STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT BOARD

IN THE MATTER OF PROPOSED NEW REGULATION,
20.2.50 NMAC – *Oil and Gas Sector – Ozone Precursor Pollutants* **No. EIB 21-27 (R)**

DIRECT TESTIMONY OF ANDREW AHR

My name is Andrew Ahr, and I am the Quality Assurance Staff Manager for the Air Quality Bureau ("Bureau") of the New Mexico Environment Department ("Department"). I have been asked to provide testimony in support of the Department's proposed new air quality regulations at 20.2.50 NMAC ("Part 50"). My testimony will address the following topics: how design values for ozone are calculated, quality assurance ("QA") of the data, and how the data is submitted to the U.S. Environmental Protection Agency ("EPA").

I. QUALIFICATIONS

I have been employed with the Bureau for over four years and have held the positions of Permit Writer and Compliance Inspector prior to becoming the QA Staff Manager. Before coming to the Department, I worked in the chemical industry for approximately 18 years at EKC Technology, Inc., DuPont, and SBA Materials. I also have 15 years of experience working in various engineering positions within the semiconductor manufacturing industry.

My full background and qualifications are set forth in my resume, which is marked as NMED Exhibit 31.

II. DESIGN VALUES

Overview

A design value is a statistic that describes the air quality status of a given location relative to the level of the National Ambient Air Quality Standards ("NAAQS"). Design values are typically used to designate and classify nonattainment areas, as well as to assess progress towards meeting the NAAQS. Design values are computed and published annually by EPA's Office of Air Quality Planning and Standards, and reviewed in conjunction with the EPA Regional Offices. Some of these design values can change after the date of publication for a variety of reasons, including but not limited to:

- EPA agreement that certain data were influenced by exceptional events and therefore not subject for comparison with the NAAQS;
- States retroactively entering or changing erroneous data based on later findings; and/or
- Notification of a monitoring issue (e.g. network design, site combination, change in the regulatory status of a monitor) that would prompt a revision.

Ozone Design Values

The primary and secondary NAAQS for ozone are met at an ambient air monitoring site when the 3-year average of the annual fourth-highest daily maximum 8-hour average ozone concentration (i.e., the design value) is less than or equal to 0.070 ppm. This ozone design value has been in effect since October 26, 2015. *See* 40 CFR Part 50, Appendix U.

The form of the ozone NAAQS requires the use of a 3-year period (as opposed to a 2-year period for other criteria pollutants) to determine the average number of exceedances per year. In its simplest form, the ozone standard requires that the average number of exceedances during a 3-year period cannot be greater than 1.0. An area with four exceedances during a 3-year period, therefore, does not meet the ozone standard because four exceedances in 3 years averages out to more than once per year. If the fourth highest value was equal to the level of the ozone standard, i.e. 0.070 ppm, then the area would have no more than three exceedances during the 3-year period and the average number of exceedances per year would be less than one. This assumes no missing data, and is how the fourth highest value in 3-years came to be used as the design value. An example is given at the end of the section titled Minimum Data Capture Requirements (Data Completeness).

Calculation of Ozone Design Values

Ozone season for most states is generally considered to be from May through September (the warmest months of the year). However, New Mexico's ozone season is designated as all 12 months, unlike many parts of the country. *See* 40 CFR Part 50, Table D-3 to Appendix D - Ozone Monitoring Season by state. Hourly average ozone concentrations are reported at each ozone monitor in parts per million (ppm) to the third decimal place, with digits to the right of the third decimal place truncated. Each hour is identified using local standard time.

The daily maximum 8-hour average ozone concentration for a given day is the highest of the 17 consecutive 8-hour averages beginning with the 8-hour period from 7:00 a.m. to 3:00 p.m., followed by 8:00 a.m. to 4:00 p.m. and ending with the 8-hour period from 11:00 p.m. to 7:00 a.m. the following day (i.e., the 8-hour averages for 7:00 a.m. to 11:00 p.m.). Daily maximum 8-hour average ozone concentrations are determined each day with ambient ozone monitoring data, including days outside the ozone monitoring season if those data are available. *See* 40 CFR Part 50, Appendix U.

