Kennecott Utah Copper LLC
4700 Daybreak Parkway
South Jordan, Utah 84095
USA
T 801-204-2128
F 801-204-2888

Chris Kaiser
Principal Advisor
Environmental Permitting and Regulations
Kennecott Utah Copper

March 24, 2014

Dr. Christopher H. Frey
Chair
Clean Air Scientific Advisory Committee
EPA Science Advisory Board (1400F)
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW.
Washington, DC 20460

Re: CASAC Review of Draft Ozone Policy Assessment

Dear Dr. Frey:

Kennecott Utah Copper LLC (KUC) submits the following comments for consideration by the Clean Air Scientific Advisory Committee (CASAC) in its review of draft of EPA's draft "Policy Assessment for the Review of the Ozone National Ambient Air Quality Standards" (NAAQS), (January 2014) ("PA"). A subsidiary of Rio Tinto, KUC mines essential elements that make modern living possible.

Our comments on the draft PA focus on the discussion of ozone background levels. We believe that the draft understates the potential for exceedances caused by ozone background concentrations in Utah and other portions of the intermountain West. Recent studies performed by the Utah Department of Air Quality and others demonstrate that portions of this area currently are exceeding the short-term primary standard of 75 ppb as a result of background levels, and many more would exceed a standard set at 70 ppb or lower.

The draft PA notes that the largest background concentrations generally are found in that area, and that there can be events where background concentrations reach or exceed 60-75 ppb. However, these events are described as "relatively infrequent" and capable of being addressed by EPA's Exceptional Events rules (Draft PA at 2-27). To the contrary, current data indicate that a revised standard would frequently be exceeded in some portions of the intermountain West and that the exceptional events rule is not an adequate tool for addressing this problem.

Zhang et al. (2011) found a significant increase in ozone background concentrations compared to prior work, particularly in the intermountain West.[1] The 2011 study found that values are typically 35-45 ppb in the East and on the West Coast but 50-60 ppb in the intermountain West. It also found that in this area, the background is higher than average when ozone exceeds 60 ppb. These finding led the authors to conclude:

> If the NAAQS is lowered in the 60-70 ppbv range, areas of the intermountain West will have little or no ability to reach compliance through North American regulatory controls . . . Whereas previous GEOS-Chem studies found no occurrences of PRB ozone exceeding 60 ppbv, we find here some occurrences in the intermountain West. The high PRB values in that region compared to the proposed revisions of the ozone NAAQS (60-70 ppbv) suggest that special consideration may be needed in the NAAQS-setting process.

Recent studies by the Utah Division of Air Quality (DAQ) have replicated and expanded upon these findings with respect to Utah and other western states. The attached presentation on recent ozone background trends in UT, CO, AZ WY and ID demonstrates significant exceedance of 70 ppb, and often 75 ppb, in rural areas throughout these states.[2] Several causes are listed for these results:

- Transport of ozone or precursors from Asia, especially during the spring. Asian impact is increasing by 0.63 ppb/yr (Cooper et al., 2010 Nature).
- Stratospheric intrusion, especially at higher altitude sites.
- Very high impacts occur when a front moves through an area, and the impact is not limited to that short-term event. Higher ozone occurs across a broad area for several days.
- Wildfires.
- Altitude and topography.

[1] Zhang et al., "Improved estimate of the policy-relevant background ozone in the United States using the GEOS-Chem global model with ½ x 2/3 horizontal resolution over North America," Atmospheric Environment 45 (2011) 6769-6776.
[2] Background Ozone, Presentation to Utah Air Quality Board July 3, 2013, Colleen Delaney, Utah Division of Air Quality.

A more detailed snapshot of ozone concentrations in rural areas near the Great Salt Lake is provided in the attached presentation on the results of special ozone studies conducted by the UT DAQ in 2010-2012.[3] Twenty-seven sites were monitored in rural areas, near the Great Salt Lake and in nearby mountain valleys. The mountain valley sites showed 12 exceedances of 70 ppb, including 7 exceedances of 75 ppb. The Great Salt Lake zone had three sites exceeding 75 ppb on 28 different occasions. The rural sites had 4 exceedances of 70 ppb, with one exceeding 75 ppb. The causes to which these concentrations were attributed are similar to those discussed above, with the added point that the Great Salt Lake itself enhances ozone formation.

These ozone concentrations attributed primarily to background in Utah and other states should be discussed in the final PA, which should include an expanded discussions of the extent to which a revised zone standard is likely to be exceeded by background concentrations in the West. Contrary to the current draft, the PA also should conclude that this issue cannot be addressed adequately through EPA's Exceptional Event Rule (EER). The EER has not been effective to date in excluding background concentrations from determinations of NAAQS attainment. The application process is extremely complex and time consuming, and applications by Utah for EER exclusions have routinely been denied by EPA regional officials following years of work by state and industry staff. Among other things, the following criteria must be satisfied for exclusion under the EER:

- The event was not reasonably controllable or preventable;
- The event was caused by human activity that is unlikely to recur at a particular location, or was a natural event;
- There exists a clear causal relationship between the specific event and the monitored concentration;
- The event is associated with a measured concentration in excess of normal historical fluctuations including background;
- There would have been no exceedance or violation but for the event.

As is readily apparent, few if any ozone exceedances caused by background concentrations would qualify for exclusion under these criteria, if only because the criteria themselves require the event to have exceeded normal background.

It is imperative that the final PA provide an accurate discussion of the extent to which a revised ozone standard would be exceeded by background concentrations in the intermountain West and other areas. This is especially true

[3] Utah special Ozone Studies 2010-2012, Seth Arens, Air Monitoring Section.

given the causes of elevated background levels discussed above. The mandatory measures currently required in the Clean Air Act were designed to solve urban ozone problems from 20 years ago and would not be effective in addressing today's zone background issues in the West. Background levels in the West are higher and more pervasive than EPA has indicated in the draft PA and it will not be possible in many cases to demonstrate attainment of a revised ozone standard. Yet if attainment cannot be demonstrated, sanctions will be applied and state regulators will be required to pour scarce resources into an effort that is doomed to fail.

We rely on the Committee to ensure that EPA's interpretations of the scientific evidence are reasonably balanced and necessary to protect public health and welfare, without causing the unnecessary economic dislocation that will surely result if the scientific studies are unduly stretched. We urge you to recommend revision of EPA's approach to ozone background levels, and we thank you for considering these issues of vital importance to our industry and the people who rely on it.

Respectfully submitted,

/s/Chris Kaiser

Chris Kaiser

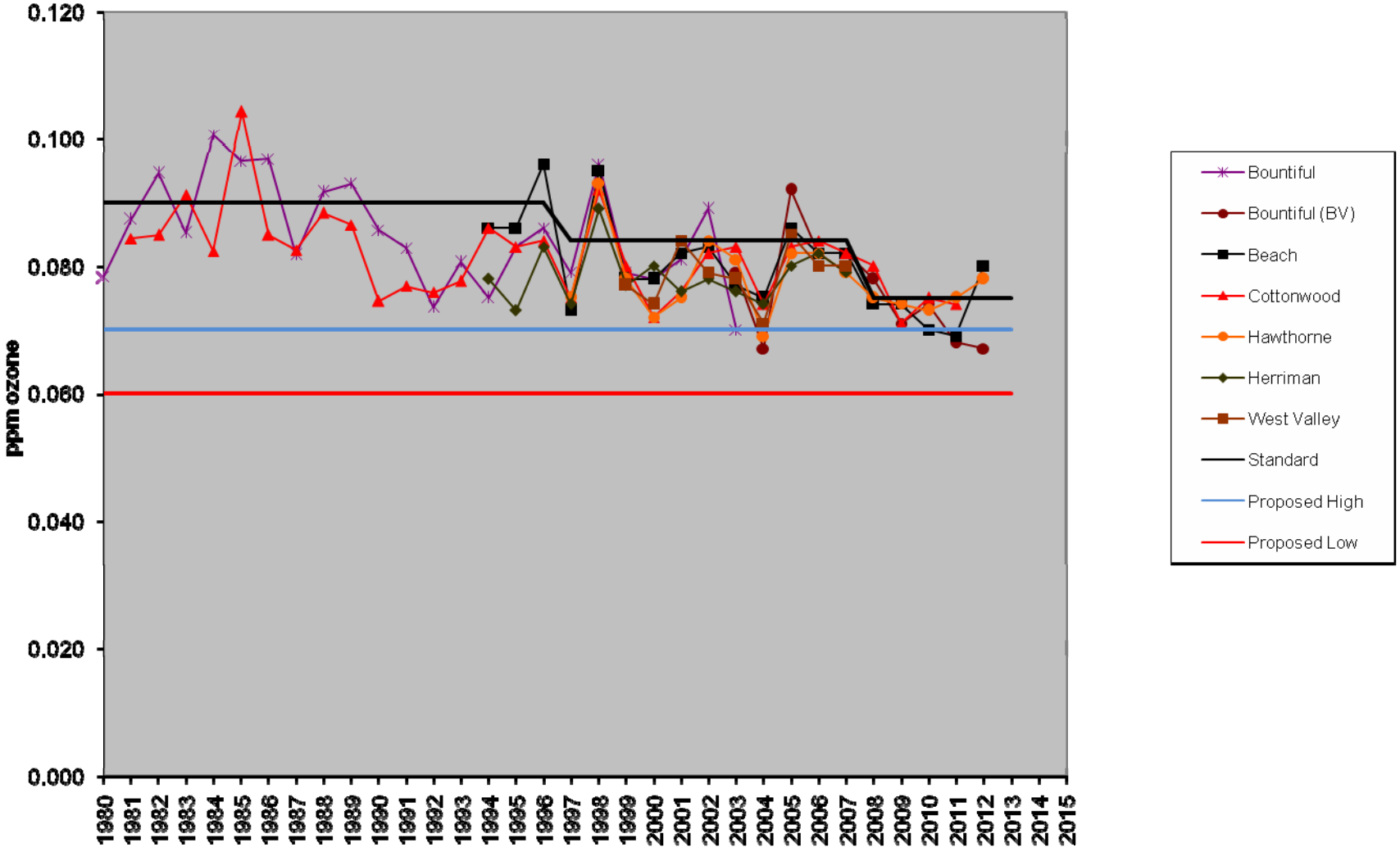
Principal Advisor
Environmental Permitting and Regulations
Kennecott Utah Copper

