Uinta & Ouray Federal Partners Webinar

Clean Air Act Ozone 101

What We Will Cover

- Current ozone design values and regulatory monitors
- Timeline of the designation process
- Implications of different classifications (what's involved in SIP/FIP, demonstrating attainment)
- Definition of Uinta Basin airshed for designation purposes
- Winter ozone field studies
- Ozone modeling for NAAQS attainment
- Uinta Basin modeling currently available
- Background ozone

Ozone Monitors

Regulatory Monitor Status

- Regulatory data is collected under an approved Quality Assurance Project Plan and in compliance with 40 CFR Parts 50 and 58
- Since 2009, Uinta Basin ozone monitors have been operated by Industry, the Ute Indian Tribe, Utah DEQ, National Park Service, and EPA contractors
- Regulatory status of monitors operated by each agency have changed over time
  - Utah DEQ: All Data (Roosevelt, Fruitland, Vernal) Regulatory 2012-2016
  - Ute Indian Tribe: 2011, 2014-2016 are regulatory
  - Industry/Contractors: 2013-2014 was regulatory
  - National Park Service: Rangely, all is regulatory; Dinosaur NM is regulatory after Jan. 2014

Ozone NAAQS and Three Year Design Value

- The 2015 ozone NAAQS is attained when the three year average of annual 4th highest daily 8-hour average is less than or equal to 0.070 ppm (or 70 ppb)
- Example for Ouray:

Year	4th high Regulatory 8-hour Average
2013	0.092 ppm
2014	0.079 ppm
2015	0.068 ppm
’13-’15 Three year average of 4th highs	0.079 ppm

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	2013	2014	2015		Design Value
1st	0.095	0.091	0.071		
2nd	0.094	0.088	0.071		
3rd	0.093	0.083	0.069		
4th	0.092	0.079	0.068	avg.▶	0.079

Current Ozone Design Values from Regulatory Monitors (based on preliminary 2013-2015 data) 2015 Ozone NAAQS: 70 ppb

Monitor	Regulatory DV
Myton	74
Whiterocks	68
Redwash	73
Ouray	79
Roosevelt	76
Rangely, CO	73
Meeker, CO	63

The design value is the 3-year average of the annual 4th highest daily maximum 8-hour ozone concentration.

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Ozone Design Value Classifications

Nonattainment Designation Classification	Design Value (ppb)	
	Current 75 ppb Ozone NAAQS	70 ppb Ozone NAAQS (Estimated)
Marginal	76 - <86	71 - <80
Moderate	86 - <100	80 - <93
Serious	100 - <113	93 - <105
Severe	113 - <119	105 - <111
Extreme	119 - <175	111 - <163

Timeline of the Designations and Implementation Process

State and Tribe Recommendations	Within 1 year after NAAQS promulgation	October 1, 2016 (Air quality data years 2013-2015, and preliminary 2016)
EPA responds to state and tribal recommendations (120-day letters)		June 1, 2017 (Air quality data years 2014-2016)
Final Designations	Within 2 years after NAAQS promulgation (Administrator has discretion to extend the deadline by one year to collect sufficient information)	October 1, 2017 Effective date may vary (Air quality data years 2014-2016)
Infrastructure SIP (outlines the state's air quality mgt. program such as monitoring and enforcement)	Within three years after NAAQS promulgation	October 2018
Attainment Plans Due	Within 36-48 months after designations depending on classification	October 2020-2021

Attainment Schedule by Classification

Classification	Schedule*
Marginal	3 years to attain
Moderate	6 years to attain
Serious	9 years to attain
Severe	15-17 years to attain
Extreme	20 years to attain

* Areas must attain as expeditiously as practical, but not later than the schedule in the table. Two one-year extensions are available in certain circumstances based on air quality. The schedule is pegged to the origin date of designation.

