



UTAH DEPARTMENT of
ENVIRONMENTAL QUALITY
**AIR
QUALITY**

Ozone Update
Bryce Bird 9/15/2021

Air Pollution Hurts People

Intermountain[®] Healthcare

News Releases

Brief Exposure to Tiny Air Pollution Particles Triggers Childhood Lung Infections, Largest Study of Its Kind Finds

LiVe Well
FACT SHEET FOR PATIENTS AND FAMILIES

Air Quality and Pregnancy
When you're pregnant, poor air quality may affect both you and your baby. This handout will help you know what you can do to have a healthier pregnancy.

What we know
Poor air quality has been linked to:

- Baby born too early
- Baby born too small
- Baby with lung problems

What we are studying
Scientists are trying to learn what quality may be related to this:

- Miscarriage
- Birth defects

Outdoor Air Quality and Heart Disease
FACT SHEET FOR PATIENTS AND FAMILIES

Poor air quality is unhealthy for everyone, but especially people with heart disease — such as heart failure or coronary artery disease. The recommendations below relate to where and when you exercise. Follow recommendations related to your specific health condition for how much you exercise. For people with heart disease, poor air quality can cause:

NOW

- Heart attack
- More hospital and emergency visits

LATER

- Greater risk of heart attack, stroke, blood clots, and early death

LiVe Well
FACT SHEET FOR PATIENTS AND FAMILIES

Outdoor Air Quality and Adult Lung Disease
Poor air quality is unhealthy for everyone, but especially for adults with lung disease — bronchitis, or emphysema. Older people are also at risk because they may have lung conditions. These pages will help you know where and when to exercise. For people with lung disease,

NOW

- Coughing, wheezing
- Trouble breathing
- More severe disease symptoms
- More hospital visits

Long-term

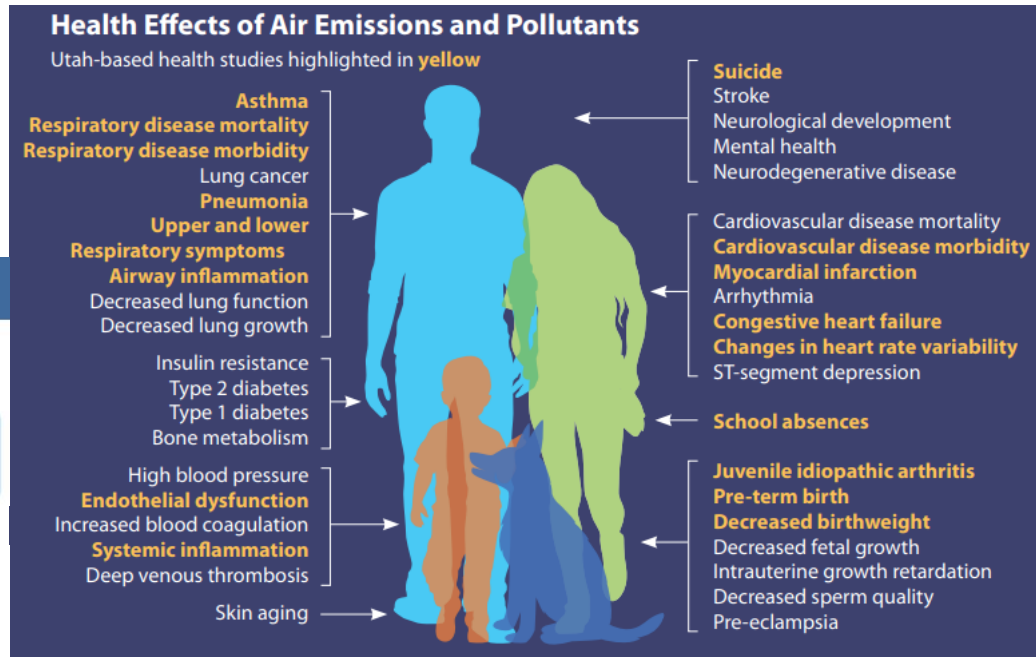
- Permanent of heart

Acute Air Pollution Exposure and Risk of Suicide Completion
Amanda V. Bakian, Rebekah S. Huber, Hilary Coon, Douglas Gray, Phillip Wilson, William M. McMahon, Perry F. Renshaw | Author Notes

American Journal of Epidemiology, Volume 181, Issue 5, 1 March 2015, Pages 295–303, <https://doi.org/10.1093/aje/kwu341>

Published: 10 February 2015 | Article history ▼

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Ozone and Particulate Pollution

Ground level or “bad” ozone is not emitted directly into the atmosphere, but is created by chemical reactions of oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of sunlight.

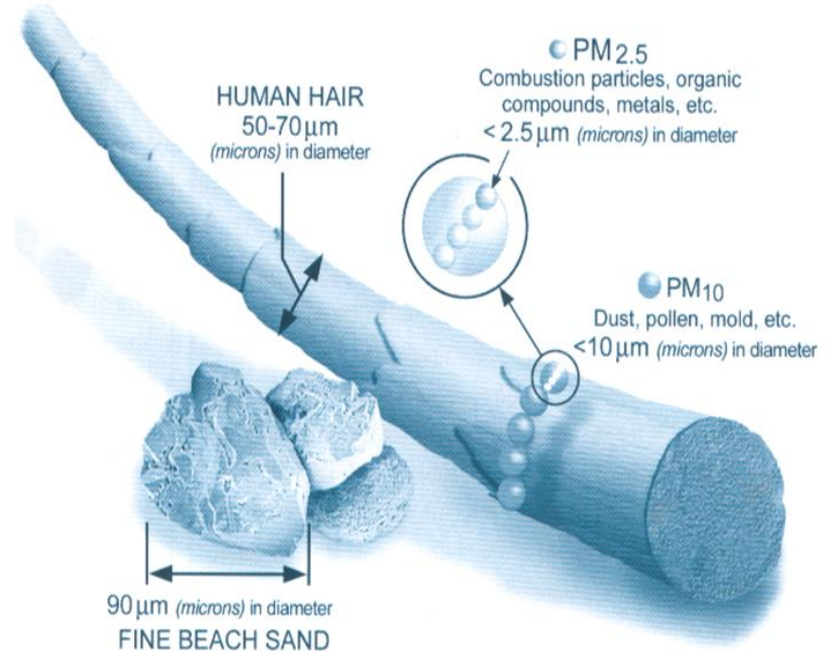
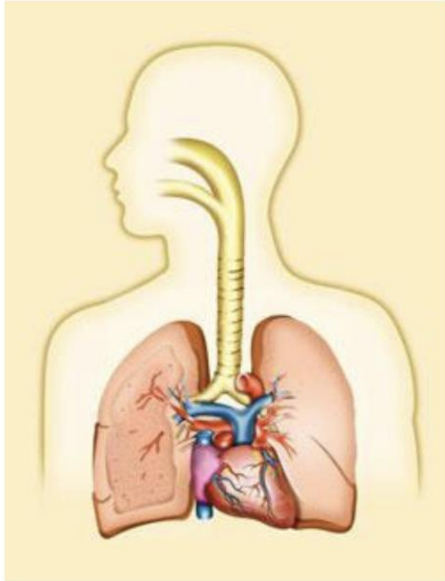