Background Ozone

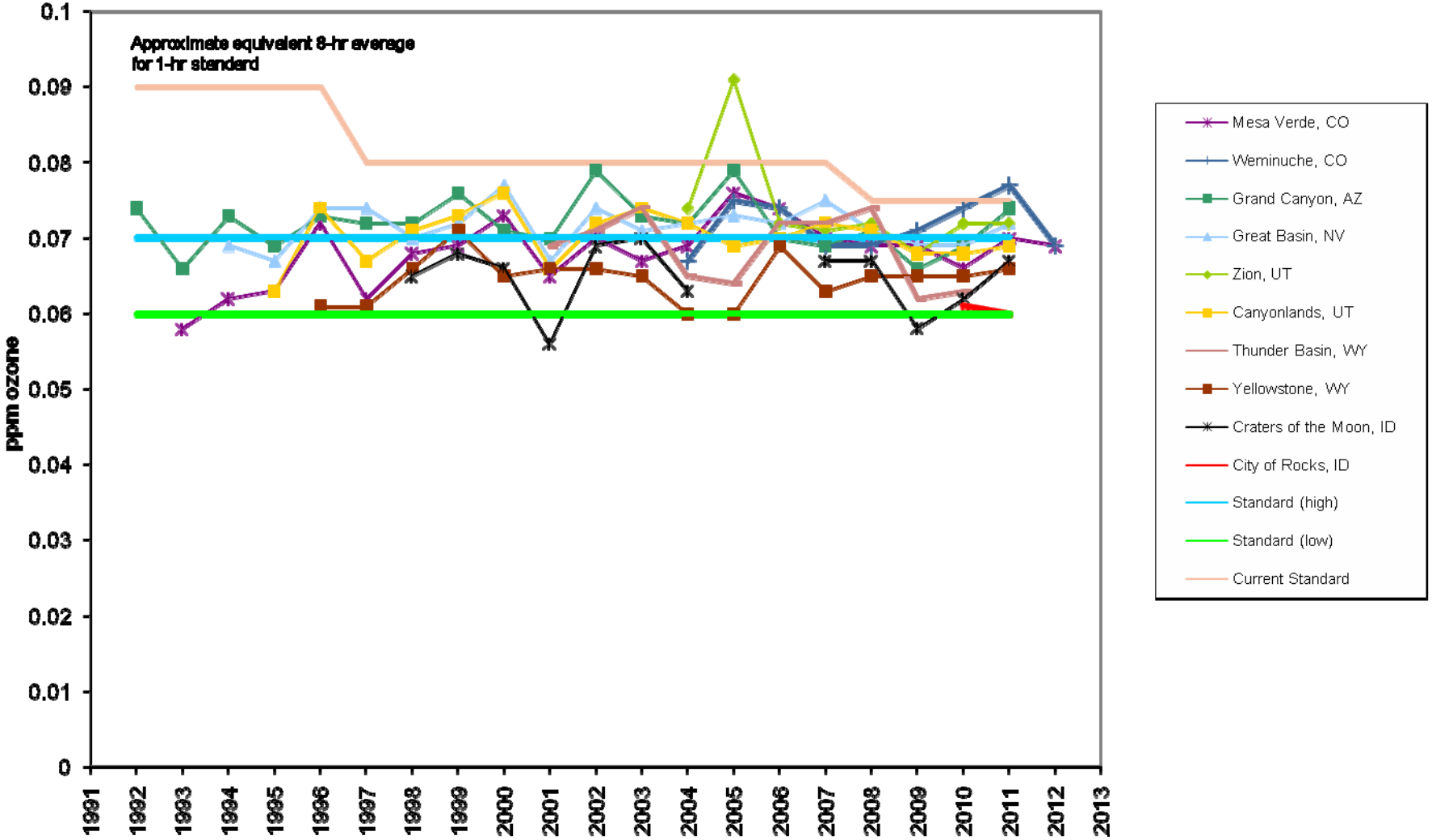
Presentation to Utah Air Quality Board
July 3, 2013

Colleen Delaney, Utah Division of Air Quality

4th High, Daily Maximum, 8-Hour Ozone Trends

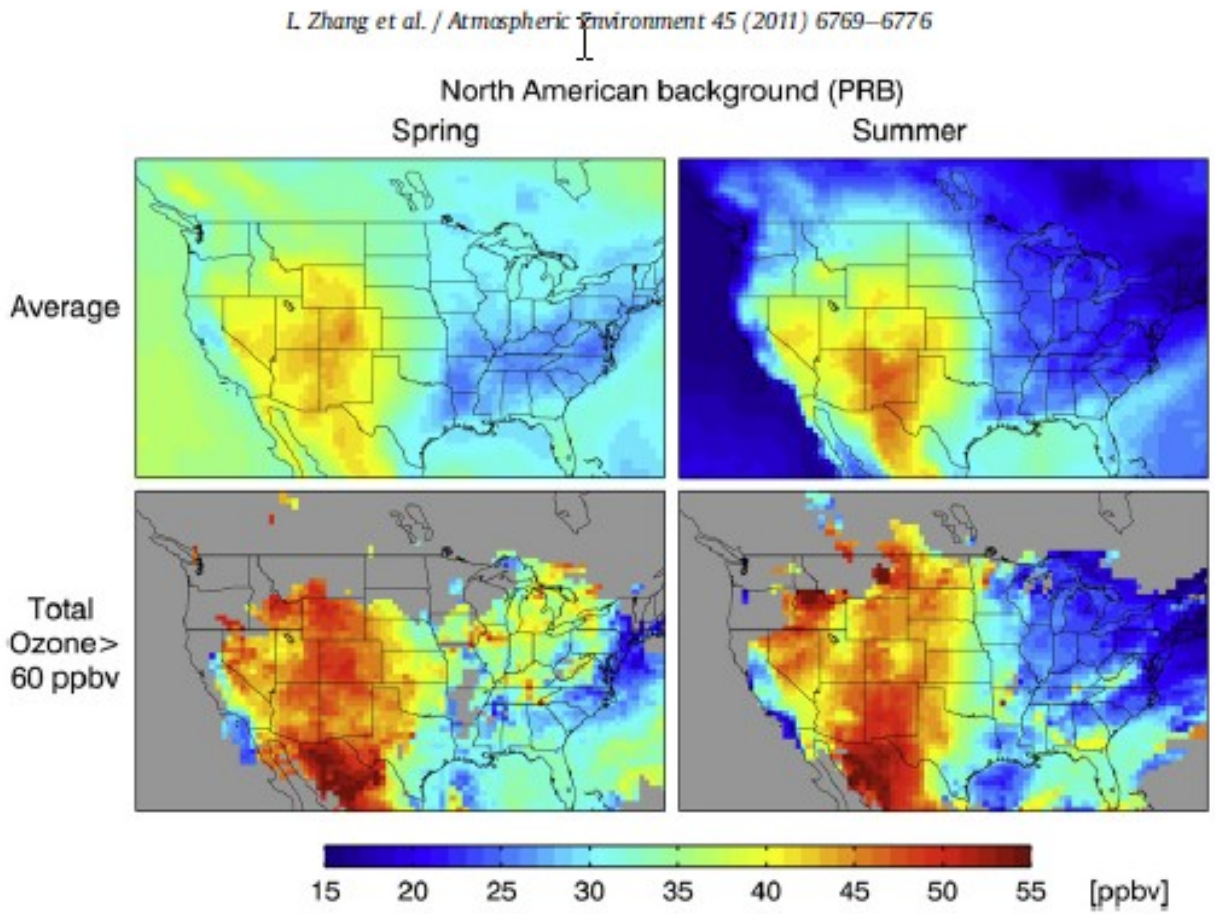


4th High, Daily Maximum Ozone Value at Rural Monitors



Background Ozone

- Background ozone levels in the west are high.
  - Transport of ozone or precursors from Asia can have a significant impact, especially during the spring.
    - Asian impact is increasing by 0.63 ppb/yr (Cooper et al., 2010 Nature)
    - Impact is concentrated in western US
  - Stratospheric intrusion can have a significant impact, especially at higher altitude sites.
    - Very high impacts when a front moves through an area
    - Impact is not limited to that short-term event. Higher ozone occurs across a broad area for several days
    - Stratospheric intrusion and mixing occur on an on-going basis even without these events
  - Wildfires have a significant impact on ozone levels. Interannual variability corresponds to variability in fire. (Jaffe, Wigden, 2012 Atmospheric Environment)
  - Altitude and topography are important factors in ozone levels.
  - Background levels in the intermountain west are increasing (Cooper et al., 2012 Journal of Atmospheric Sciences)
- There is a lot of good research regarding what is contributing to ozone levels in the west, but the monitoring equipment and research centers are not widespread.
- Funding for monitoring, research, and regional modeling is decreasing rather than increasing.



Zhang, et al., 2011 used GEOS Chem modeling to show North American background ozone. Values are significantly higher in the intermountain west.