Overview of CAA Ozone Nonattainment Area Planning & Control Mandates by Classification

			NSR offset ratio	Major source threshold
EXTREME (20 years to attain)	TRAFFIC CONTROLS DURING CONGESTION	CLEAN FUELS REQUIREMENT FOR BOILERS	1.5 : 1 Extreme	10
SEVERE (15/17 years to attain)	PENALTY FEE PROGRAM FOR MAJOR SOURCES LOW VOC REFORMULATED GAS VMT GROWTH OFFSET		1.3 : 1 Severe	25
SERIOUS (9 years to attain)	VMT DEMONSTRATION (& TCMs IF NEEDED) NSR REQUIREMENTS FOR EXISTING SOURCE MODS ENHANCED VEHICLE I/M MODELED DEMO OF ATTAINMENT 3% ANNUAL RFP UNTIL ATTAINMENT	CLEAN FUELS PROGRAM (IF APPLICABLE) MILESTONE CONTINGENCY MEASURES FOR RFP ENHANCED MONITORING PLAN	1.2 : 1 Serious	50
MODERATE (6 years to attain)	~~STAGE II GASOLINE VAPOR RECOVERY~~ BASIC VEHICLE I/M ROP (15% RFP OVER 6 YEARS) VOC/NOx RACT for MAJOR/CTG SOURCES	CONTINGENCY MEASURES FOR FAILURE TO ATTAIN ATTAINMENT DEMONSTRATION	1.15 : 1 Moderate	100
MARGINAL (3 years to attain)	TRANSPORTATION CONFORMITY DEMONSTRATION NEW SOURCE REVIEW PROGRAM BASELINE EMISSION INVENTORY (EI)	GENERAL CONFORMITY/NEPA MAJOR SOURCE EMISSION STATEMENTS PERIODIC EMISSION INVENTORY UPDATES	1.1 : 1 Marginal	100

Nonattainment Area Boundary Determination

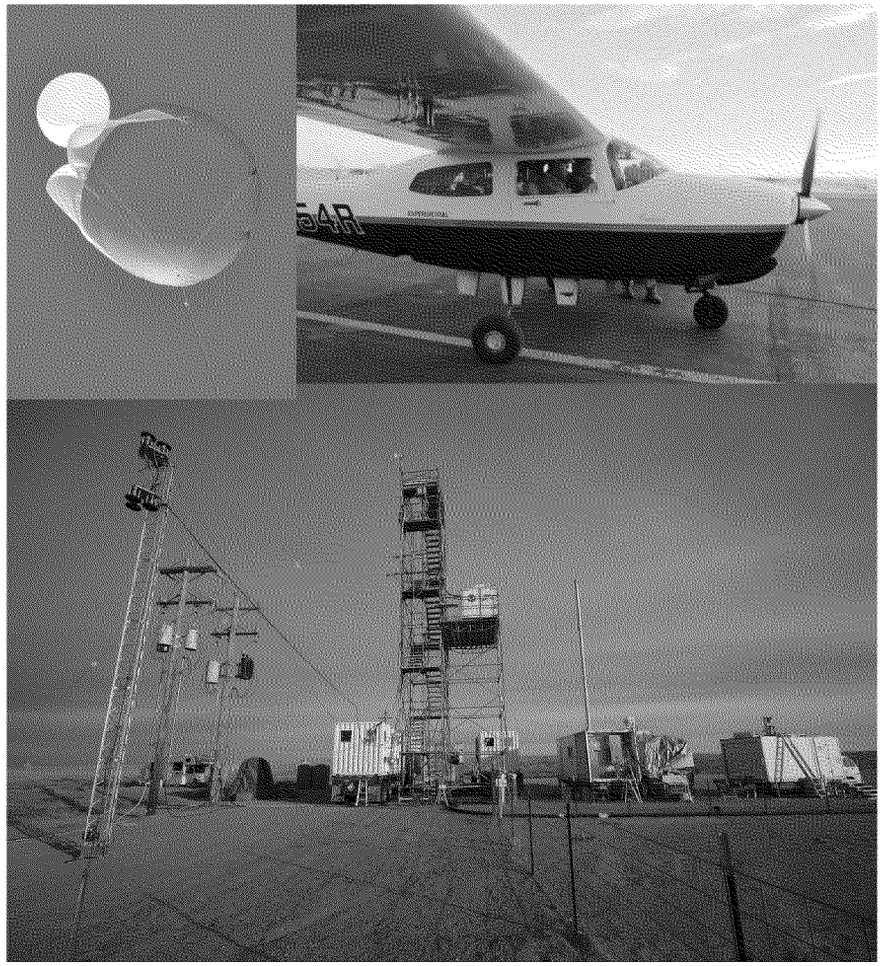
- The boundary of the non-attainment area is proposed by the state (or tribe)
  - Those recommendations are then used by EPA in the final designation process
- EPA recommends that states/tribes consider five factors
  1. Air quality data
  2. Emissions and emissions related data
  3. Meteorology
  4. Geography/Topography
  5. Jurisdictional boundaries
- May or may not follow Metropolitan Statistical Areas/Combined Statistical Area boundaries
- Boundary may include partial counties