Image courtesy of the U.S. EPA

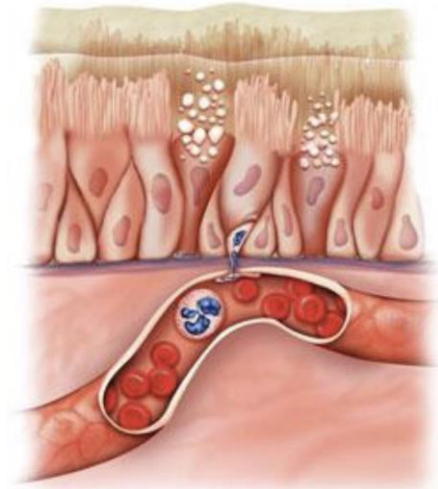
Ozone and Health



Ozone is a powerful oxidant that can irritate the airways.



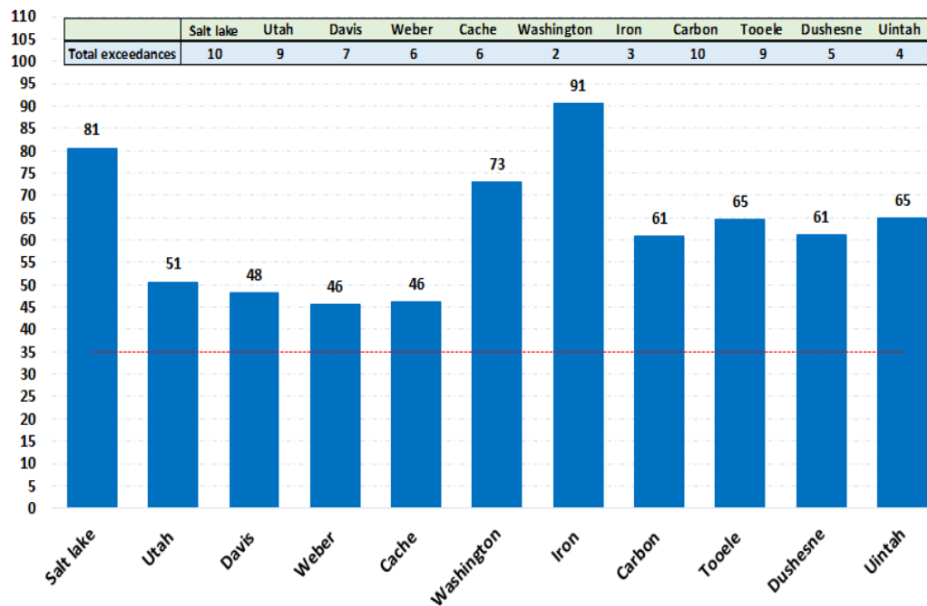
Ozone can cause the muscles in the airways to constrict, trapping air in the alveoli. This leads to wheezing and shortness of breath.



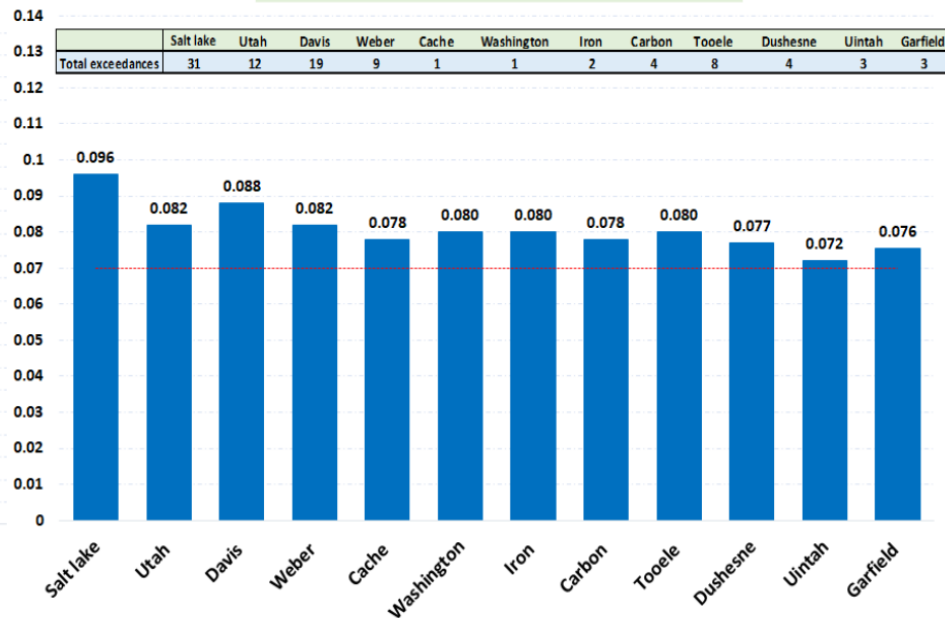
With inflammation, the airway lining is damaged. It has been compared to the skin inflammation caused by sunburn.