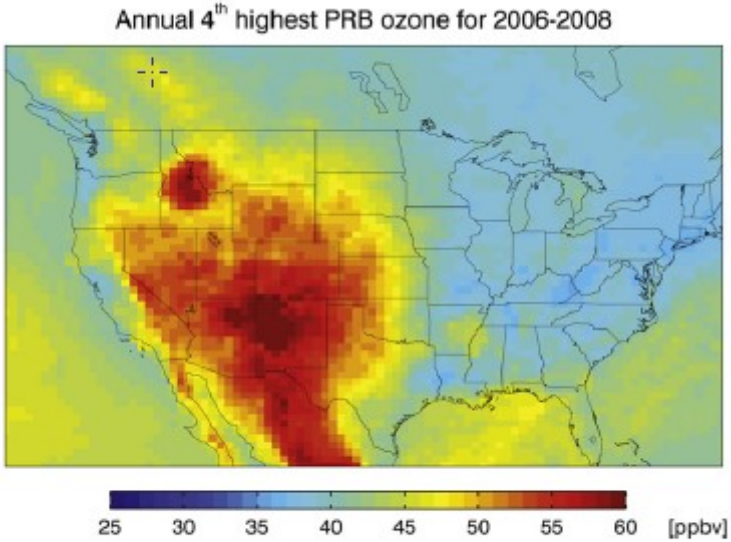
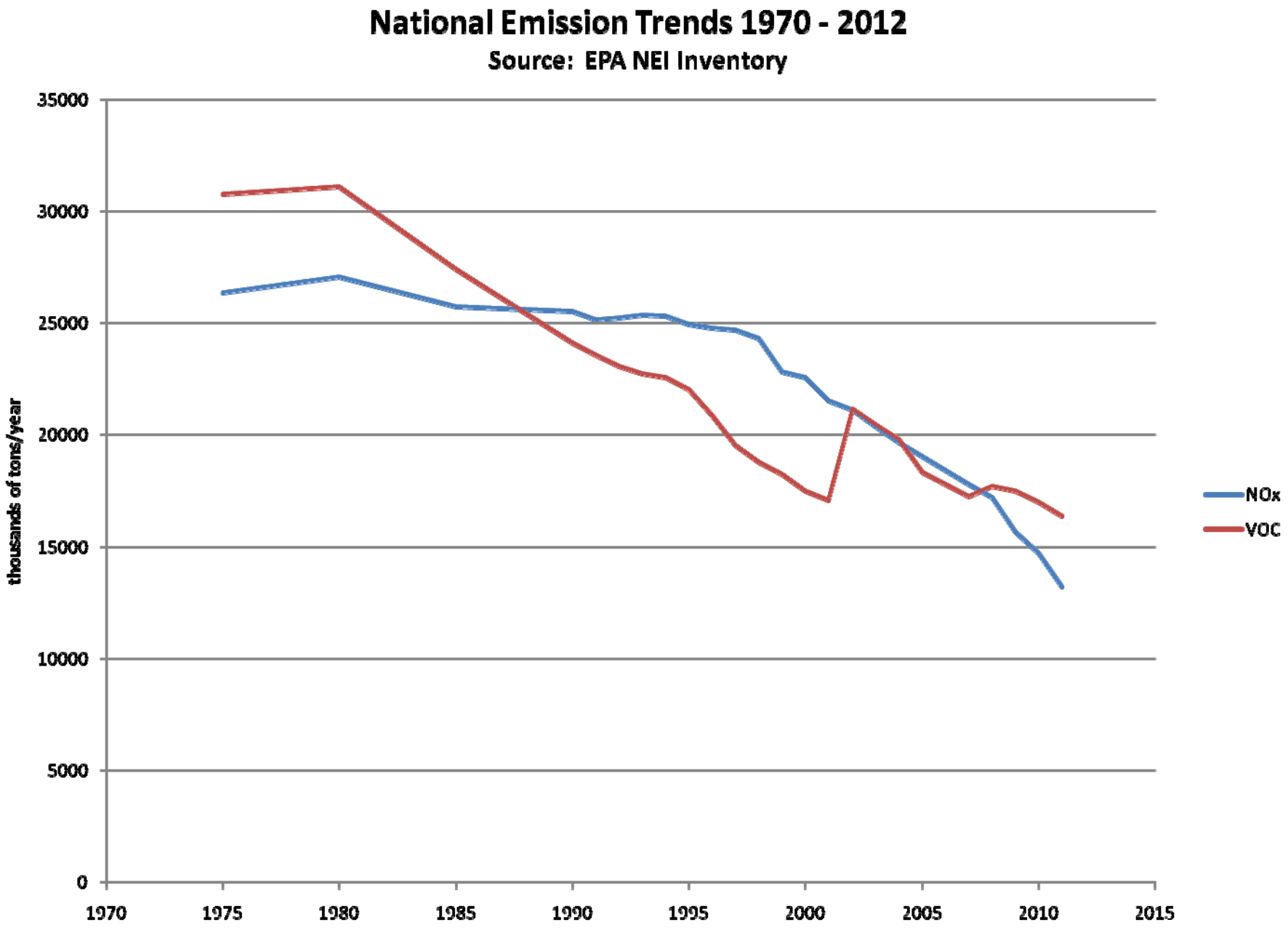


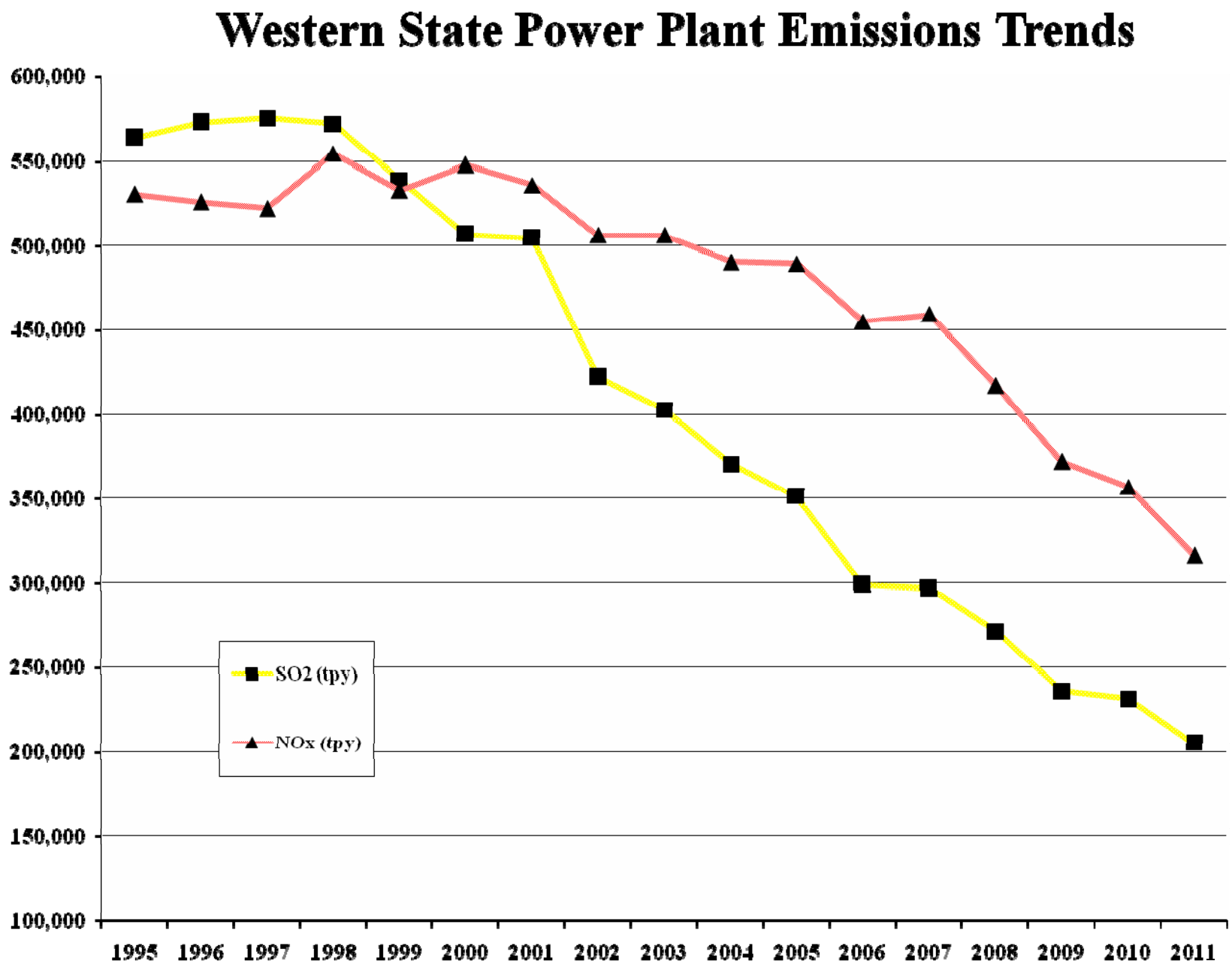
Fig. 7. Annual 4th-highest value of North American background ozone (PRB) calculated in GEOS-Chem as daily 8-h max and averaged for 2006–2008.

