IOWA DEPARTMENT OF NATURAL RESOURCES

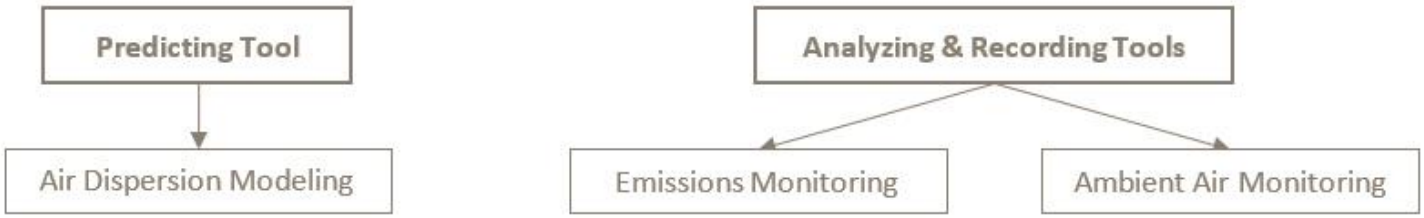
UNDERSTANDING AIR QUALITY EVALUATION TOOLS

Air quality regulators and planners use three main tools to determine the quantity of air pollution. Each tool has a specific purpose, primarily to predict future or determine existing air quality. In your community, the tools:

- Can help ensure present and future air pollutant concentrations comply with the National Ambient Air Quality Standards (NAAQS)—federal regulations designed to protect public health and the environment
- Have practical implications, providing a continuous record of the rate of pollutants emitted or a snapshot of current air pollutant concentrations.

Pollutants with National Ambient Air Quality Standards

Particulate Matter < 10 microns (PM_{10})
Particulate Matter < 2.5 microns ($PM_{2.5}$)
Nitrogen Dioxide (NO_2)
Sulfur Dioxide (SO_2)
Carbon Monoxide (CO)
Lead (Pb)
Ozone (O_3)



① Air Dispersion Modeling - *Uses pollutant emission rates to predict concentration*

Air dispersion modeling predicts the quantity, or concentration, of pollutants in the air we breathe. This prediction is made by means of a computer-based program.

This tool is used to ensure that federal health standards will be maintained.

Information about the area being evaluated are entered into the dispersion modeling program, such as:

- The amount of pollution being released into the air
- The height of smoke stacks that the pollution is coming from
- The area's terrain and weather conditions

The photo on the left is an example of modeling output. Pollution concentration is represented by color, with the smallest area of red representing the most concentrated pollutants and the outer blue area the least concentrated.

The output from an air dispersion modeling analysis is used to determine if the amount of pollution that can be released from nearby industrial facilities will result in concentration levels below the federal health standards.

② Emissions Monitoring - *Measures pollutant emission rate at the source*

Emissions monitoring records the quantity of pollution being released into the air at the exit point of a smoke stack or other release point (see Figure 1). This tool is used to ensure that the operation of an industrial facility meets specific requirements that pertain to the quantity of pollutants released (such as those determined by dispersion modeling).

Meeting these specific requirements helps to ensure that the federal health standards are achieved. Emissions monitoring can either be a one-time test (generally used for smaller emission sources), or a continuous process (usually only necessary for large smoke stacks).

③ Ambient Air Monitoring - *Measures pollutant concentration in the air we breathe*

Ambient air monitoring measures the concentration of air pollutants in, and around, our communities. This tool is used to evaluate the ongoing condition of the air we breathe and compare the data collected to the federal health standards. Ambient air monitoring data can show history of air pollution in an area and how quantities have changed over time.

Monitors are set up outside of facility property lines and often are sited based on areas of particular interest or areas that are most impacted by air pollution as in Figure 1 below.

Ambient air quality monitor at 10th and Vine Street near Jefferson Edison Elementary School in Davenport.