Ozone and Particulate Pollution Summer 2021

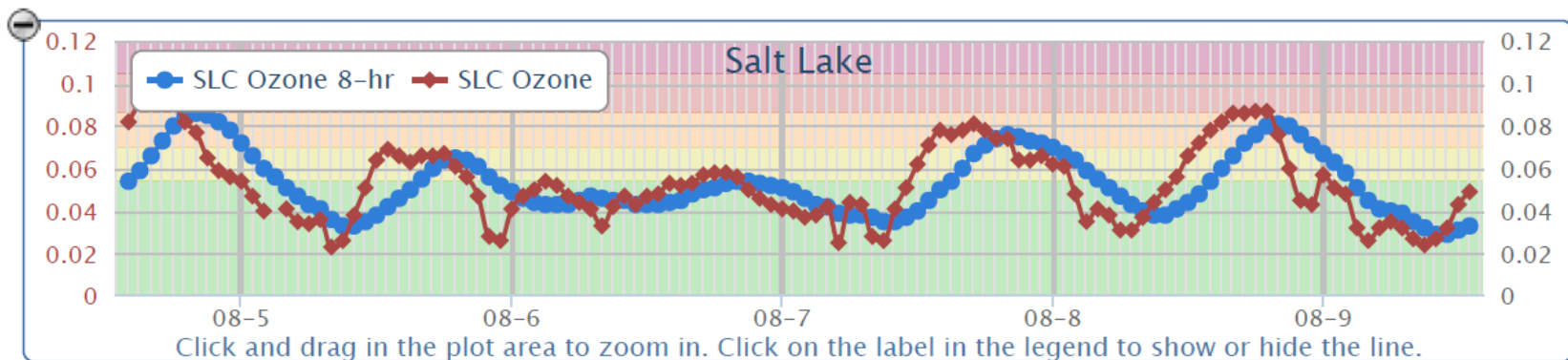
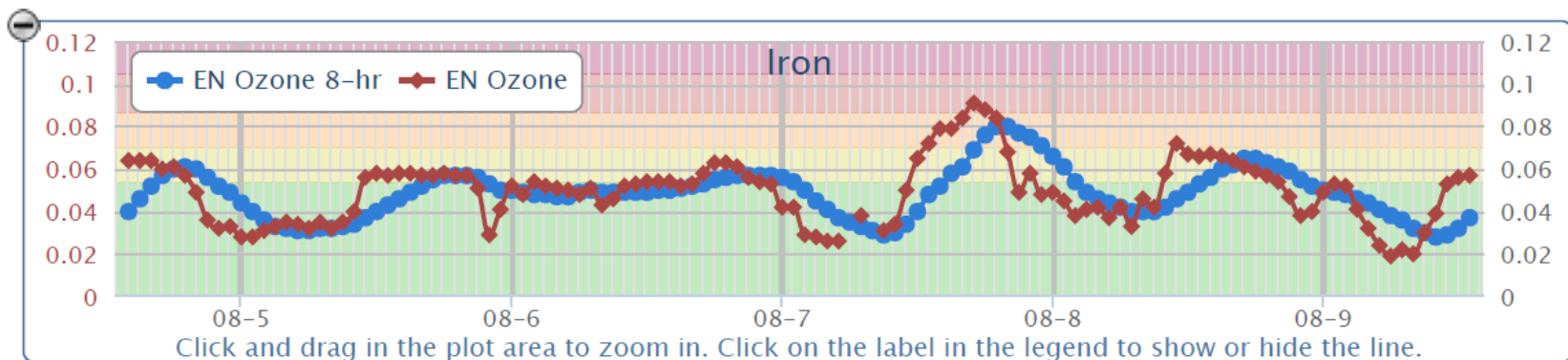
Max 24-hr PM2.5 average (ug/m3) from Jun 1 to Sep 8



Highest 8-hr Ozone (ppm) from Jun 1 to Sep 8



Ozone peaks with afternoon heat and solar intensity



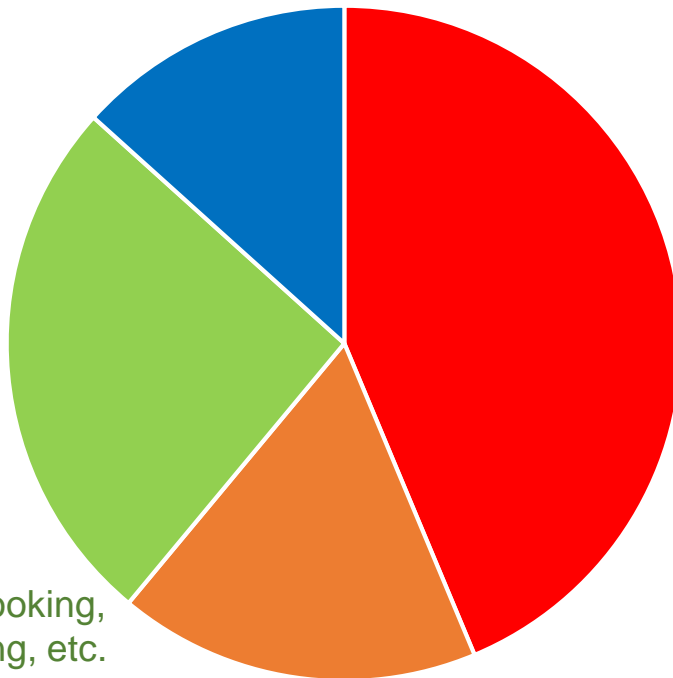
Sources of Utah Man-Made Emissions in the Northern Wasatch Front on an average “ozone season” day.

Point:

- Electric generation
- Petroleum refining
- Other large industry

Area:

- Restaurants
- Auto body
- Painting
- Dry cleaners
- Gas stations
- Commercial
- Small industry
- Residential heating, cooking, hot water, wood-burning, etc.



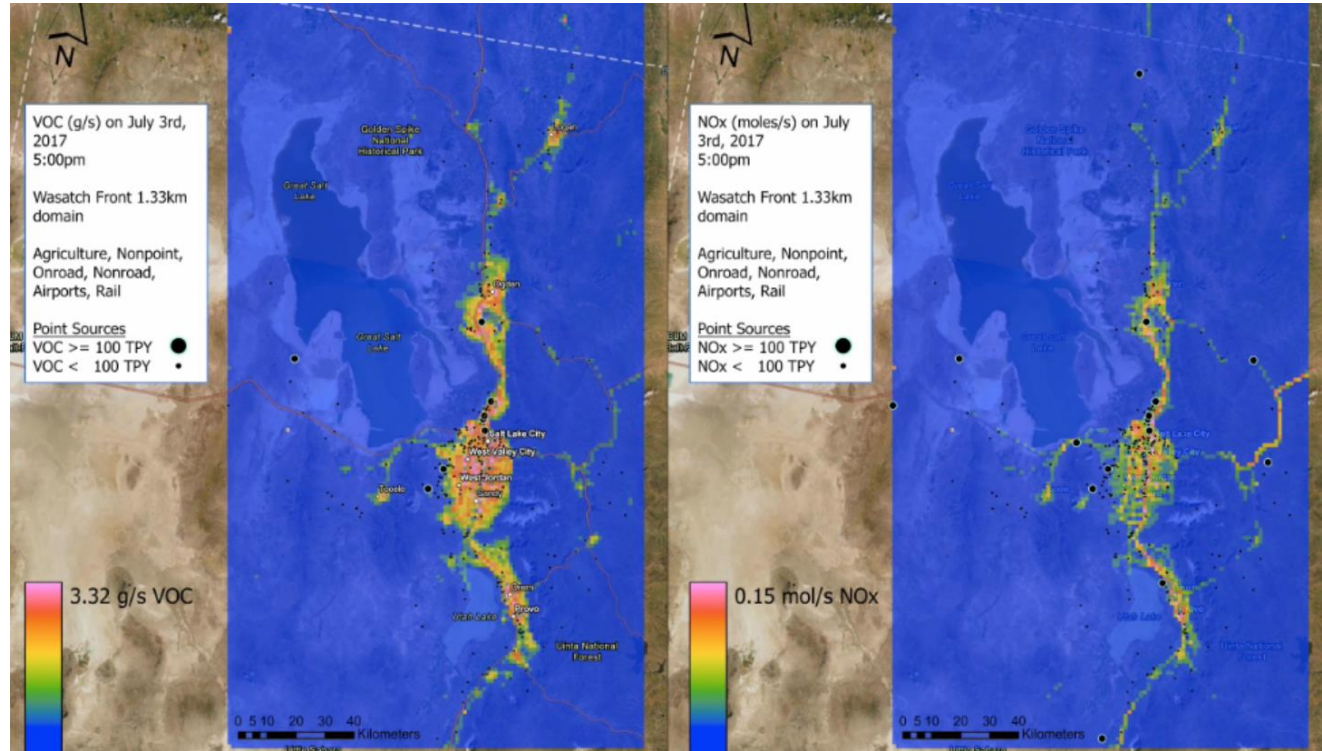
Over 80% of summer emissions are transported from other states, nations or are naturally occurring

Mobile:

- On-road cars and trucks
- Non-road trains, construction, lawn/garden, airport, etc.

