7.1.3.   Dispersion Modeling Methods

Typically, the first step in dispersion modeling is to compile detailed information on the emission sources being modeled. This information includes the source emission rates (including temporal variations), release characteristics, location coordinates, and source layout. For an airport, these emission source data may take the form of an aircraft fleet mix, runway and taxiway locations, gate assignments, stack height, and airport operational profiles (see **Appendix D**, *Airport Dispersion Modeling*, for more information).

Second, representative meteorological information is required, typically obtainable from publicly-available databases; this data includes wind speed, wind direction, and atmospheric stability (i.e., surface roughness, albedo, and Bowen Ratio). For those locations with variable terrain, local topographic data may also be required. Receptors are similarly identified and located as representing the locations where pollutant concentrations are computed.

Finally, appropriate background concentrations are added to the computed concentrations to represent the contributions from all other emission sources within the study area. Special consideration should be given to the estimation of NO_2 concentrations to account for the conversion of nitric oxide (NO) to NO_2 (see **Appendix D**, *Airport Dispersion Modeling*, for more information).

For clarity, this multi-step process of setting up and running a dispersion model such as AERMOD for aviation-related sources is summarized as follows:

- *Select model options* - Model options include averaging periods, pollutant types, urban vs. rural setting, receptor layout, and data output format.

- *Select emission source characteristics* - Develop source release conditions for point, area, line, and volume sources including emission rate, stack height and diameter, exhaust temperature and exit velocity, source length and width, and volume height above ground level. Also, source locations are to be provided to create a spatial relationship between sources and receptors.

- *Select meteorological data* - Develop meteorological data such as wind speed, wind direction, turbulence indices, temperature, and relative humidity using the AERMET processor and surface/upper air data from the nearest representative monitoring station.

- *Select terrain data* - Digital elevation data is used to determine elevations for sources and receptors using AERMAP and account for wind and plume behavior associated with terrain features.

- *Select receptor site locations* - The locations at which concentrations are estimated are known as receptors. Generally receptors are located where the general public is likely to have continuous access.

- *Determine background concentrations* - Background concentrations are typically obtained from a representative background monitoring site not affected by the modeled emission source(s).

- *Tabulate results* - Representative background concentrations should be added to the model predicted concentrations.