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From: New Mexico Environment Department Air Quality Bureau

Subject: How Ozone Trends at New Mexico's Ozone Monitoring Stations are Being Addressed

This document discusses how ozone is regulated, the recent trends in monitored ozone values in New Mexico, and the steps that the New Mexico Environment Department (NMED or Department) is taking to address this issue.

How does the Department regulate ozone?

The Department's Air Quality Bureau operates a network of ambient air monitors that continually sample the air across New Mexico, with the exception of Bernalillo County and tribal lands, which are not under the Department's jurisdiction. Click here to go to the NMED Air Monitoring web site, where you can view photos of the monitoring sites, and learn more about what pollutants we monitor and their potential health effects.

The federal national ambient air quality standard (NAAQS) for ozone is currently set at 70 parts per billion (70 ppb). As discussed below, two of New Mexico's ozone monitors (Carlsbad and Hobbs) have recently monitored ozone concentrations in excess of the federal standard. However, readings from monitors showing exceedances of the NAAQS do not in themselves trigger changes to permitting or other actions on the part of NMED. Instead, the vehicle for addressing exceedances of the NAAQS is through designation of particular areas as in "attainment" or "non-attainment".

The process of determining whether an area is in attainment or in nonattainment of a NAAQS is triggered when the 'design value' (DV) for a pollutant is shown to be in excess of the standard. The DV is the three-year average of the annual fourth-highest daily monitored value. Thus, each year, for each NAAQS standard, the DV is calculated by averaging the fourth highest monitored reading for the previous year with the fourth highest reading of the two previous years. The resulting calculated value is the DV for that pollutant for that year. For ozone, this calculated value is compared to the 8-hour NAAQS ozone standard, which is 0.070 ppm. If the calculated DV is 0.0705 or above, it is rounded up to 0.071 ppm (0.0704 is rounded down to 0.070). At 0.071 the design value is in exceedance of the 8-hour NAAQS ozone standard. DVs for each monitor for each year are submitted to EPA for verification.

What areas of the state are showing exceedances of the ozone NAAQS?

The Carlsbad monitor has monitored exceedances resulting in the DV exceeding the 8-hour ozone NAAQS in the years 2017, 2018, and 2019. The Carlsbad monitored design values are 0.076, 0.083, and

0.080 ppm, for each year, respectively. Similarly, the ozone monitor in Hobbs showed a DV exceedance in 2018. However, in 2019 the Hobbs monitor's DV demonstrated compliance with the NAAQS with a design value of 0.070 ppm. The first two-year (2017 and 2018) DVs for Carlsbad and Hobbs have been submitted to and verified by EPA. The 2019 DV for Carlsbad and Hobbs have been submitted but have yet to be verified by EPA.

How is the New Mexico Environment Department responding to these monitored exceedances?

The Air Quality Control Act requires the state to develop a plan, including regulations, to reduce ozone precursors in areas of the state that are exceeding 95% of the ozone standard. The AQB has been working diligently to address the rising ozone in those areas through its Ozone Attainment Initiative (OAI), which will include proposal of new regulations for reducing ozone precursors. The OAI is the vehicle through which NMED will investigate and implement strategies to ensure the region's 8-hour ozone levels return to full attainment status.

In order to fully understand the sources of VOC and NOx and what sectors are responsible for those pollutants, it is essential to determine whether and to what extent regional transport of these pollutants and mobile sources of these pollutants are contributing to the monitored exceedances. Thus, the state is currently conducting regional ozone modeling to determine what equipment, sources, and sectors are emitting the ozone precursors, and what portion of those emissions are being transported from other states and internationally. The results of this modeling will help guide what sources should be targeted for regulatory action to reduce their contribution to the ozone exceedances. The attached Fact Sheet provides further information regarding issues specific to ozone modeling.

Given the probability of contributions from oil and gas operations in the state, the first step of what will likely be several rulemakings under the OAI will be to reduce ozone precursors from the oil and gas industry located within the Permian and San Juan Basins. The Department intends to submit proposed rules to the Environmental Improvement Board by the end of 2020. It is anticipated that other rulemakings will follow, targeting emissions reductions from other industrial sectors, as well as the transportation sector.

The Department's current strategy is to rely upon the authority under its enabling statute, the Air Quality Control Act, to develop and implement the OAI and regulations to target and reduce the contributing ozone precursors. The plan and regulations implemented under the OAI will reduce those emissions, and the Department expects those reductions to reverse the current trend of rising ozone concentrations.

Questions?
Please contact Ted Schooley, Permit Section Chief, at 476-4334 or Kerwin Singleton, Planning Section Chief, at 476-4350.

NMED Fact Sheet on Ozone Modeling

How are ozone concentrations predicted?
Ozone is a secondary pollutant, meaning that rather than being directly emitted to the atmosphere from sources, it is created from a series of chemical reactions that occur between ozone precursors in the presence of sunlight. The precursor pollutants that contribute to ozone formation are nitrogen oxides (NO_X) and volatile organic compounds (VOC). Because chemical reactions must occur between precursors to form ozone, a chemical model (photochemical modeling) is required to predict ozone concentrations. Photochemical modeling is much more complex than the dispersion modeling typically performed for directly emitted pollutants.

How is ozone modeled?
Photochemical modeling (modeling chemical reactions in the presence of light) is generally conducted using gridded cells (or volumes) over the areas under evaluation. In each cell, pollutant concentrations are calculated using a series of mathematical equations that describe the physics and chemistry of the atmosphere. These mathematical equations describe emission rates in the cells, chemical reaction rates, and rates of mixing with neighboring cells. Chemical reaction rates within a cell will depend on the concentration of pollutants, the amount of sunlight, and temperature. Mixing to and from neighboring cells is determined using meteorological data and a separate meteorological model. Pollutant concentrations are then predicted by solving the set of mathematical equations.

How does ozone modeling differ from other criteria pollutant modeling?
Ozone (photochemical) modeling is significantly different from the dispersion modeling conducted for directly emitted criteria pollutants. In the atmosphere, the direction of criteria pollutants' flow and how the concentration disperses over time is controlled by meteorological factors. Dispersion modeling assumes that emissions from surrounding sources do not chemically interact. As described above, photochemical modeling predicts the mixing of NO_X and VOCs to calculate ozone concentrations.

Why is ozone modeled differently?
Chemical reactions govern the concentrations of ozone in the atmosphere. This is not true for most other criteria pollutants. Because chemical formation is the predominant source of ozone, chemistry must be considered. Additionally, interactions between precursors emitted from different sources can be quite important. Chemical formation and removal is significantly less important for other criteria pollutants.

When do we perform ozone modeling?
Due to the complexity of photochemical modeling, regulatory ozone modeling is typically performed only for the development or revision of state implementation plans (SIPs) or when there is a compelling reason for concern. This is currently the case in seven New Mexico counties, which have sources that cause or contribute to the high ozone concentrations. As discussed above, the initial step of the OAI will be photochemical modeling, to be performed by a contractor under the direction of the Bureau. This modeling effort will identify the different source categories that contribute to ozone formation and identify control strategies that will result in reduced ozone concentration in future years.

What is the cost of typical ozone modeling?
The cost of this modeling will be approximately two hundred and seventy thousand dollars ($270,000). A similar photochemical modeling project was completed for NMED, the Southern New Mexico Ozone Study, at a cost of approximately two hundred and fifty thousand dollars ($250,000).