Nonattainment Area Boundary Determination

- Boundary determinations must include not only the area that is violating, but also nearby areas that contribute to the violation
- Tribes may recommend that the EPA designate areas of Indian country separately from the adjacent state areas.
  - December 20, 2011:"Policy for Establishing Separate Air Quality Designations for Areas of Indian Country" http://www3.epa.gov/air/tribal/pdfs/0067_001.pdf
- The combination of all factors represents a "weight-of-evidence" regarding the most appropriate boundary for the nonattainment area

Uinta Basin Winter Ozone Field Studies

- Utah State University (USU) performed the first distributed ozone monitoring study in winter 2011. Very few measurements of precursors.
- WEA, UDEQ, EPA, NOAA and university researchers collaborated on major field studies in 2012, 2013, and 2014.
- Studies found that high ozone occurs in a shallow surface layer during strong inversion conditions with snow cover.
- VOC and NOx emissions from oil and gas development are the largest sources that contribute to winter ozone.
- Models simulations indicate that ozone is more sensitive to reductions in VOC



Ozone modeling for NAAQS Attainment

- Areas that violate the ozone NAAQS at a level of "moderate" or greater are required to develop an air quality modeling ozone attainment demonstration as part of their SIP or TIP:
  - The modeling system includes emissions data, meteorological modeling and a photochemical air quality model, usually CMAQ or CAMx.
  - The modeling system is evaluated for historical episodes, and if the model performs well, it is used to evaluate the emissions control strategies needed to attain the NAAQS.
  - Model sensitivity and source apportionment simulations can be used to identify the sources that contribute most to ozone and to evaluate control scenarios.
- Models are also used to evaluate interstate transport contributions to ozone monitors that violate the NAAQS. If the transport contribution exceeds a threshold, infrastructure SIPs (or TIPs/FIPs) must demonstrate plans to address transported ozone in downwind

Modeling currently available for the Uinta Basin

- Air Resource Management Strategy (ARMS) for 2010 using CMAQ and CAMx at a 4 km resolution. Completed in 2013 and was based on the 2008 NEI(?)
- Western Air Quality study for 2011 includes CMAQ and CAMx simulations at 4 km resolution. Completed in 2016, based on the 2011 NEI with updates developed for some emissions source sectors.
- EPA transport modeling for 2011 used CAMx at a 12 km resolution to evaluate ozone contributions to downwind states.
- NOAA performed WRF-Chem model simulation for the Uinta Basin using emissions based on the 2011 NEI.
- Utah DEQ and EPA have also performed CMAQ model simulations for 2013 using emissions based on the 2011 NEI.
- All model simulations to date have been biased low for VOC and ozone in the Uinta Basin, and large increases in the modeled oil and gas VOC emissions were necessary to improve model performance.

Uncertainty in Oil and Gas Emissions

- NOAA modeling estimate of VOC emissions is two times higher than NEI VOC emissions.
- EPA model simulations of individual VOC species are biased low by a factor of five compared to observations for some the highest reactivity components of VOC, including formaldehyde, toluene and xylene.
- Emissions sources of formaldehyde include engines, combustion sources and methanol used as a de-icing agent.
- The high reactivity VOC species are also of interest because they are hazardous air pollutants. Sources include glycol dehydrators, tanks and evaporation ponds.
- Utah DEQ, EPA, WRAP and WEA are working to develop improved emissions data.

Background ozone

- EPA and other modeling studies have found high levels of background ozone during spring and summer in the western US.
  - High background levels can result from a combination of natural precursor emissions, international and interstate transport, and transport from the stratosphere.
  - High contributions from background ozone occur during spring and summer under well ventilated conditions with transport from the free troposphere to the surface.
- High background ozone is not a concern for winter ozone in UT and WY:
  - There is very little contribution from transport during persistent cold air pool inversion events. Instead, ozone and precursors accumulate in a shallow surface later under stagnant air conditions.
  - Background ozone levels during winter ozone events are relatively low, typically between 35 to 45 ppb.

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