The primary and secondary ozone design value statistic is the annual fourth-highest daily maximum 8-hour ozone concentration, averaged over three years, expressed in ppm.
The 3-year average is computed using the three most recent, consecutive years of ambient ozone monitoring data. Design values are also reported in ppm to three decimal places, with digits to the right of the third decimal place truncated.

III. DATA GATHERING AND QUALITY ASSURANCE

Minimum Data Capture Requirements (Data Completeness)

Both the daily maximum 8-hour average ozone concentration data and the design value data, must meet specific requirements to be considered valid:

(1) A daily maximum 8-hour average ozone concentration shall be considered valid if valid 8-hour averages are available for at least 13 of the 17 consecutive 8-hour periods starting from 7:00 a.m. to 11:00 p.m. In the event that fewer than 13 valid 8-hour averages are available, a daily maximum 8-hour average ozone concentration shall also be considered valid if it is greater than the NAAQS. Hourly ozone concentrations that have been approved under 40 CFR § 50.14 as having been affected by exceptional events shall be included when determining whether these criteria have been met. *See* 40 CFR Part 50, Appendix U.

(2) A design value less than or equal to the level of the NAAQS must meet minimum data completeness requirements in order to be considered valid. However, a design value greater than the level of the NAAQS is always considered to be valid.

(3) These requirements are met for a 3-year period at a site if valid daily maximum 8-hour average ozone concentrations are available for at 90% of the days within the ozone monitoring season, on average, for the 3-year period, with a minimum of at least 75% of the of the days within the ozone monitoring season in any one year. *See* 40 CFR Part 50, Appendix U.

See the examples below:

EXAMPLE 1—SITE MEETING THE PRIMARY AND SECONDARY O_3 NAAQS

Year	Percent valid days within O_3 monitoring season (Data completeness)	1st highest daily max 8-hour O_3 (ppm)	2nd highest daily max 8-hour O_3 (ppm)	3rd highest daily max 8-hour O_3 (ppm)	4th highest daily max 8-hour O_3 (ppm)	5th highest daily max 8-hour O_3 (ppm)
2014	100	0.082	0.080	0.075	0.069	0.068
2015	96	0.074	0.073	0.065	0.062	0.060
2016	98	0.070	0.069	0.067	0.066	0.060
Average	98				0.065	

As shown in Example 1, this site meets the primary and secondary O_3 NAAQS because the 3-year average of the annual fourth-highest daily maximum 8-hour average O_3 concentrations (*i.e.,* 0.065666 ppm, truncated to 0.065 ppm) is less than or equal to 0.070 ppm. The minimum data completeness requirements are also met (*i.e.,* design value is considered valid) because the average percent of days within the O_3 monitoring season with valid ambient monitoring data is greater than 90%, and no single year has less than 75% data completeness.

EXAMPLE 2—SITE FAILING TO MEET THE PRIMARY AND SECONDARY O_3 NAAQS

Year	Percent valid days within O_3 monitoring season (Data completeness)	1st highest daily max 8-hour O_3 (ppm)	2nd highest daily max 8-hour O_3 (ppm)	3rd highest daily max 8-hour O_3 (ppm)	4th highest daily max 8-hour O_3 (ppm)	5th highest daily max 8-hour O_3 (ppm)
2014	96	0.085	0.080	0.079	0.074	0.072
2015	74	0.084	0.083	0.072	0.071	0.068
2016	98	0.083	0.081	0.081	0.075	0.074
Average	89				0.073	

As shown in Example 2, this site fails to meet the primary and secondary O_3 NAAQS because the 3-year average of the annual fourth-highest daily maximum 8-hour average O_3 concentrations (*i.e.,* 0.073333 ppm, truncated to 0.073 ppm) is greater than 0.070 ppm, even though the annual data completeness is less than 75% in one year and the 3-year average data completeness is less than 90% (*i.e.,* design value would not otherwise be considered valid). *See* 40 CFR Part 50, Appendix U.

