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Air Quality Models

The purpose of this fact sheet is to provide the reader with basic understanding of air quality models and their purpose in the NDEE Air Quality Program.

Air quality models are valuable air quality management tools. Models are mathematical descriptions of pollution transport, dispersion, and related processes in the atmosphere. Air quality models estimate the air pollutant concentration at many locations, which are referred to as receptors. The number of receptors in a model far exceeds the number of monitors one could typically afford to deploy in a monitoring study. Therefore, models provide a cost-effective way to analyze impacts over a wide spatial area where factors such as meteorology, topography, and emissions from nearby sources could be important.

Air pollution source information such as the rate of emissions from stacks and openings, stack heights, stack gas temperatures and velocity, and the influence of surrounding buildings is examined during a modeling analysis. The source data is evaluated in conjunction with meteorological information such as wind speed, direction, atmospheric stability, air temperature, and inversion heights in the air quality model. The model examines all of these components together to characterize the state of the atmosphere and predict how pollution is transported from the sources and estimates the concentration of these pollutants in the atmosphere.

Air pollution models are used during the permitting process to verify that a new source of air pollution will not exceed the National Ambient Air Quality Standards (NAAQS). Models are also used to evaluate whether the new source will cause degradation in air quality beyond the maximum allowable increment. (See the related guidance document Maintaining Good Air Quality Through the Increment Rules of the Prevention of Significant Deterioration Program.) Models used for permitting purposes estimate downwind concentrations from a proposed facility prior to its construction.

Large scale or regional models are sometimes used to simulate the air quality impacts from all sources in a wide area. This is a more complex analysis that is usually reserved for developing plans to clean up areas where air quality does not comply with the NAAQS. These models are useful for determining the effectiveness of regional air pollution control strategies such as vehicle inspection or fuels programs and point source control measures.

If you have questions or for more information on air quality modeling, contact the Air Quality Program at (402) 471-2186 or submit your question via e-mail to NDEE.AirQuality@nebraska.gov.

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