Zhang et al., 2011
Atmospheric Enviroment

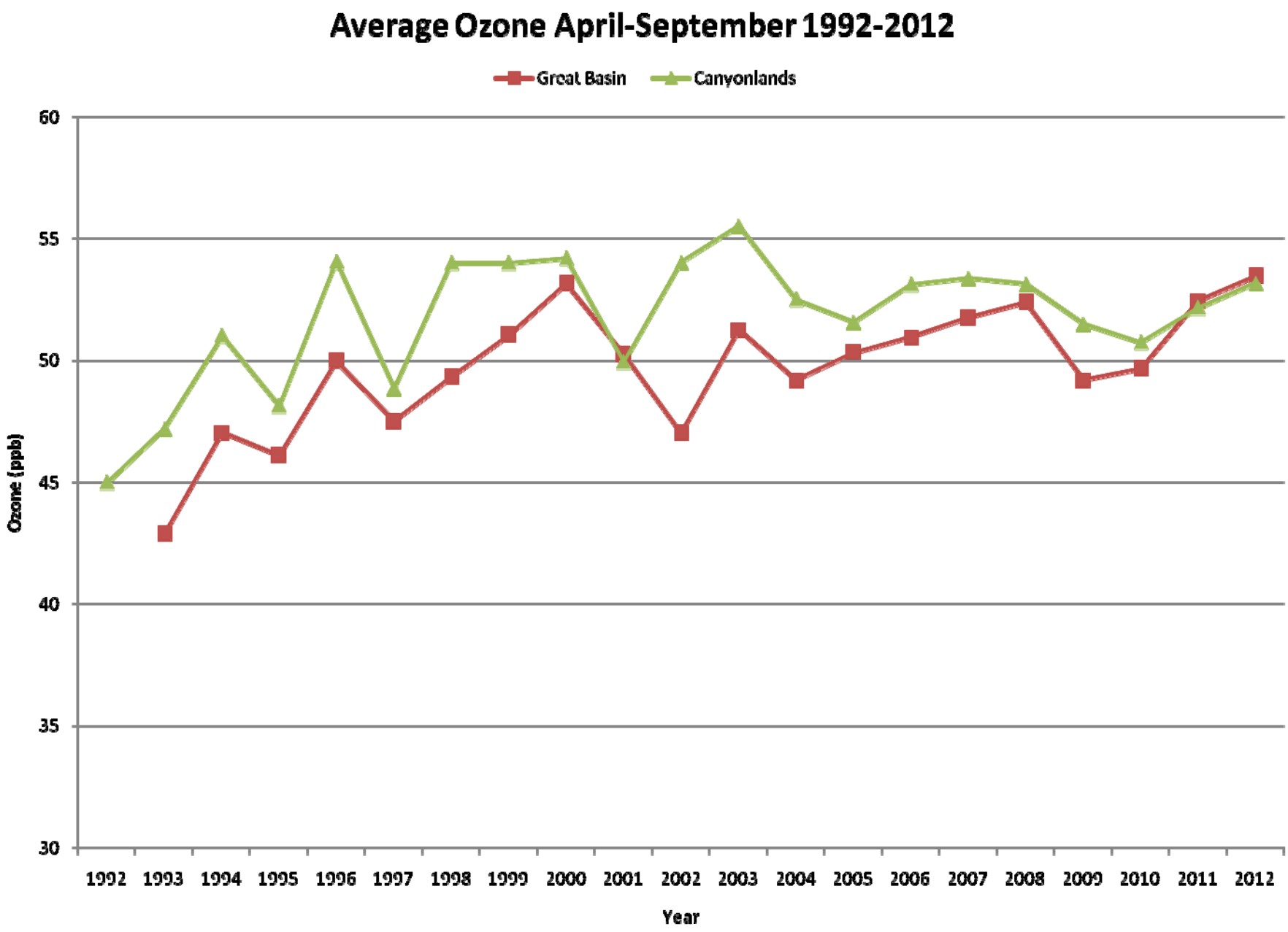
North American background (PRB) represents the minimum standard achievable through suppression of North American anthropogenic emissions.

"The high PRB values in [the Intermountain West] compared to the proposed revisions of the ozone NAAQS (60-70 ppbv) suggest that special consideration may be needed in the NAAQS-setting process."


National Emission Trends 1970 - 2012
Source: EPA NEI Inventory
thousands of tons/year
35000
30000
25000
20000
15000
10000
5000
0
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
NOx
VOC



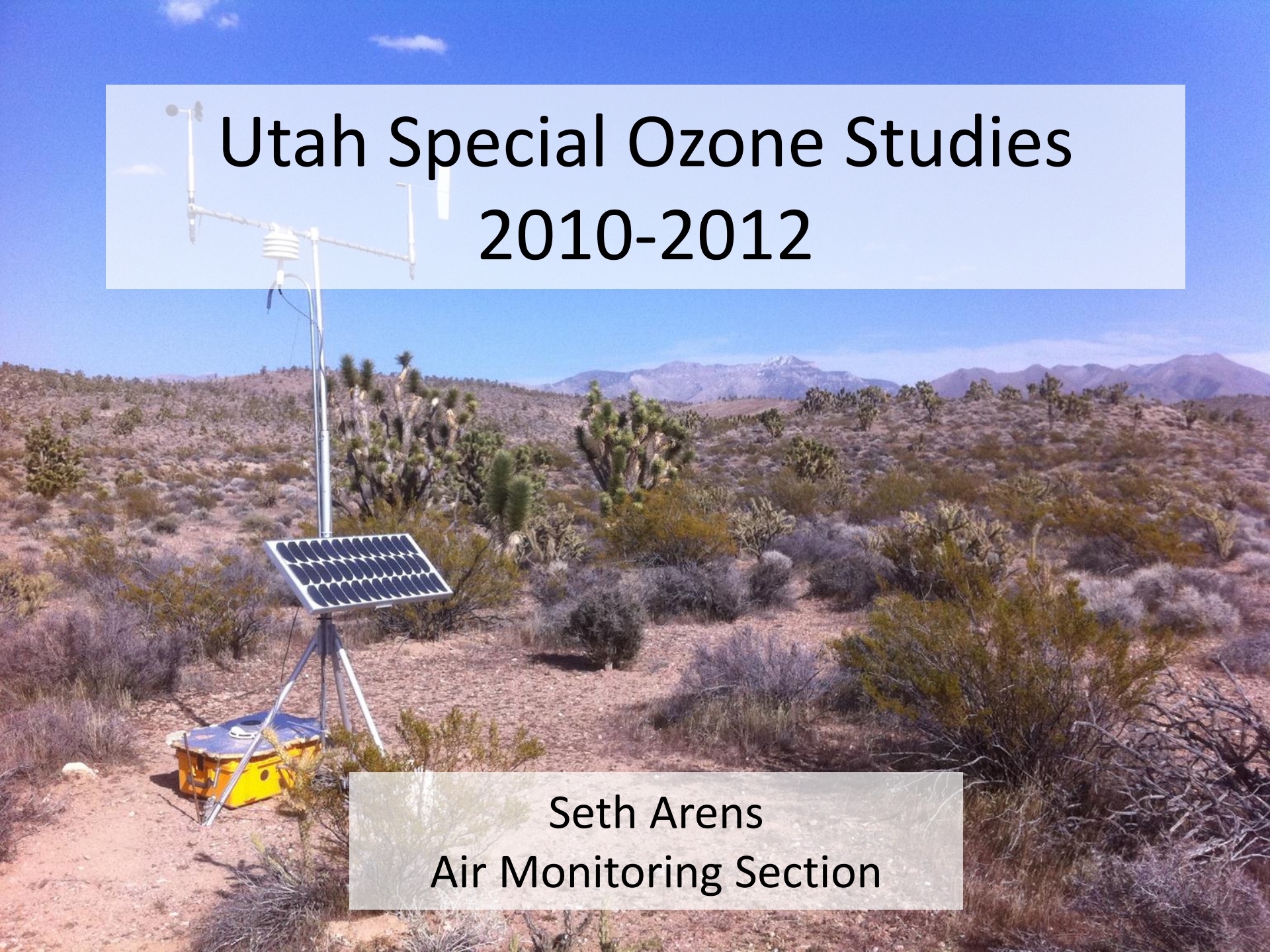
Data from EPA Clean Air Markets Division


Average Ozone April-September 1992-2012
Great Basin
Canyonlands
Ozone (ppb)
60
55
50
45
40
35
30
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year

Clean Air Act Requirements

- Mandatory measures required by the CAA
  - Designed to solve urban ozone problem from 20 years ago
  - Focus on mobile sources and fuels
  - Nonattainment NSR – makes no sense in areas affected primarily by transport
  - Mandatory VOC reductions
  - Transportation and general conformity
- Background levels are high – it may not be possible to show attainment in many areas
  - Mandatory bump-ups require more urban area controls
- If a state can't demonstrate attainment, then sanctions are applied
- This process guarantees failure for many areas in the west