State Hygienic Laboratory

Check the Air Quality Index for today's air quality and long-term trends. Find State Hygienic Laboratory's monitoring results for sulfur dioxide, nitrogen dioxide and particulate matter. Or, check local results for Polk and Linn counties.

Comparison of Air Quality Analysis Tools

Air dispersion modeling is a predictive tool used in the design of industrial sources to maintain federal health standards. Sometimes modeling will result in a limitation on the amount of pollution that industrial sources are permitted to emit.

Emissions monitoring is a measurement tool used to confirm that industrial sources comply with their permitted limits.

Ambient air monitoring is another measurement tool used to determine if the air in our communities is meeting the federal health standards.

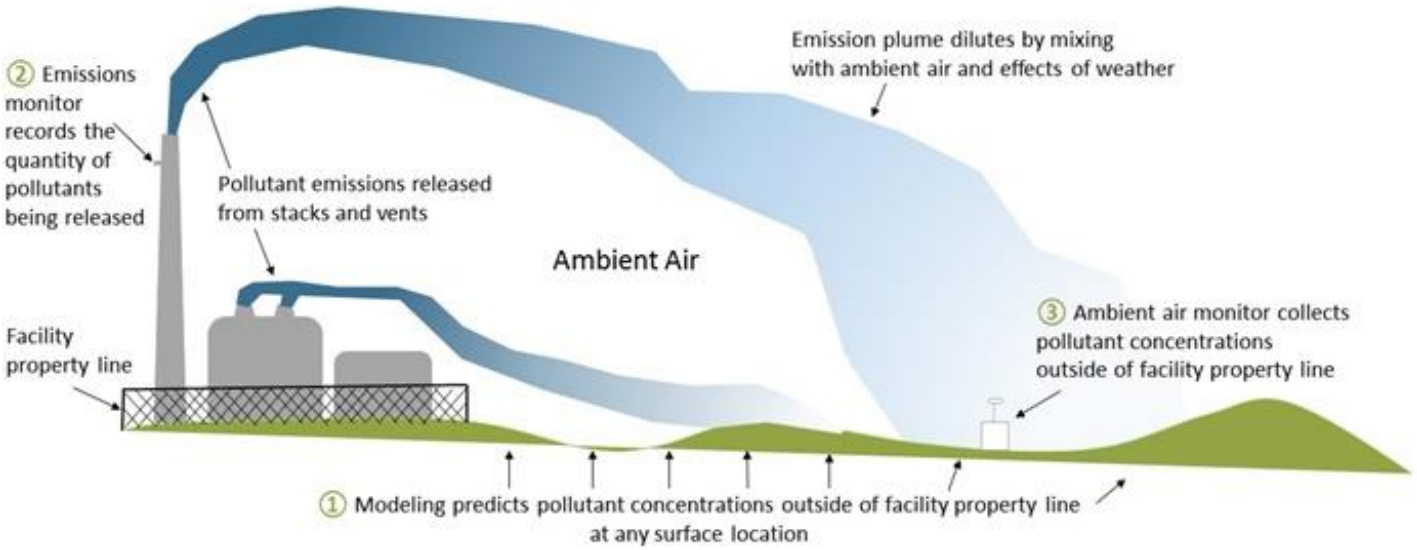
Emissions monitoring measures the quantity of pollutants being released into the air at the source. Air dispersion modeling predicts, and ambient air monitoring measures, the concentration of those pollutants in the air after they are transported downwind.

Air dispersion modeling and ambient air monitoring are both affected by how the pollution is emitted, the local terrain, and weather. In contrast, only the operation of the pollution source affects emissions monitoring.

Some ambient air monitors are located in an area of maximum pollutant impact (generally sited using dispersion modeling). This is not always possible due to siting limitations and requirements, terrain or other factors. Monitoring can also be much more expensive than modeling for determining ambient air pollutant concentrations.

Emissions monitoring and ambient air monitoring help ensure that the design of an industrial facility, as indicated by dispersion modeling, continually meets federal standards designed to protect public health.

Figure 1. Summary of Air Quality Tools



August 2018