■ On Road Mobile ■ Non-Road Mobile ■ Area Sources ■ Point Sources

Wasatch Urban Precursor Emissions

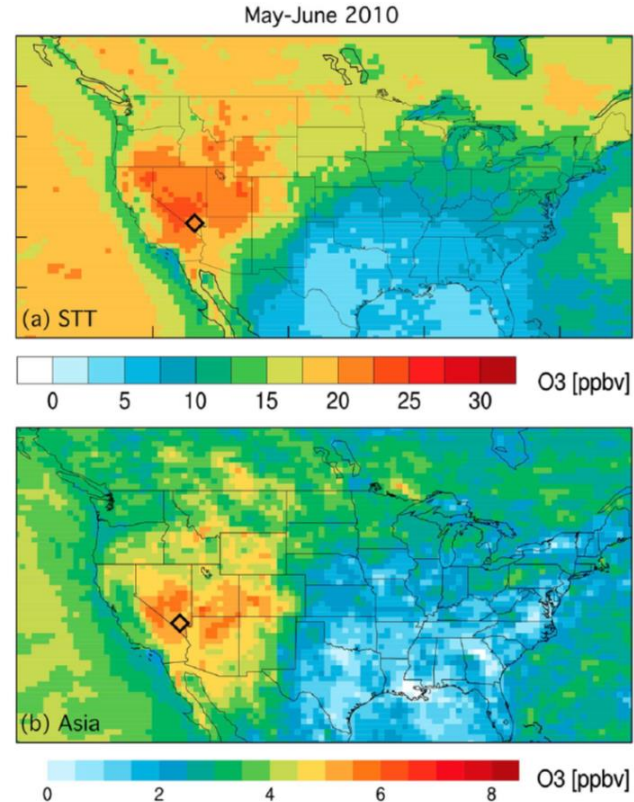


Natural, transported, boundary and background

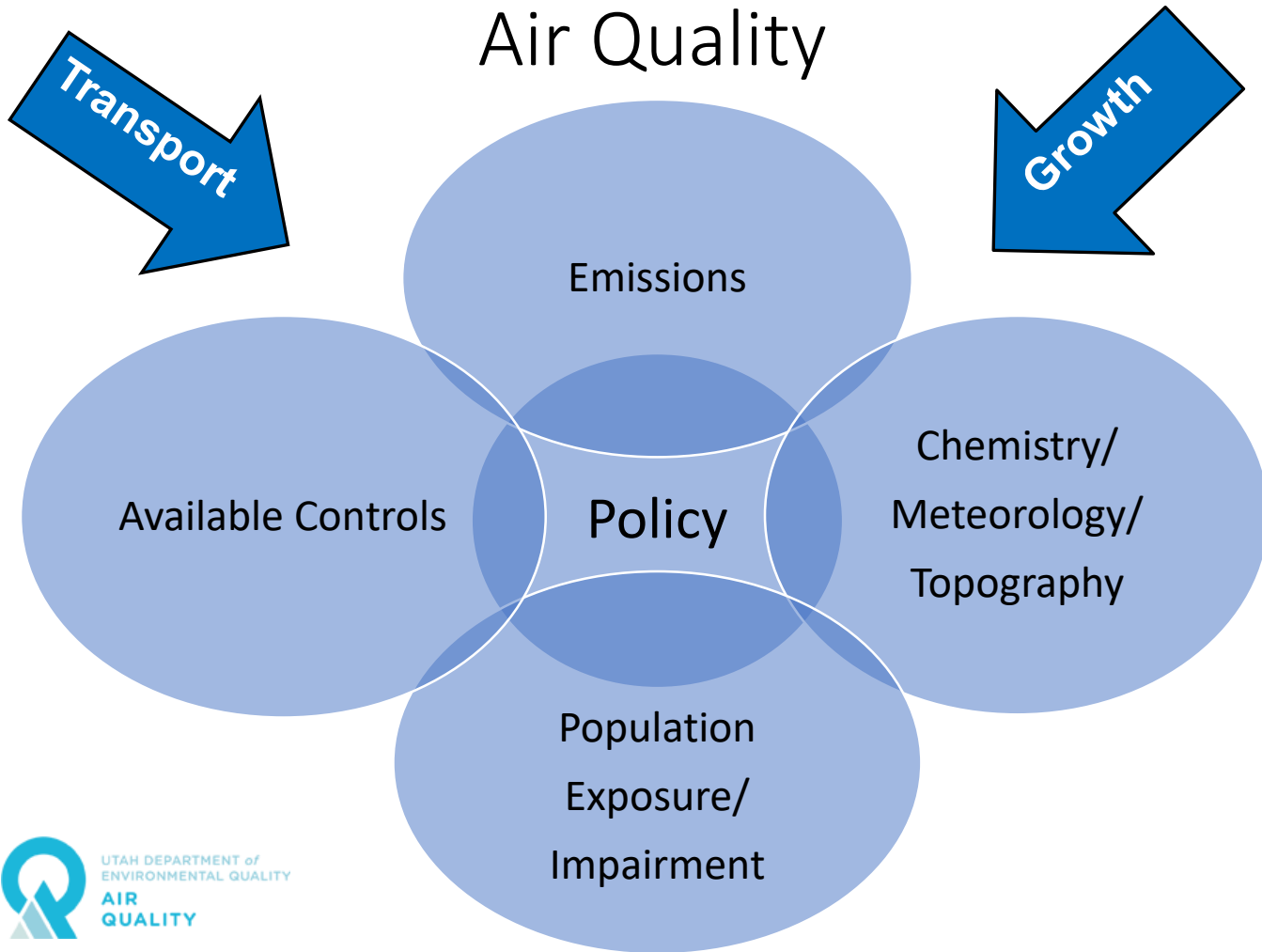
Many high elevation rural areas in the western US experience elevated ozone due to natural ozone, natural precursor emissions, and transported emissions from within the US and internationally.