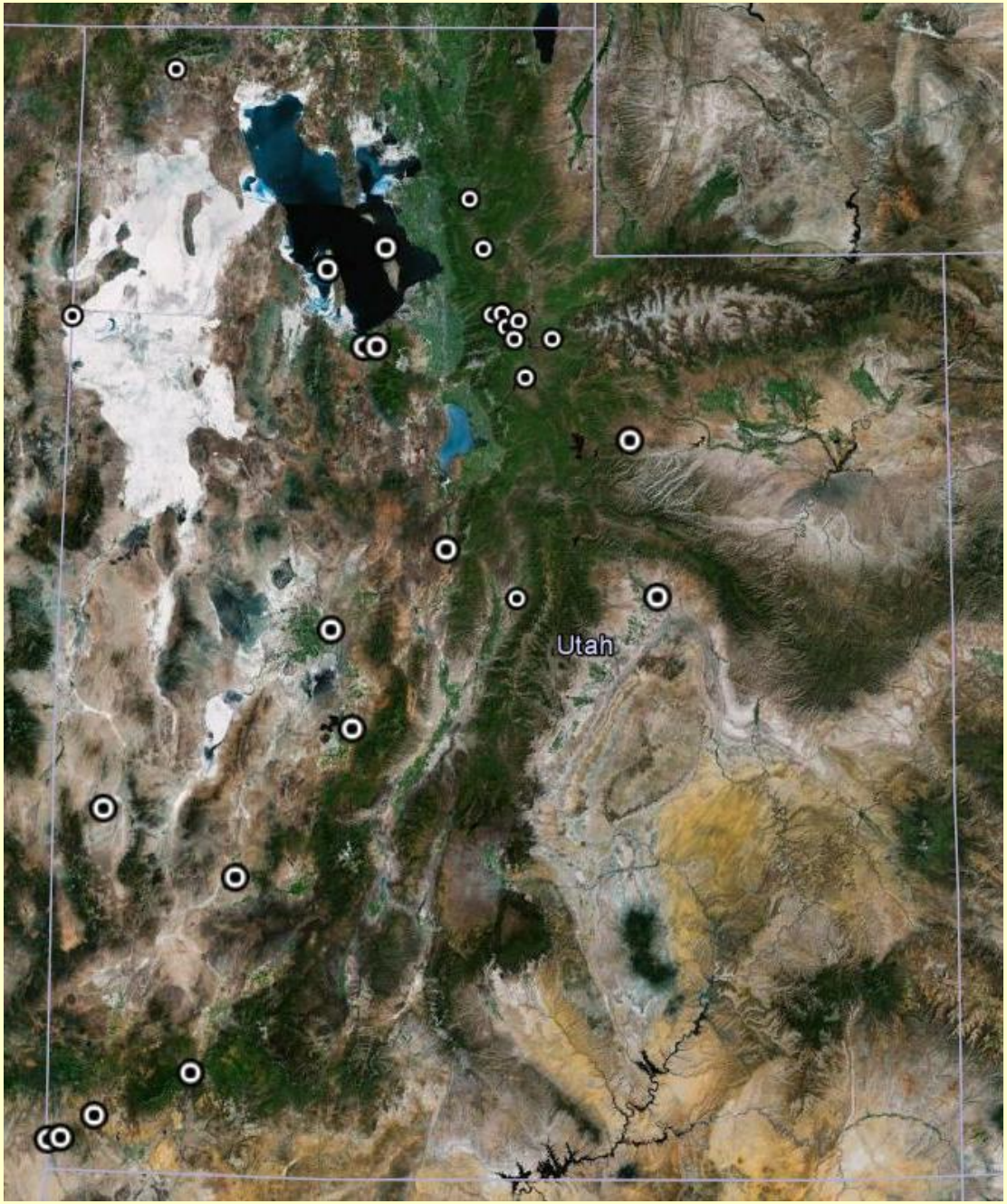
Utah Special Ozone Studies 2010-2012



Seth Arens
Air Monitoring Section

Overall Project Goals

- Assess ozone nonattainment area
- Assess rural Utah ozone
- Estimate impact of transport on Utah ozone
- Assess role of GSL on ozone formation



2010-2012

- 27 sites
  - Rural Utah
  - GSL sites
  - Mountain valleys
- 2 years at 9 sites
- 3 years at 2 sites
  - Silver Summit
  - Erda

Ozone studies in 2012

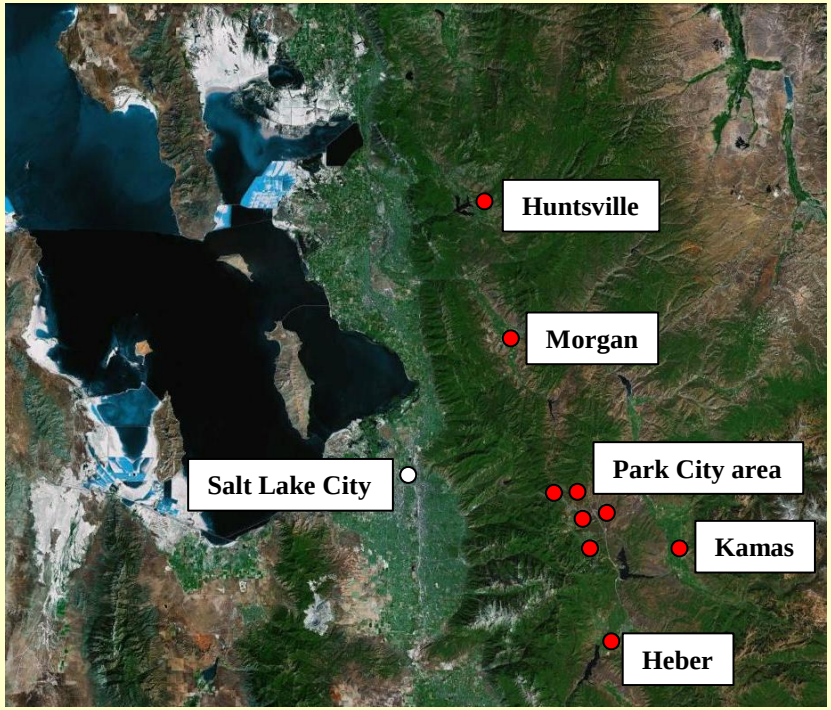
1. Mountain valley ozone saturation study
2. Tooele Valley ozone saturation study
3. Rural ozone

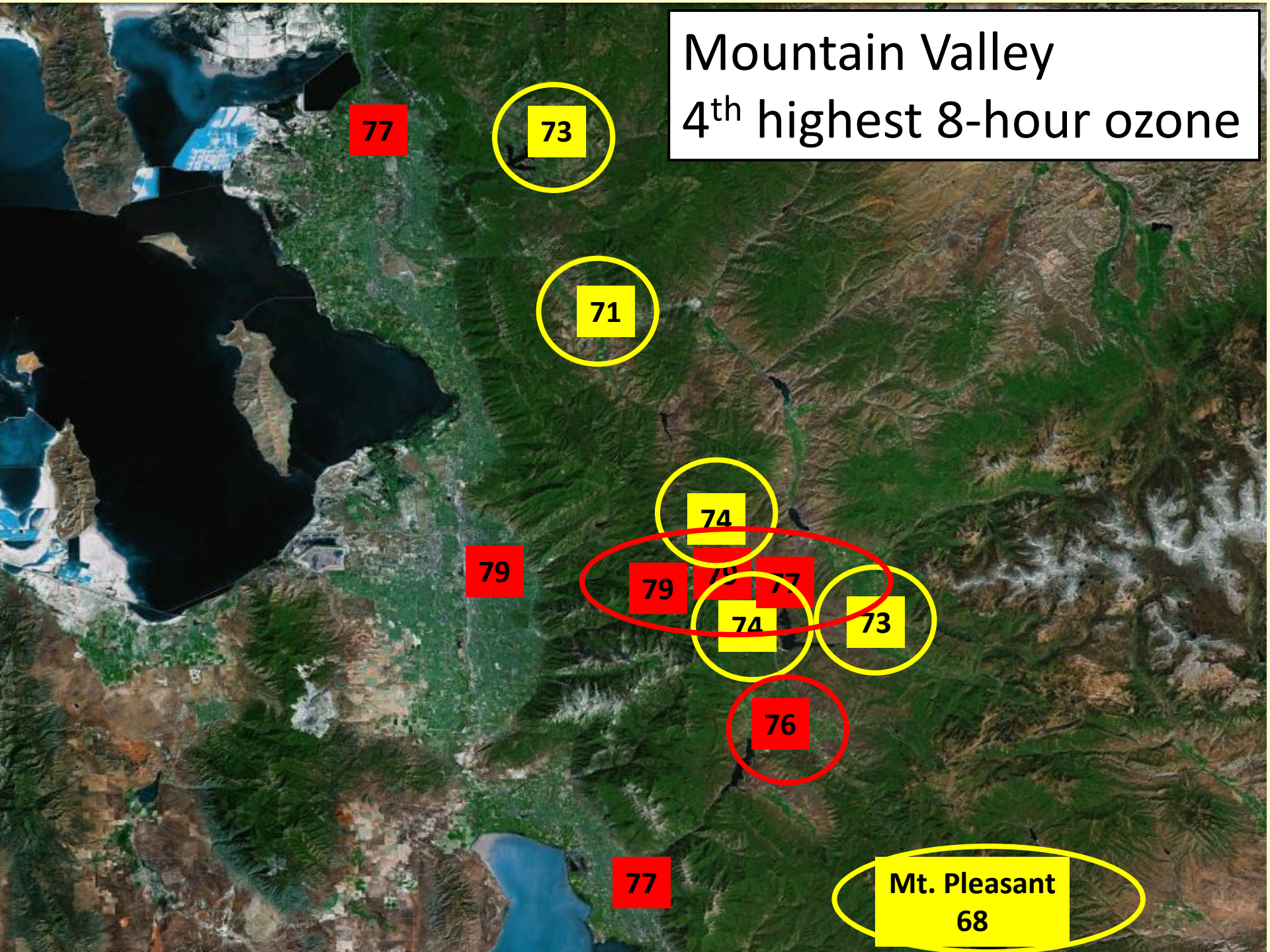
Federal (EPA) Ozone Standard

- Ozone National Ambient Air Quality Standard
  - **NAAQS**
  - **75 ppb**
  - 4th highest, daily maximum, 8-hour average
  - Averaged over 3 years
- 5-Year review of NAAQS
  - EPA *likely* to lower to **60 - 70 ppb**
  - Secondary standard to protect vegetation (W126)

