National Park Service
U.S. Department of the Interior

Interior Regions 6, 7, and 8 (Intermountain), and
Air Resources Division
Natural Resource Stewardship & Science

Summary of Technical Testimony to New Mexico Regarding the Proposed Ozone Precursor Rule

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The National Park Service (NPS) appreciates the opportunity to provide technical comments to the New Mexico Environmental Improvement Board on the 20.2.50 NMAC Oil and Gas Sector-Ozone Precursor Pollutants Rulemaking (EIB No. 21-27 (R)). If the proposed rule is enacted, it will help protect the air resources of the national parks in and near New Mexico. The NPS operates ozone air quality monitoring stations at a number of parks across the country, including Carlsbad Caverns National Park and Chaco Culture National Historical Park in New Mexico, as well as Mesa Verde National Park in Colorado. These monitors all follow Environmental Protection Agency (EPA) regulatory monitoring protocols. The NPS also operates a non-regulatory ozone monitor at Guadalupe Mountains National Park in Texas. We measure exceedances of the national ambient air quality standard (NAAQS) for ozone at all these sites. The 3-year average of the 4th highest 8-hour average (the form of the ozone NAAQS) has exceeded the level of the NAAQS (70 ppb) consistently at Carlsbad Caverns National Park. (2016-18: 71 ppb, 2017-19: 74 ppb, 2018-20: 73 ppb)

Ozone concentrations that exceed the NAAQS pose a health threat to park visitors and staff. High ozone levels can also adversely affect plants and the ecosystems that depend on them. Given the high levels measured at Carlsbad Caverns National Park, the NPS studied the causes of high ozone at the park in 2017 and 2019. Ozone is formed in the atmosphere near the earth's surface through reactions of Volatile Organic Compounds (VOCs) and Oxides of Nitrogen (NO_x), in the presence of sunlight. Therefore, the measurements in the studies included over 70 VOCs and the nitrogen compounds that occur during the ozone formation process.

The 2017 study measured VOCs at Carlsbad Caverns, Great Basin, Grand Canyon, and Joshua Tree National Parks. The level of VOCs at Carlsbad Caverns was more than five times the levels at the other parks. The mix of VOCs at Carlsbad Caverns was striking in that it was dominated by Alkane compounds that are predominantly associated with oil and gas production. The VOC sampling was done in the afternoon using automated sample containers. To further understand what was happening at Carlsbad Caverns, the NPS initiated a 2019 study with real time measurements of VOC and NO_x components.

The 2019 study clearly showed that the NO_x and VOCs that reach the park are associated with oil and gas production to the east and southeast of the park. Ethane is a VOC that is associated with oil and gas production. Ethane concentrations were 16 ppb averaged over the duration of the study and one-hour values exceed 100 ppb. Ethane levels in unpolluted areas are generally around 1 ppb. Mixes of other VOCs, such as the i-pentane to n-pentane ratios, indicated the dominance of oil and gas sources. The mix of total nitrogen compounds (NO_y) to NO_x clearly indicates nearby sources of NO_x as the dominant contributor to ozone formation.

The data from the measurements at Carlsbad Caverns National Park and a review of the proposed rule lead us to the following conclusions:

- Ozone concentrations at Carlsbad Caverns National Park frequently exceed the national ambient air quality standard for ozone.

- The information from the studies highlights the need for both NO_x and VOC reductions in the oil and gas sector to reduce ozone concentrations and supports the proposed engine & turbine standards.
- NMED's proposed NO_x limits for engines and turbines are similar to on-the-books standards in other states, including Texas and Pennsylvania. Note: California engine NOx limits are significantly more stringent than NMED's proposal—our recommended changes are based on Pennsylvania's Best Available Technology (BAT) limits.
- Based on examples from Pennsylvania's state requirements, we recommend the following changes are incorporated to strengthen the proposed rule (based on Pennsylvania general permitting and Reasonable Available Control Technology (RACT) requirements):

  Rich-burn Engines

  - Require all *new* and *existing* rich-burn engines >500 HP to meet a limit of 0.2 g NO_x/hp-hr (NMED proposed 0.5 g NO_x/hp-hr)
  - Require all *new* and *existing* rich-burn engines >100 HP and ≤500 HP to meet a limit of 0.25 g NO_x/hp-hr (NMED did not propose limits for this size class)
  - Require all *new* rich-burn engines ≤ 100 HP to meet a proposed limit of 1.0 g NO_x/hp-hr (NMED did not propose limits for this size class)

  Lean-burn Engines

  - Require all *existing* lean-burn engines ≤100 HP to meet a proposed limit of 2.0 g NO_x/hp-hr (NMED did not propose limits for this size class)
  - Require all *existing* lean-burn engines >100 and ≤500 HP to meet a proposed limit of 1.0 g NO_x/hp-hr (NMED did not propose limits for this size class)
  - Require all *existing* lean-burn engines >500 HP to meet the proposed limit of 0.5 g NO_x/hp-hr (NMED proposed this limit for all *existing* engines greater than 1,000 HP)
  - Require all *new* lean-burn engines ≤500 HP to meet a proposed limit of 1.0 g NO_x/hp-hr (NMED did not propose limits for this size class)

  Existing Turbines

  - Require all *existing* turbines ≥1,000 and <5,000 HP to meet a NO_x limit of 25 ppmvd @15% O_2 (NMED proposed a limit of 50 ppmvd @15% O_2 for all turbine size classes)
  - Require all *existing* turbines ≥ 5,000 HP and <60,000 HP to meet a NO_x limit of 15 ppmvd @15% O_2 (NMED proposed a limit of 50 ppmvd @15% O_2 for all turbine size classes)
  - Require all *existing* turbines ≥ 60,000 HP to meet a NO_x limit of 9 ppmvd @15% O_2 (NMED proposed a limit of 50 ppmvd @15% O_2 for all turbine size classes)

The National Park Service greatly appreciates the opportunity to provide technical comments. Please refer to the accompanying presentation to the board and the redline/strikeout version of the rule for more details.

Relevant reference:

Benedict, K.B., Prenni, A.J., El-Sayed, M.H., Hecobian, A., Zhou, Y., Gebhart, K.A., Sive, B.C., Schichtel, B.A, Collet, J.L., 2020. Volatile organic compounds and ozone at four national parks in the southwestern United States. Atmos. Environ. 239 https://doi.org/10.1016/j.atmosenv.2020.117783