Stratospheric intrusion, fire smoke, and biogenic VOC contribute to the natural background levels of ozone

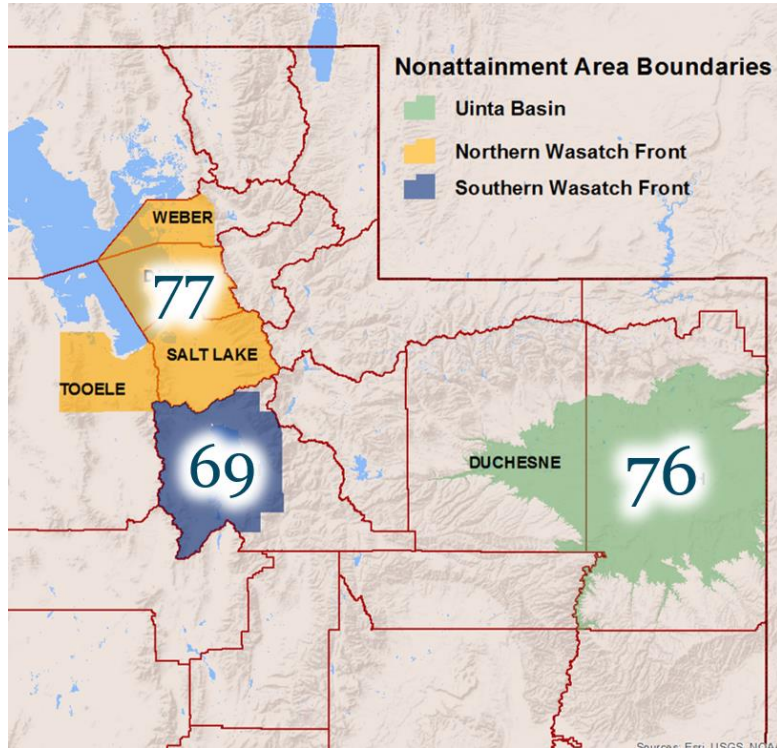
The local emissions are added to the background emissions that result in exceedance days along the Wasatch Front.