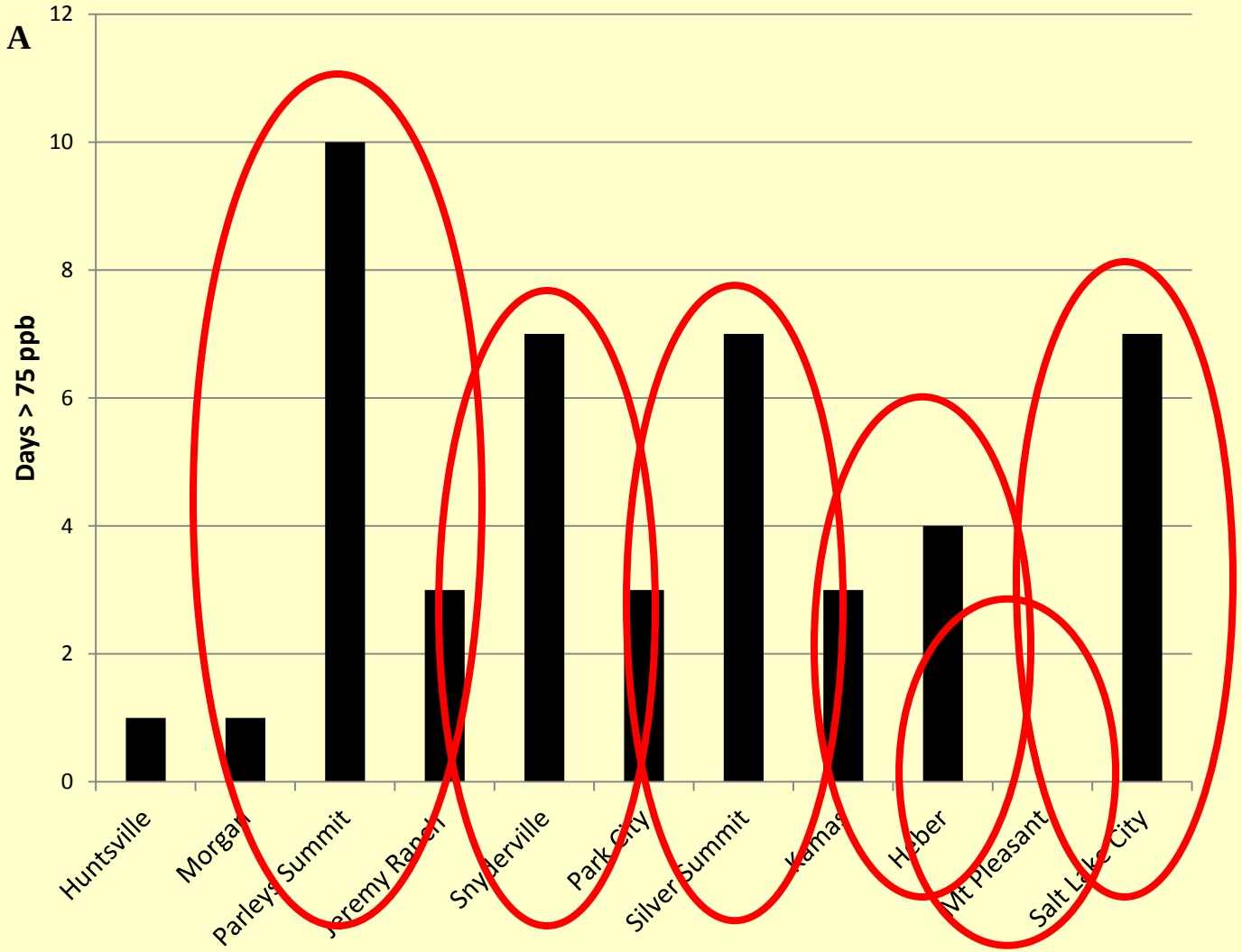
Mountain Valley ozone sites

- Huntsville
- Morgan
- Parleys Summit
- Jeremy Ranch
- Snyderville
- Park City
- Silver Summit
- Kamas
- Heber



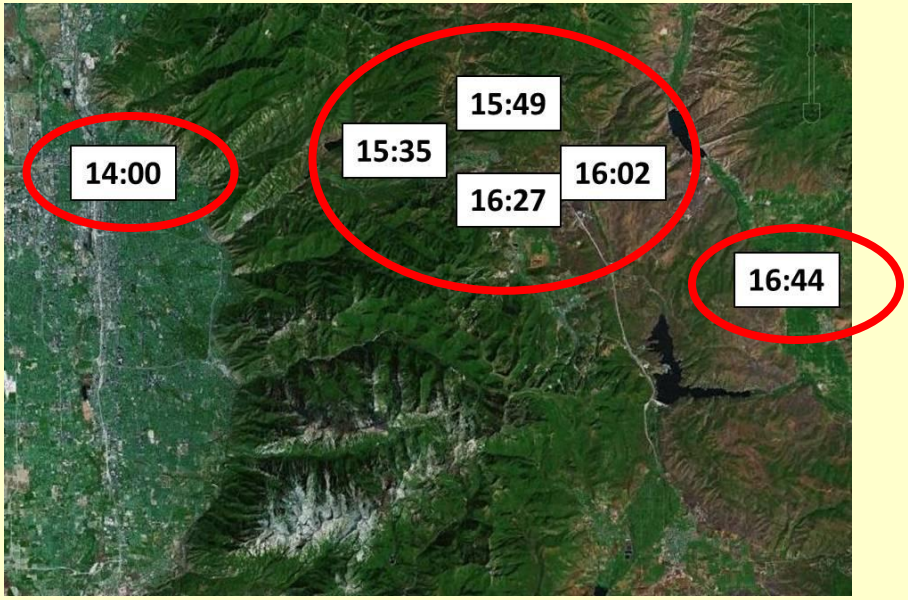

Mountain Valley
4th highest 8-hour ozone
77
73
71
74
79
79
77
74
73
76
77
Mt. Pleasant
68

Mountain Valley – Days > 75 ppb



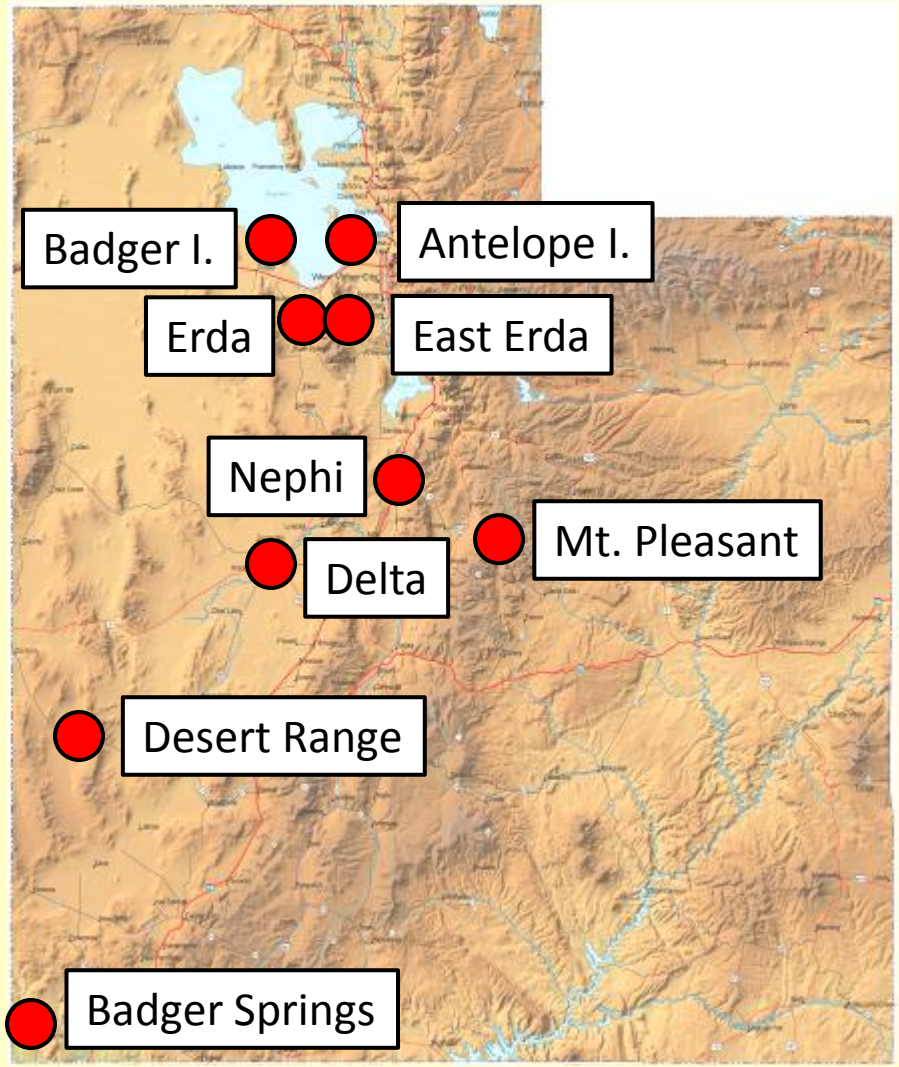
Why high ozone in mountain valleys?

- Transport from SLC
  - Ozone and precursors
  - Wind patterns
  - Timing of ozone peak
  - Jeremy Ranch to Kamas
- Higher solar radiation
  - 57% higher than SLC
- Biogenic VOCs??