QA Requirements for Design Value Data

Before daily 8-hour average ozone concentration data is submitted to the EPA, the data is reviewed by QA personnel at the Bureau to meet validity requirements as described below:

(1) Ozone monitoring equipment must pass an annual accuracy audit performed by a QA Auditor to ensure that all flows, pressures, lamp intensities, temperatures and instrument response to ozone concentrations are within instrument specifications.

(2) Quarterly calibrations (four times per year) are performed on all ozone monitoring instruments by personnel from the Bureau's Monitoring Section.

(3) Ozone monitoring instruments must pass weekly 1-point quality control ("QC") checks. These checks are performed automatically on Sunday mornings. If any ozone monitors do not pass this weekly check, Monitoring personnel make required adjustments/fixes to the failing instrument to bring it back within specification in order to pass the weekly check. QA personnel verify that all ozone monitoring instruments pass this check within a 14-day span and then submit the weekly 1-point QC check data to EPA through the Air Quality System ("AQS") website as per precision and accuracy requirements.

(4) Daily checks are performed everyday by Monitoring Section personnel to ensure ozone monitoring equipment is reporting and operating within specifications. They also look for any equipment alarms and note any unusual or high value concentrations above 0.070 ppm. The QA Data Steward also performs a daily check of ozone data each morning to ensure that instruments are reporting and takes note of any data abnormalities.

(5) Lastly, an Annual Data Certification is performed on all monitoring data by QA personnel. A certification letter and related AQS reports are submitted to EPA by May 1st of each year by the Bureau's QA Staff Manager. EPA then sends an acknowledgement letter to the Bureau.

III. SUBMISSION OF DATA TO EPA

Following review by the Bureau's QA personnel to ensure that the data meets all validity requirements, the data is submitted to and processed by EPA as follows:

(1) On a quarterly basis, hourly ozone data is submitted using XLM Reporter software to EPA through the AQS website. The submittal of data is performed by the Bureau's QA Data Steward.

(2) Once the hourly ozone data is submitted, EPA uses it to calculate the 8-hour average ozone concentrations for each day.

(3) From the 8-hour average ozone concentration data, the EPA determines the 1st, 2nd, 3rd and 4th highest daily maximum 8-hour ozone concentrations for the entire year.

(4) Design values are produced by the EPA (not the Bureau) based on the annual fourth-highest daily maximum 8-hour ozone concentration, averaged over three years, expressed in ppm. The 3-year average is computed using the three most recent, consecutive years of ambient ozone monitoring data.

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Career Summary: Technically oriented professional who brings a skill set consisting of applications/process engineering, technical sales, customer service and management from the areas of semiconductor manufacturing, chemical materials applications and environmental science. A positive attitude, attention to detail, imaginative problem solving, along with high level of integrity and self-confidence have made for a successful career.

Work Experience

State of New Mexico, Environment Department, Air Quality Bureau (AQB) – **Quality Assurance Staff Manager** – Sep. 2019 to present. Manage Quality Assurance Auditors to perform field audits of all air monitoring site equipment to insure it is reporting data as accurately as possible. Manage a Data Handling Specialist to produce periodic air monitoring reports and certification of data to the EPA. Write the AQB's annual Quality Assurance Project Plan, Quality Management Plan, ICIS – Air Quality Assurance Project Plan, and quality assurance standard operating procedures. Perform annual data certification of the AQB's air monitoring data that is submitted to the EPA.

State of New Mexico, Environment Department, Air Quality Bureau – **Compliance Inspections Specialist** - Sep. 2018 – Sep. 2019; Santa Fe, NM
Perform onsite inspections of oil/gas facilities, construction product facilities, landfills and other types of industrial facilities throughout the state of New Mexico. Review permits, regulations and reports associated with the facility. Write detailed reports along with Areas of Concern documents if irregularities are discovered during inspection of facility or regulatory documents.

State of New Mexico, Environment Department, Air Quality Bureau – **Major Source Permit Writer** - Jul. 2017 to Sep. 2018; Santa Fe, NM
Performed technical and regulatory review of complex air quality permit applications. This includes verifying emissions calculations, determining applicable state and federal regulations and drafting legally enforceable air permits and technical support documents.