Air Quality

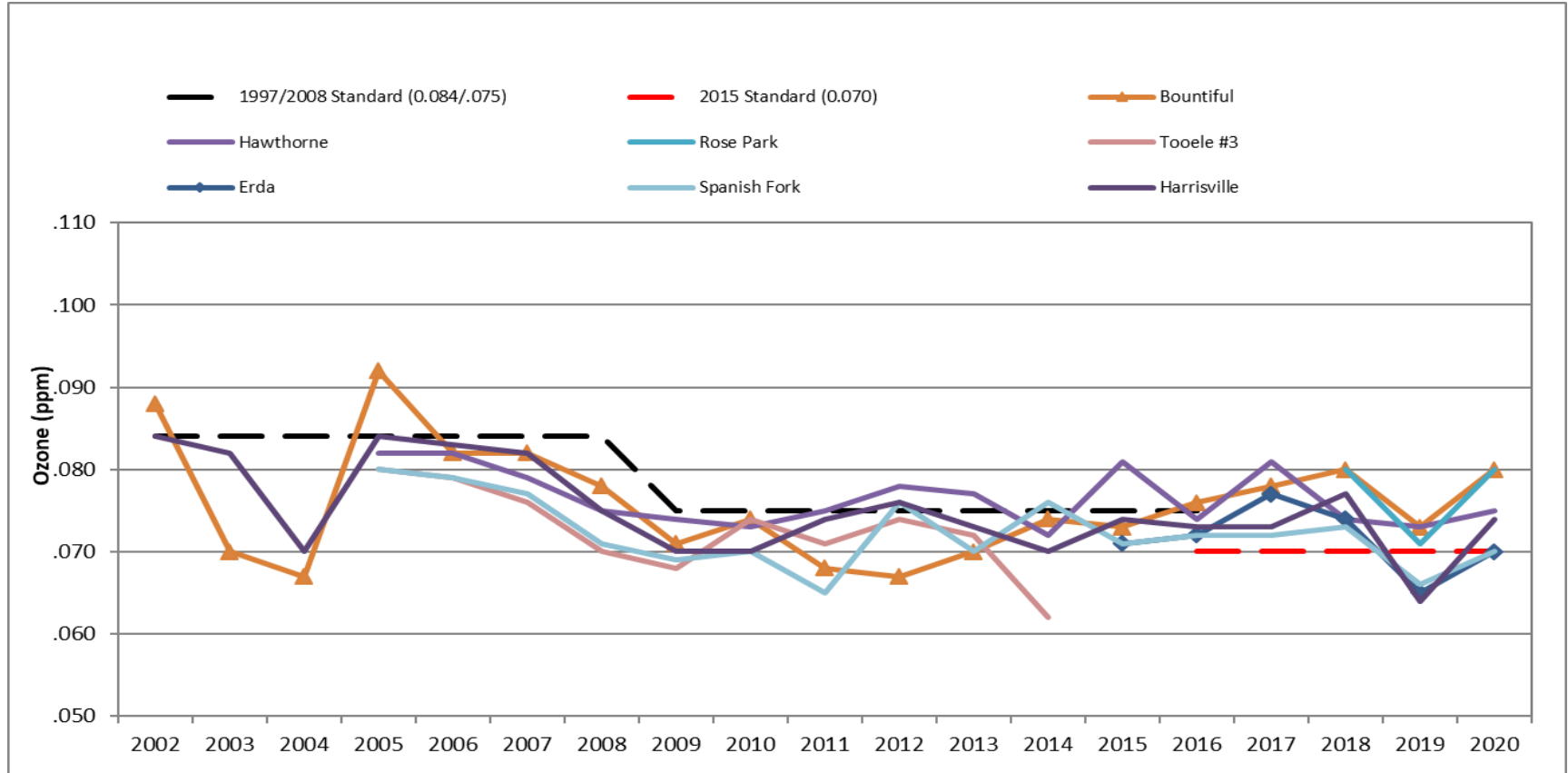


Utah Ozone Nonattainment Area Planning

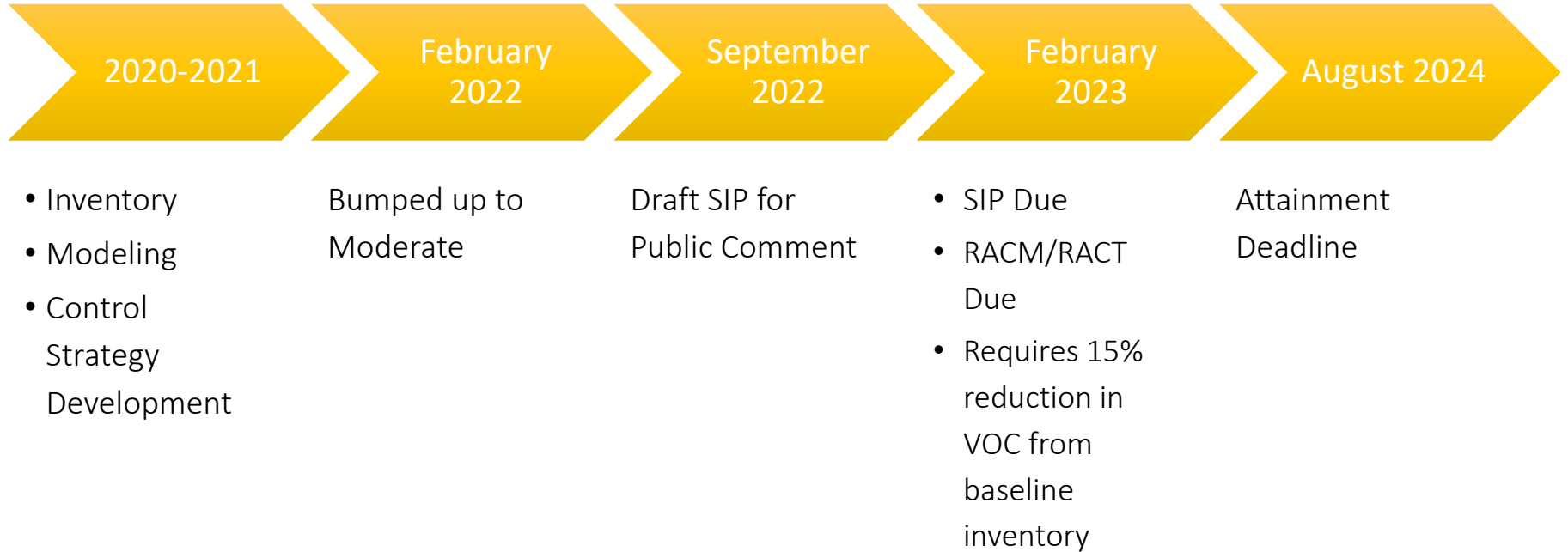


- EPA designated three nonattainment areas in Utah for the 2015 Ozone Standard of 70ppb as a three year average if the 4th highest daily 8-hour average at a regulatory monitor.
- Nonattainment areas are currently classified as Marginal.
 - Emissions inventory (submitted August 2020);
- Attainment deadline: August 2021 (to be based on data from 2018, 2019, & 2020)
- If the standard is not met, we will be bumped up to Moderate
- A Moderate SIP requires:
 - 15% reduction of both NO_x and VOCs (Ozone precursors);
 - Vehicle Inspection and Maintenance Program (population threshold);
 - Reasonably Available Control Technology installed on point sources; and
 - Demonstration of attainment by August 2024.