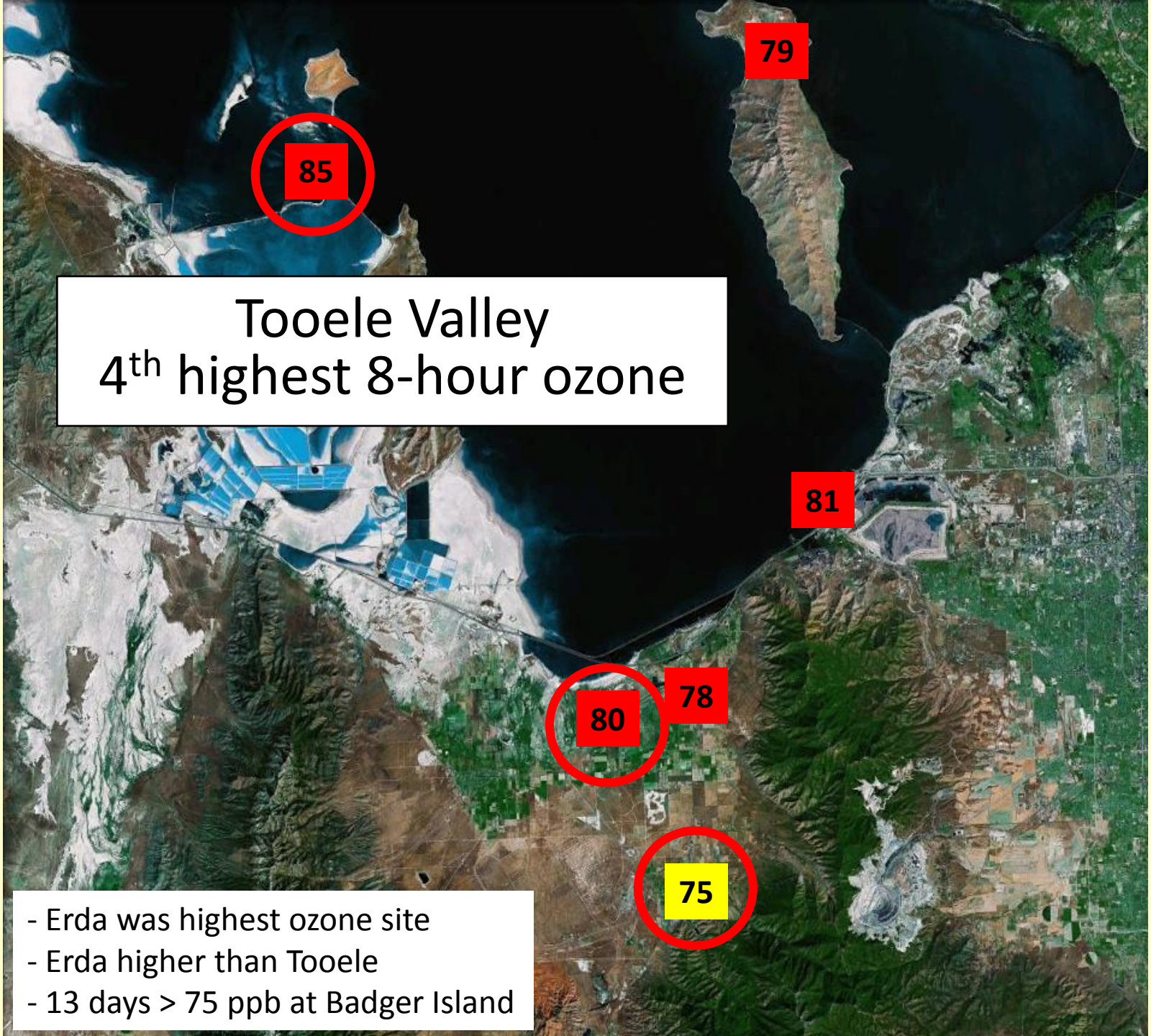
Tooele Valley and rural ozone sites

- Badger Island
- Erda
- East Erda
- Antelope Island
- Mt. Pleasant
- Nephi
- Delta
- Desert Range
- Badger Springs



High GSL ozone

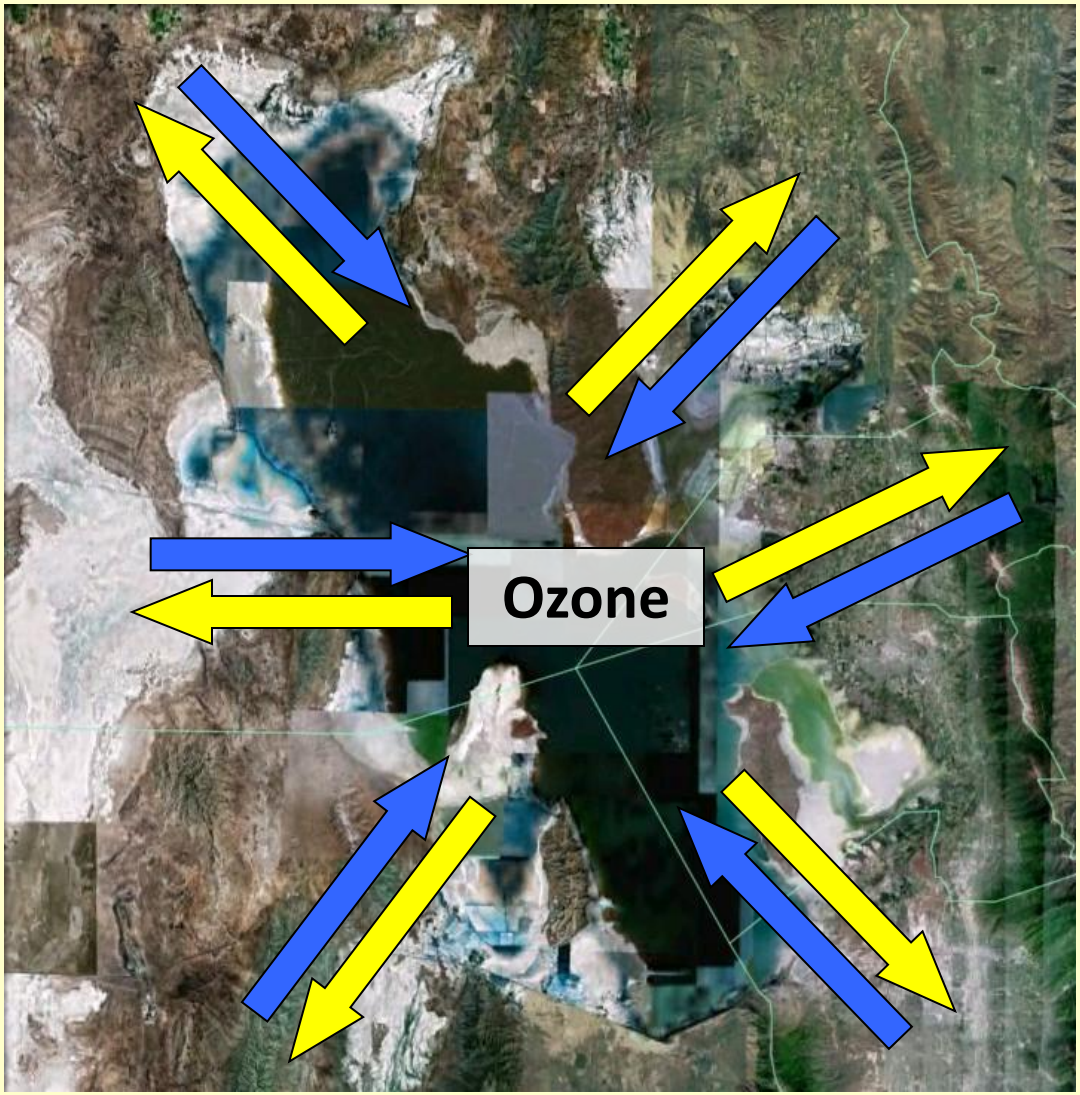
- Erda
  - 77 ppb (2010-1012)
  - 6 days > 75 ppb
- Badger Island 2012
  - 13 days > 75 ppb
- Antelope Island 2012
  - 9 days > 75 ppb



Tooele Valley
4th highest 8-hour ozone

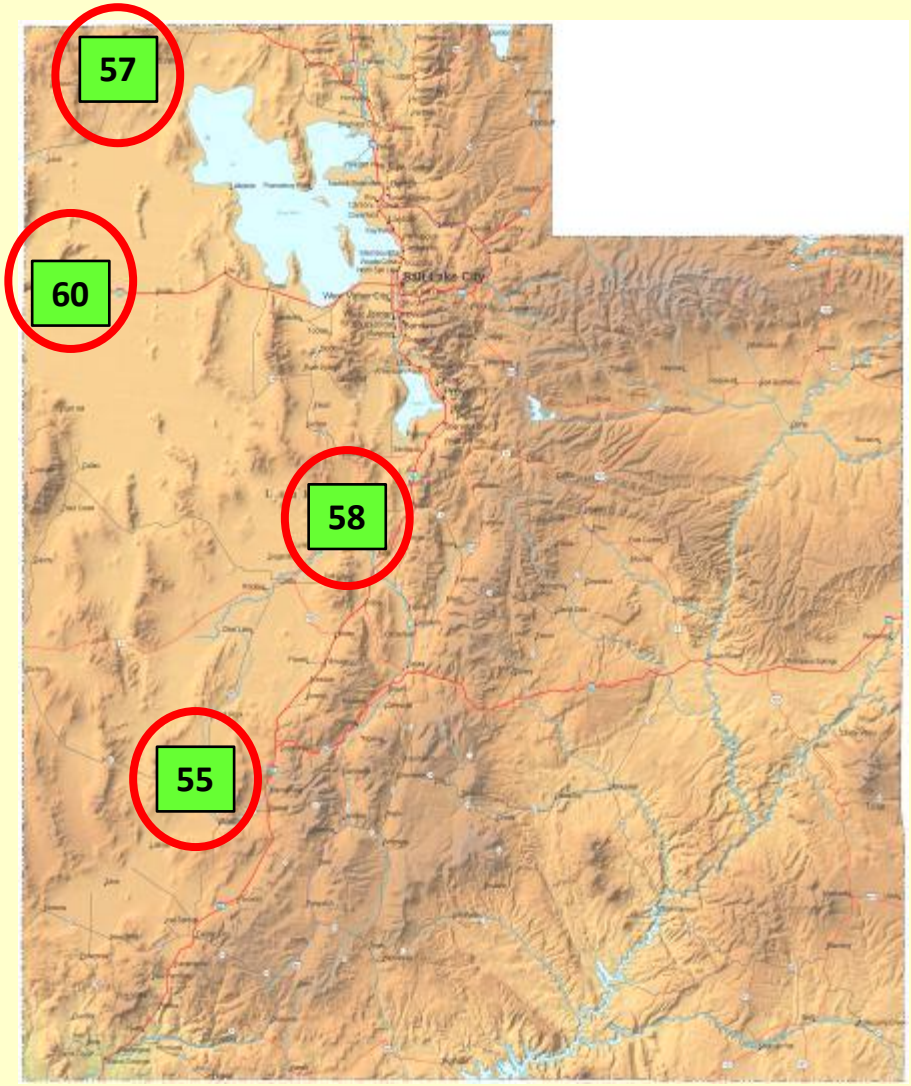
- Erda was highest ozone site
- Erda higher than Tooele
- 13 days > 75 ppb at Badger Island

