

## Air Dispersion Modeling Team Meteorology

**Reason for update:** The meteorological files were updated to fix inconsistent data and to replace overly conservative wind speed data with more representative values. These revised data sets provide a complete standardized set of meteorological input data for use with ISCST3 model when deposition or gravitational settling is not required. Standardization of the input data allows the staff to automate the review process thus reducing processing time. If an applicant determines that deposition or gravitational settling should be considered, additional meteorological parameters must be derived for the measurement and application sites. These parameters are developed on a case-by-case basis at this time and should be approved for use by the ADMT before meteorological data sets are processed.

**File naming convention:** File names have changed from those used in the past, but the meteorological years for state permitting have not changed. The "02" designation signifies when the data were assembled. The one-year meteorological input files all contain surface and upper-air data from 1988 with the exception of input files that include Shreveport, LA, surface data. Since the Shreveport anemometer height changed during 1988, we use 1989 Shreveport, LA, surface data files. The five-year meteorological input files for federal permitting applications vary between 1983 and 1993. The exact five-year period for a county may not contain successive data depending on the availability of representative surface and upper-air data used to develop the five-year sets.

**Source of data:** Hourly surface data for the measurement sites were obtained from the National Climatic Data Center (NCDC) Solar and Meteorological Surface Observation Network (SAMSON) compact disk (CD) (years 1961-1990), the Hourly United States Weather Observations (HUSWO) CD (years 1990-1995), and the Environmental Protection Agency (EPA) Support Center for Regulatory Air Models (SCRAM) website. Upper-air data (twice daily mixing heights) were also obtained from the EPA SCRAM website.

**Filling in missing data:** Data were replaced according to EPA guidance outlined in the July 1992 memo, Subject: Procedures for Substituting Values for Missing NWS Meteorological Data for Use in Regulatory Air Quality Models.

**Mixing height adjustments:**

Low nighttime and daytime mixing heights were adjusted according to the procedure located in the January, 1997 memo, Subject: Procedure for Replacing Low Mixing Height Data in Meteorological Files. Daytime heights were changed based on meteorological observations for those affected hours.

**Wind speed adjustments:** Wind speed values for all meteorological data sets were adjusted after processing by PCRAMMET in three ways. PCRAMMET is a personal computer meteorological preprocessor developed for the RAM model and is used by EPA to preprocess meteorological data for the ISCST3 model.

- 1) **Two-knot winds:** The SAMSON raw data contained some observations that included two-knot winds. The National Weather Service (NWS) directs that wind speeds measured at 2 knots [2.3 miles/hour (mph), 1.0 meters/second (m/s)] or less should be reported as calm (0 knots) conditions. The lowest wind speed that should be recorded by the NWS is 3 knots (3.5 mph, 1.5 m/s). However, some two-knot wind speeds appear in some surface data sets. All instances of two-knot winds were replaced with a value of "0" in the PCRAMMET output.
- 2) **Consistency between SAMSON and HUSWO data:** The wind speed data in the SAMSON data sets are recorded in knots as whole integers. In the HUSWO datasets the wind speed is recorded in m/s to one decimal place. In processing these data, PCRAMMET converts SAMSON data in knots to m/s to four decimal places. For the HUSWO data, PCRAMMET converts the m/s to knots to a specified number of decimal places, then converts the knots value to m/s. The result is a slightly different value for the same wind speed between SAMSON and HUSWO derived data. For example, an eight-knot observed wind would result in an equivalent 4.1155 m/s wind derived from SAMSON data; however, the result derived from HUSWO data is a wind speed of 4.1227 m/s.

To make the data consistent, equivalent wind speeds were given the value they would have resulting from SAMSON derived data. As in the example above, all instances of 4.1227 were changed to 4.1155.

- 3) **Consistency between wind speeds and ISCST3 wind category thresholds:** The ISCST3 model allows wind speeds to be categorized to apply emission rate multipliers based on the wind speed. The categories are set based on the upper-bound value of the category. In the ISCST3 model the upper-bound values are 1.54, 3.09, 5.14, 8.23, and 10.8 m/s. The wind speeds obtained from PCRAMMET are listed to four decimal places. The result of this difference in notation causes the model to calculate impacts from emission rates when it should not. For example, PCRAMMET will convert a three-knot observed wind to 1.5433 m/s in the preprocessed meteorological input file. The 1.54 m/s upper bound is supposed to correspond to winds of 3 knots and less. Since PCRAMMET carries the wind speed to four digits, the 1.5433 wind speed is included in the ISCST3 wind category with a 3.09 m/s upper-bound value since 1.5433 is greater than 1.54.

To make the data consistent, the PCRAMMET output values were rounded to correspond to the ISCST3 wind category upper-bound values. For example, all hourly data with wind speeds of 1.5433 were changed to 1.54. This procedure was followed for all wind speed categories.