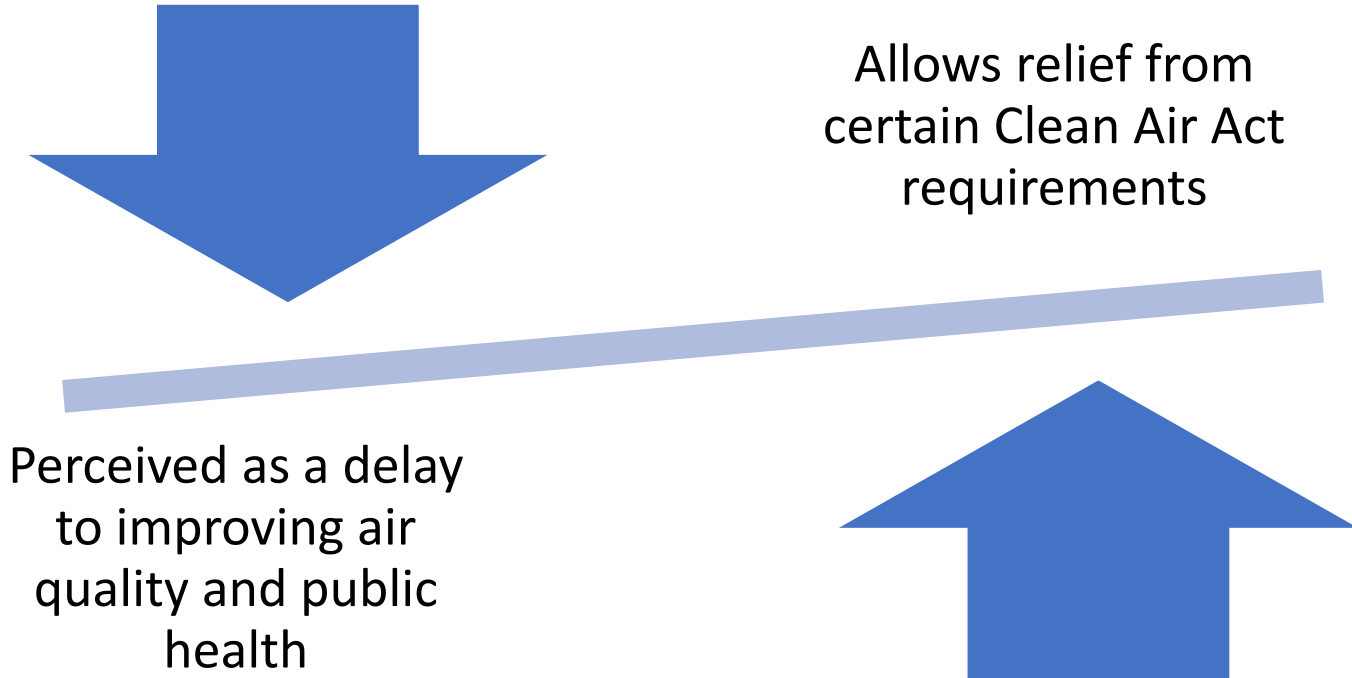
Utah Ozone Nonattainment Area Planning



Utah Ozone Nonattainment Area Planning

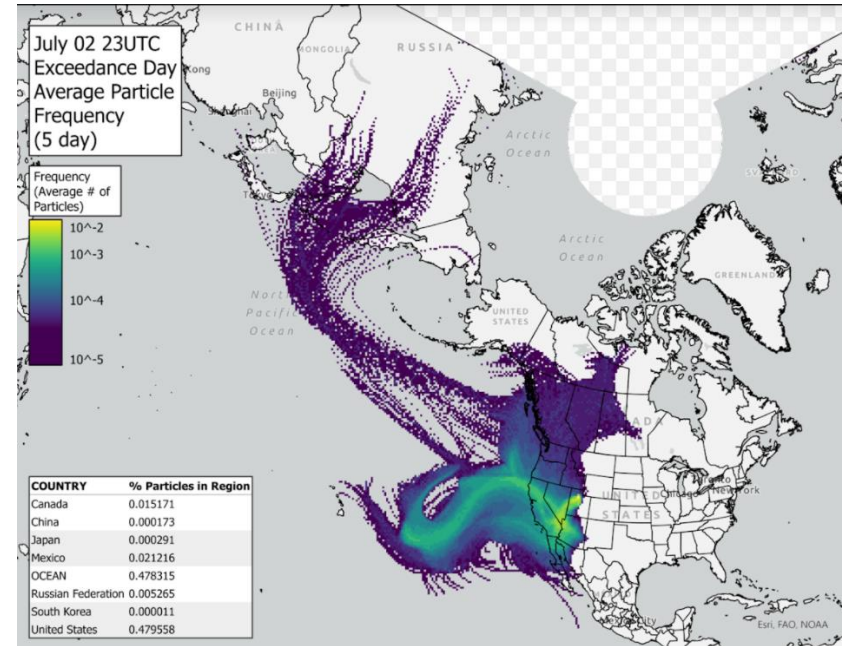


Clean Air Act Section 179 International Borders



International Transport – International Border Areas

Section 179 of the Clean Air Act allows relief from certain obligations for states with ozone nonattainment areas if they demonstrate to the satisfaction of the EPA Administrator that the area would comply with the air quality standard “but for emissions emanating from outside of the United States.”

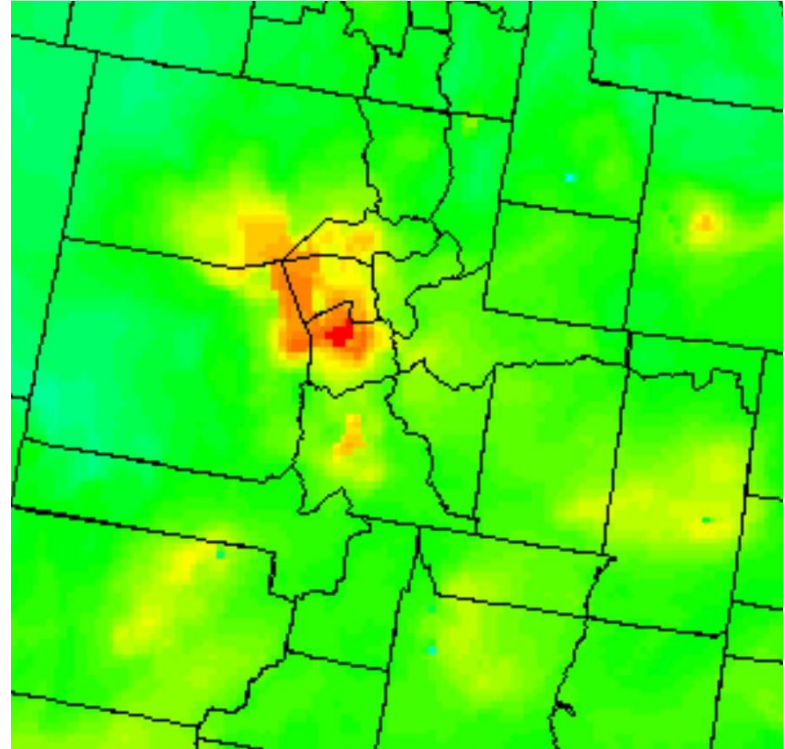


Guidance - <https://www.epa.gov/ground-level-ozone-pollution/international-transport-air-pollution>

Moderate vs Marginal designation for Utah

Allows more time to identify controls and understand ozone formation in Utah

Nearly all sources already meet the more protective BACT/BACM that is in place for VOC and nitrogen oxide under the State Implementation Plans for PM_{2.5}



179 (a) and (b) International Transport Options

Prior to 2021 Attainment Deadline

- Marginal requirements still apply
- Avoid bump-up to Moderate

Part of a Moderate SIP Attainment Demonstration

- SIP elements still required
- Not required to model attainment
- If approved, avoid bump-up to “Serious”

179B Demonstration

News and Announcements

Clean Air Act 179B(b) Demonstration Northern Wasatch Front Ozone Nonattainment Area

The Utah Division of Air Quality has submitted to the EPA its International Transport Demonstration, also known as 179B(b), for the Northern Wasatch Front Ozone Nonattainment Area. A 179B(b) demonstration provides relief from a bump-up in nonattainment status if the state can prove that the area would have met the National Ambient Air Quality Standard but for the influence of pollution emanating from an international source. A successful 179B(b) demonstration would prevent the Northern Wasatch Front from being reclassified from marginal to moderate status in the upcoming Determination of Attainment by Attainment Date, which is expected in the next year.

<https://documents.deq.utah.gov/air-quality/planning/air-quality-policy/DAQ-2021-005764.pdf>



179B Demonstration

In late 2020, EPA issued guidance on the preparation of demonstrations under 179B. The approach is novel because in the past 179B had only been used in states with an international border.

After prolonged discussions with EPA technical staff and early briefings to environmental advocacy stakeholders, DAQ identified three assessment tools that could test if there was a clear and causal connection to international emissions with ozone exceedances along the Wasatch Front.

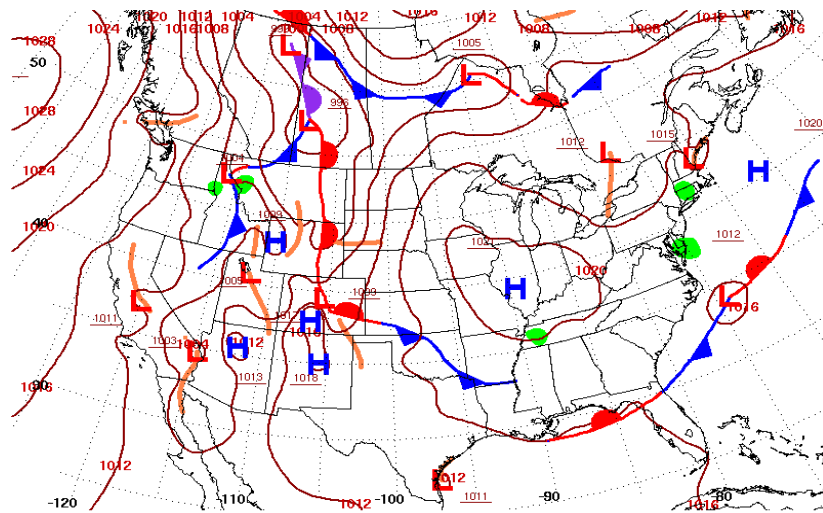
179B Demonstration - Analysis

- Synoptic analysis looked at storm front events that could quickly deliver international emissions to the Wasatch Front area and compare exceedance with non exceedance days
- Back trajectory analysis to see if there was an observed correlation between the movement of near-term air parcels with exceedance versus non exceedance days
- Global chemistry and meteorology modeling to apportion the local, US and international contribution to ozone exceedance days