Great Salt Lake can enhance ozone formation



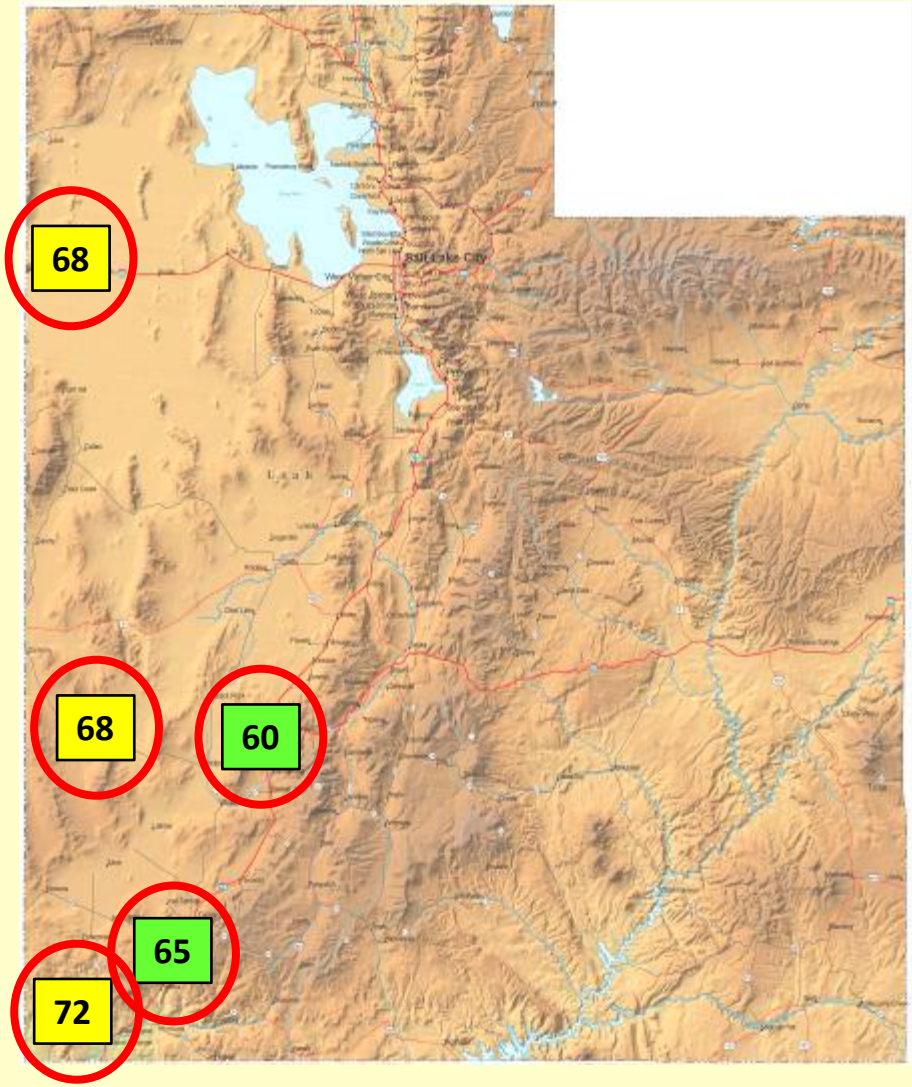
- Ozone forms early in day over lake
  - High albedo
- Morning heating
  - Wind blows away from lake
- Evening cooling
  - Down-canyon winds
  - Higher ozone over lake
- Diurnal pattern remains during high pressure

2010 rural sites
4th highest 8-hour ozone



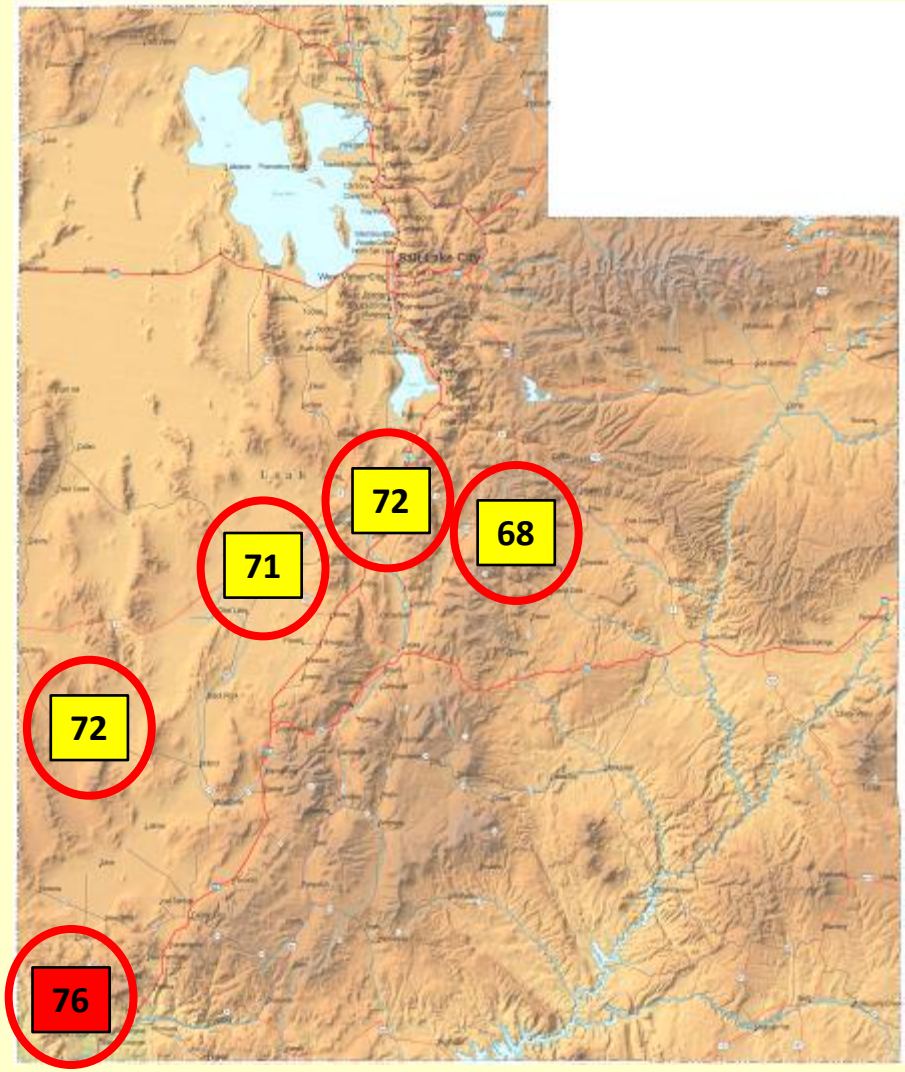
- Low ozone
- Sites:
  - Park Valley
  - Wendover
  - Nephi
  - Milford

2011 rural sites
4th highest 8-hour ozone



- Sites:
  - Filmore
  - New Harmony
  - Wendover
  - Desert Range
  - Western Washington Cty

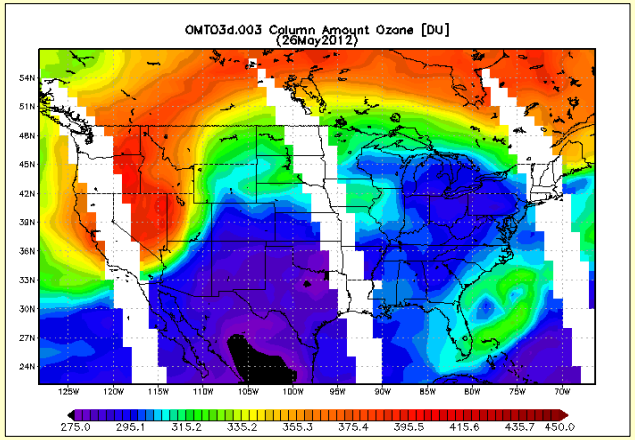
2012 rural sites
4th highest 8-hour ozone



- Moderate to high ozone
- Sites:
  - Mt. Pleasant
  - Nephi
  - Delta
  - Desert Range
  - Western Washington Cty

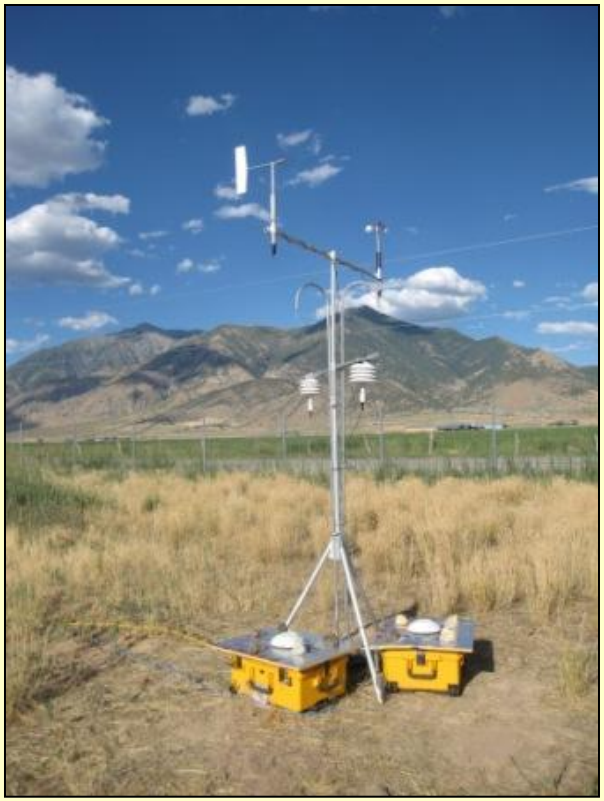
Factors affecting rural ozone

- Regional transport
  - LA, Las Vegas
  - Difficult to pin-point
- Wildfire (2012)
  - Utah fires in June; Idaho fires in July-September
- Stratospheric ozone intrusion
  - Emerging issue
  - 13 days in 2012



Future ozone study

- 2013
  - 5-10 sites
  - Rural and mountain valley sites
- 2014
  - Intensive GSL ozone study
  - SE Utah



Nonattainment area assessment (current NAAQS)

<u>Potential nonattainment</u>

- **Tooele** (77 ppb)
- Summit
- Wasatch
- Washington

<u>Attainment</u>

- Morgan (2 y)
- Western Weber (2 y)
- Western Tooele (2 y)
- Western Box Elder
- Millard (2 y)
- Juab(2 y)
- Beaver
- Sanpete

Nonattainment area assessment (NAAQS = 70 ppb)

<u>Potential nonattainment</u>

- **Tooele** (77 ppb)
- **Summit** (73 ppb)
- Wasatch
- Washington
- Morgan (2 y)
- Eastern Weber (2 y)
- Millard (2 y)
- Juab(2 y)

<u>Attainment</u>

- Western Tooele (2 y)
- Western Box Elder
- Beaver
- Sanpete