SBA Materials, Inc. - **Process Engineer and Facility Manager** – Dec. 2010 to Jul. 2016
Albuquerque, NM and San Jose, CA
Assured and maintained the operation of all laboratory/facility equipment and material stocks used in the product formulation and development of spin-on ultra-low-κ dielectric materials. Performed engineering studies on low-k films using a wide variety of laboratory equipment. Researched and applied state and federal environmental regulations for storage, use, shipment and disposal of dangerous chemicals. Other duties include evaluation of test data, purchasing, writing of specifications (SOPs), training new personnel, facility maintenance and the international shipping of dangerous goods.

DuPont / EKC Technology, Inc. - **Senior Field Applications Engineer** – Dec. 1997 to Jul. 2009
Albuquerque, NM / Hayward, CA
Performed engineering and sales support for chemical cleaning and surface preparation products to semiconductor and electronics manufacturers throughout North America. Developed wafer cleaning processes at the in-house lab to plug and play at the customer's facility with minimal adjustments. Frequently used process problem solving skills to unravel issues at customer sites associated with plasma etch tools and chemical cleaning systems. These included automated spray / rinse /dry tools and wet benches. Acted as the main point of contact for customer technical questions about products and services. Worked with internal

sales/marketing teams, R&D engineers, quality control engineers and customer development teams to design, evaluate and characterize new products. Designed manufacturing processes that were both more environmentally friendly and lower in cost of ownership. My efforts helped acquire new accounts and expand business at existing customer sites. Prepared reports and presented technical information directly to customers. Used my superior interpersonal communication skills to resolve difficult issues at customer meetings. Primarily used Microsoft Office Suite software for the generation of technical reports. Compiled and prepared application data for use in technical marketing materials. Traveled up to 80% of the time when required for business purposes.

Philips Semiconductors - **Senior Process Engineer** (metal etch) – Mar. 1996 to Dec. 1997 and from Aug. 1991 to Mar. 1994 – Albuquerque, NM
Developed and maintained plasma etch and wet etch processes on aluminum, tungsten and titanium metals using Lam 9600 TCP and Applied Materials 8330 plasma metal etch systems. Used manual and automated wet benches for wet etch processes. SPC disciplines were used to maintain process control and to consistently drive for improved results. Inspected metal profiles with a scanning electron microscope.

High Yield Technology - **Senior Field Applications Engineer** – Mar. 1994 to Mar. 1996
Albuquerque, NM
Installed and developed in-situ particle monitors using laser light scattering /detection technology on a wide variety of high vacuum semiconductor process equipment at customer sites in the U.S., Ireland and Israel. Wrote application notes and lead training sessions for technicians and engineers. Performed field service engineering of the sensors.

Signetics Fab 22 & Fab 23 - **Defect Density Engineer** - Mar. 1986 to Aug. 1991
Albuquerque, NM
Helped establish and supervise this new engineering group which collected defect data from key fab process areas. The statistical data was graphed and reported weekly. Defect data was analyzed so correlations to particular tool events could be understood. Defect data was collected through the use of a KLA-2028 wafer inspection system and optical microscopes.

Signetics Fab 22 - **Quality Assurance Coordinator** – Feb. 1983 to Mar. 1986
Albuquerque, NM
Supervised a group of up to six operators to perform incoming acceptance inspections on all masks and reticles. Other duties included specification distribution and checking all measurement equipment for proper calibration and functionality.

U.S. Navy (Reserve) – **Lieutenant (junior grade)** – Oct. 1980 to Nov. 1986
Pensacola, FL and Corpus Christi, TX
Student Naval Aviator and later became an assistant air operations officer for the Chief of Naval Air Training. Scheduled aircraft for cargo missions and air show appearances.

Education

Bachelor of Science degree from the University of New Mexico in Albuquerque, NM
Majored in Biology with a minor in Chemistry

Graduated from the U.S. Navy's Aviation Officer Candidate School in Pensacola, FL
Earned a commission as an officer in the U.S. Navy (Reserve)

Master of Business Administration degree from New Mexico Highlands University branch in Albuquerque, NM