utilize the distribution view and contribution view (which enable users to determine the distribution and contribution of each source over a given time period) and create a variety of animations (e.g., map, 3D, cross-section, contribution chart, distribution chart, and Google Earth contour animation). [Download](#) the table to compare the features available in BREEZE AERMOD Pro and Pro Plus.

## Product Features of Both Editions

- ▶ Incorporates the latest U.S. EPA AERMOD executable
- ▶ Incorporates the ISC model
- ▶ Preserves compatibility with U.S. EPA AERMOD versions back to executable 07026
- ▶ Enables users to download or import high-resolution base maps for any location around the world
- ▶ Enables converting imported DWG/DXF objects to AERMOD model objects and buildings
- ▶ Integrates with the [BREEZE 3D Analyst](#) post-processing program to provide users with a wealth of post-processing options
- ▶ Employs a streamlined graphical user interface for more intuitive and easier dispersion modeling
- ▶ Models an unlimited number of sources, source types, and receptors

## Pricing and What's Included

The prices below are for the purchase of a single license. We offer a multiple license discount if you purchase multiple licenses of one edition within the same transaction. Additionally, if you don't expect to use the software long-term, we offer 1-, 3-, 6-, and 9-month leasing options.

Contact us at [breeze@trinityconsultants.com](mailto:breeze@trinityconsultants.com) or +1 972.661.8881 for lease pricing details.

## AERMOD Pro

BREEZE AERMOD Pro is loaded with features to optimize your modeling. The intuitive user interface is extremely easy to learn and understand, and guides users through the model setup and analyzing results. With BREEZE AERMOD Pro, users have access to a variety of displays (e.g., 3D view, Map view, etc.), data entry options (e.g., importing a base map, copying and pasting to a table from Excel, CAD drawing tools), data processing options, model outputs, and plotting and data manipulation/analysis tools. Additionally, significant effort has gone into giving users the option to hide many of the data entry options that they might not require. For example, if you are not modeling deposition, you can choose not to show the data entry options related to deposition. These advanced features included in BREEZE AERMOD Pro are very beneficial for new and seasoned users and increase productivity by adapting to the users preferences and workflow.

### What's Included?

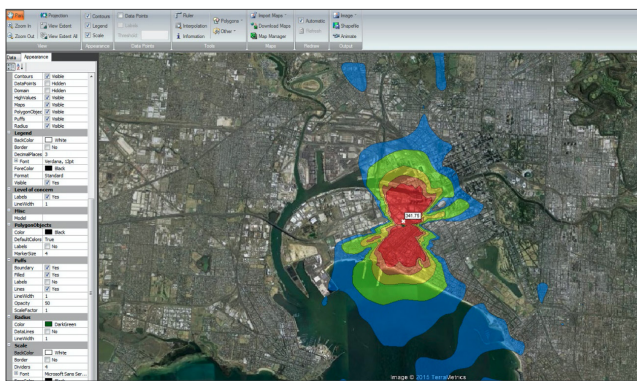
- ▶ Both the AERMOD and ISC models
- ▶ [BREEZE 3D Analyst](#) for post-processing and graphical displays of results
- ▶ Basic version of [BREEZE MetView](#)
- ▶ Basic, merge-only version of [BREEZE AERMET](#)
- ▶ Ability for parallel processing using two cores
- ▶ Complimentary **10-day** trial period to the [high-speed remote modeling system](#)
- ▶ A perpetual license of the software
- ▶ One free year of technical support and maintenance (upgrades) for the registered user

## AERMOD Pro Plus

BREEZE AERMOD Pro Plus includes all of the features of the Pro edition, as well as a handful of additional features mainly pertaining to data manipulation/analysis and animation graphics. For example, BREEZE AERMOD Pro Plus provides users with a distribution view and a contribution view option, which users can utilize to determine the distribution and contribution of each source over a given time period. Additionally, with BREEZE AERMOD Pro Plus, users have the ability to create a variety of animations (e.g., map, 3D, cross-section, contribution chart, distribution chart, and Google Earth contour animation) that they would not have access to with the Pro edition. These animations are great visual tools when presenting results to colleagues or clients. To see the full advantages of purchasing BREEZE AERMOD Pro Plus, [click here](#) to compare the features in the two editions.

## What's Included?

- ▶ Both the AERMOD and ISC models
- ▶ [BREEZE 3D Analyst](#) for post-processing and graphical displays of results
- ▶ Full version of [BREEZE MetView](#)
- ▶ Basic, merge-only version of [BREEZE AERMET](#)
- ▶ Complimentary **30-day** trial period to the [high-speed remote modeling system](#)
- ▶ A perpetual license of the software
- ▶ One free year of technical support and maintenance (upgrades) for the registered user
- ▶ One free license of [BREEZE Downwash Analyst](#)
- ▶ One free license of [BREEZE AERMOD Parallel 8-CPU](#)
- ▶ A 1-2 hour “getting started” training recording



## Related Products and Services

- ▶ [BREEZE MetView](#)
- ▶ [BREEZE Downwash Analyst](#)
- ▶ [BREEZE AERMET](#)
- ▶ [BREEZE AERSCREEN](#)
- ▶ [AERMOD-Ready Meteorological Data](#)
- ▶ [High-Speed Modeling Solutions](#)
- ▶ [Specialized Consulting Services](#)
- ▶ [Training](#)

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