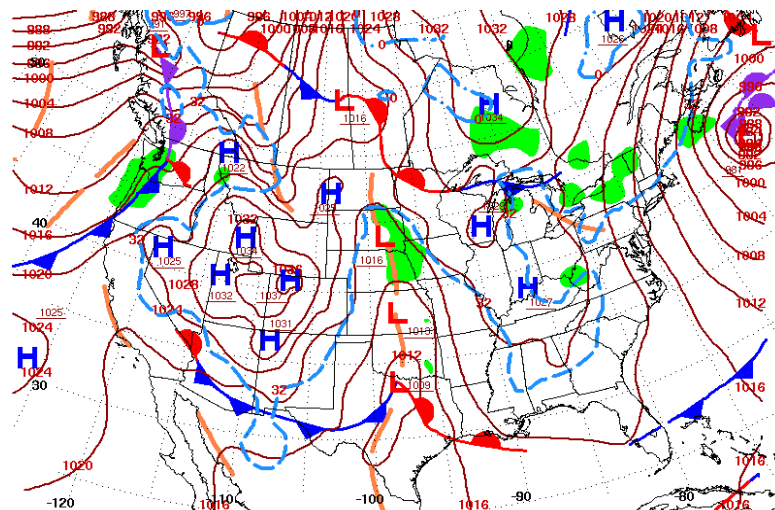
Tests one and two are most applicable to near border areas

179B Demonstration – Synoptic Analysis

Looks at surface air movement that can quickly bring emissions from long range sources



Surface Weather Map at 7:00 A.M. E.S.T.

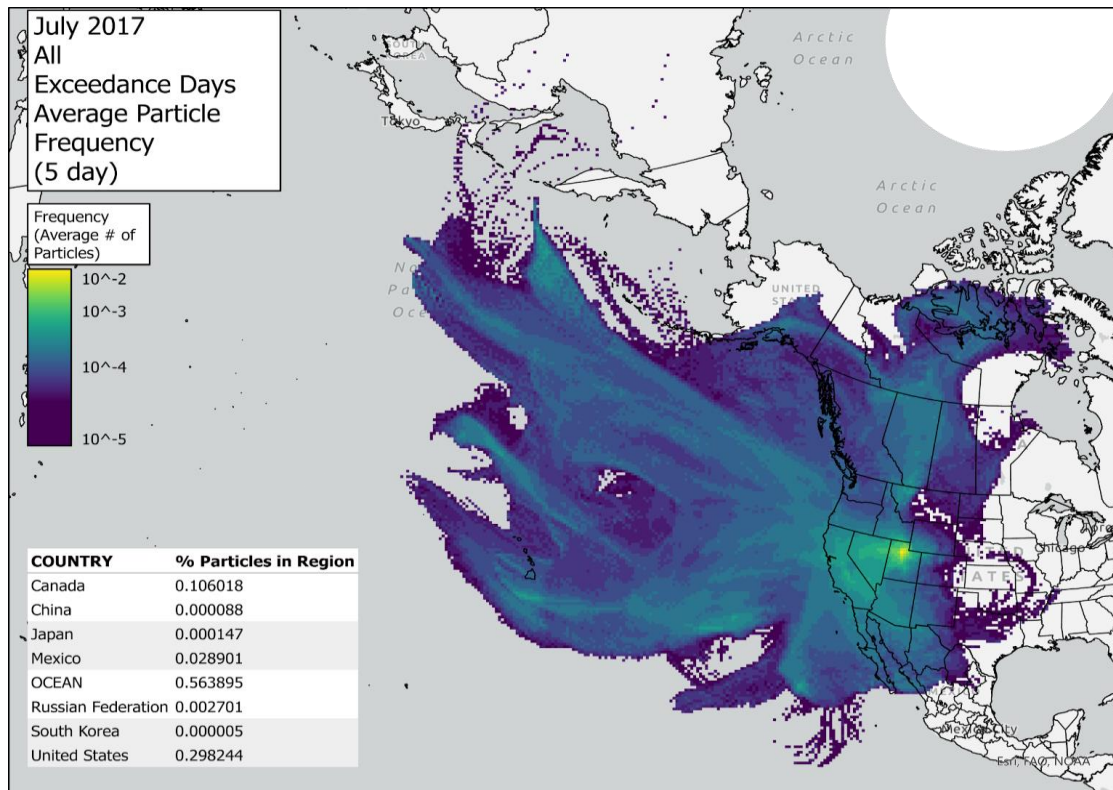


Surface Weather Map at 7:00 A.M. E.S.T.

Found that exceedance days were closely associated with periods of increasing stagnation with high pressure settling in across much of the inner mountain west.

179B Demonstration - HySPLIT Backward Dispersion Analysis

No significant difference in near term transport patterns between exceedance and non-exceedance days that would point to a specific location that was contributing air pollutant emissions to the Wasatch Front in the 5 days prior to an ozone exceedance event.



179B Demonstration – Global Photochemistry Model

In order to meet EPA's timeline for submitting a demonstration (6-months after the guidance was finalized) it was not possible for DAQ to complete global photochemistry modeling because the required inputs for boundary emissions inventories to cover the baseline period for the nonattainment designation were not available from EPA.

The Utah Petroleum Association and Utah Mining Association contracted with a national environmental consulting company, Ramboll, (the developer of EPA's photochemical air pollution computer model) to perform modeling with older data sets to provide a proof of concept that the contribution of international emissions could be determined and the preliminary results showed that "but for" the contribution of international emissions, the area would have attained the standard by the attainment date as required by CAA Section 179.

179B Demonstration – Global Chemistry Model

To evaluate the potential applicability of the Section 179B(b) provisions for the NWF NAA, Ramboll conducted a preliminary modeling analysis that quantitatively estimated the contribution from global international transport of ozone. They applied both the Community Multiscale Air Quality (CMAQ)⁴ and the Comprehensive Air quality Model with extensions (CAMx)⁵ photochemical models using EPA-derived meteorology and emission datasets representing conditions using the best available data set. They also considered two approaches, a sensitivity analysis and a source apportionment method.

Ramboll concluded that results from both approaches and models show that the Wasatch Front would attain the 70ppb ozone standard in the absence of international anthropogenic contributions

179B Demonstration – Submission

These three analyses taken together indicate that in the NWF, exceedances of the 8-hour ozone NAAQS typically occur on hot, atmospherically stable summer days and that international transport of ozone contributes consistently to background concentrations to the Wasatch Front, but does not increase in contribution on specific exceedance days.

Acknowledging that the technical rigor described in EPA's Section 179B guidance was not yet available, DEQ developed a full photochemical modeling protocol that will be able to quantify the contribution of transported ozone from international sources to ozone levels in Utah and requested that EPA review the preliminary information contained in the submission and provide definitive feedback on the following:

1. Can the novel interpretation of 179B(b) for the NWF result in a satisfactory demonstration?
2. If yes, is the additional modeling exercise outlined in this packet required for a satisfactory 179B(b) demonstration, or are the materials contained herein sufficient?