March 2008 Final National Ambient Air Quality Standards for Ground-level Ozone

General Overview

Setting Regulations for Ozone Pollution

- The Clean Air Act requires EPA to set primary and secondary NAAQS for common air pollutants:
  - **Ground-level ozone (smog)**
  - Carbon monoxide
  - Nitrogen dioxide
  - Particulate matter
  - Lead
  - Sulfur dioxide
- The law requires EPA to review scientific information and standards for each pollutant ***every five years,*** and to obtain advice from the Clean Air Scientific Advisory Committee (CASAC) on each review
- Different considerations apply to setting NAAQS than to achieving them:
  - Setting: health and environmental effects
  - Achieving NAAQS: cost, technical feasibility, time needed to attain

The Previous Standards

- EPA last revised the ozone standards in 1997
  - Primary standard to protect public health, including the health of "sensitive" populations such as people with asthma, children, and older adults: 0.08 ppm, 8-hour average
  - Secondary standard to protect public welfare and the environment, including sensitive vegetation and ecosystems: 0.08 ppm, 8-hour average
  - Both standards effectively became 0.084 ppm due to rounding

The 2008 Ozone Standards

- New standards are significantly stronger
  - Reflect new scientific evidence about ozone and its effects on public health and the environment
- New primary and secondary 8-hour ozone standards are identical, at 0.075 parts per million
- EPA also specified the level of the standards to the nearest thousandth of a ppm (a.k.a. the “third decimal place”)
  - Eliminates the need for rounding when comparing measured ambient levels to the new standard

Ozone and Health

- Ozone can penetrate deep into the lungs and can:
  - Make it more difficult for people working or playing outside to breathe as deeply and vigorously as normal
  - Irritate the airways, causing coughing, sore or scratchy throat, pain when taking a deep breath and shortness of breath
  - Increase asthma attacks and use of asthma medication
  - Inflame and damage the lining of the lung by injuring the cells that line the air spaces in the lung
  - Increase susceptibility to respiratory infection
  - Aggravate chronic lung diseases such as asthma, emphysema and bronchitis

Ozone and Health, cont.

- Repeated episodes of ozone-induced inflammation may cause permanent changes in the lung, leading to long-term health effects and a lower quality of life
- Ozone may continue to cause lung damage even when symptoms have disappeared
- Sensitive groups include: asthmatic children and other people with lung disease; children and older adults; people who are active outdoors; and outdoor workers

New Health Evidence Since the Last Review

- More than 1,700 new scientific studies
- Studies show:
  - ***Adverse respiratory responses at level of 1997 standard and below:***
    - Clinical studies provide clearest and most compelling evidence of an array of effects, including adverse respiratory responses in healthy adults at a level of 0.080 ppm
      - Lung function decrements and respiratory symptoms
      - Biomarkers of lung injury including inflammation, increased airway permeability, and increased susceptibility to respiratory infection
      - Increased airway responsiveness (airway hyperreactivity)
    - Very limited evidence of lung function and respiratory symptom responses in healthy adults at lower exposure levels (i.e., 0.060 ppm)

Health Evidence Since the Last Review

What studies show, continued:

- ***Strengthened confidence in linkages between ozone and health effects:***
  - Large numbers of new epidemiological studies, including new multi-city studies, strengthen EPA's confidence in the links between ozone exposure and respiratory morbidity effects
    - Lung function decrements, respiratory symptoms, emergency department visits and hospitalizations
    - Effects evaluated in outdoor workers, athletes, the elderly, hikers, school children, and asthmatics

Health Evidence Since the Last Review

What studies show, continued:

- ***New evidence about ozone and mortality:*** Large multi-city studies and meta-analyses provide evidence of a robust association
  - Observed effects supported by new animal toxicological studies that provide new information regarding mechanisms of actions and biological plausibility
  - Report effects at levels well below the level of the 1997 standard
- ***Other important ozone effects:*** Studies now link ozone exposure to other important health effects, including, increased asthma medication use, school absenteeism, and cardiac-related effects

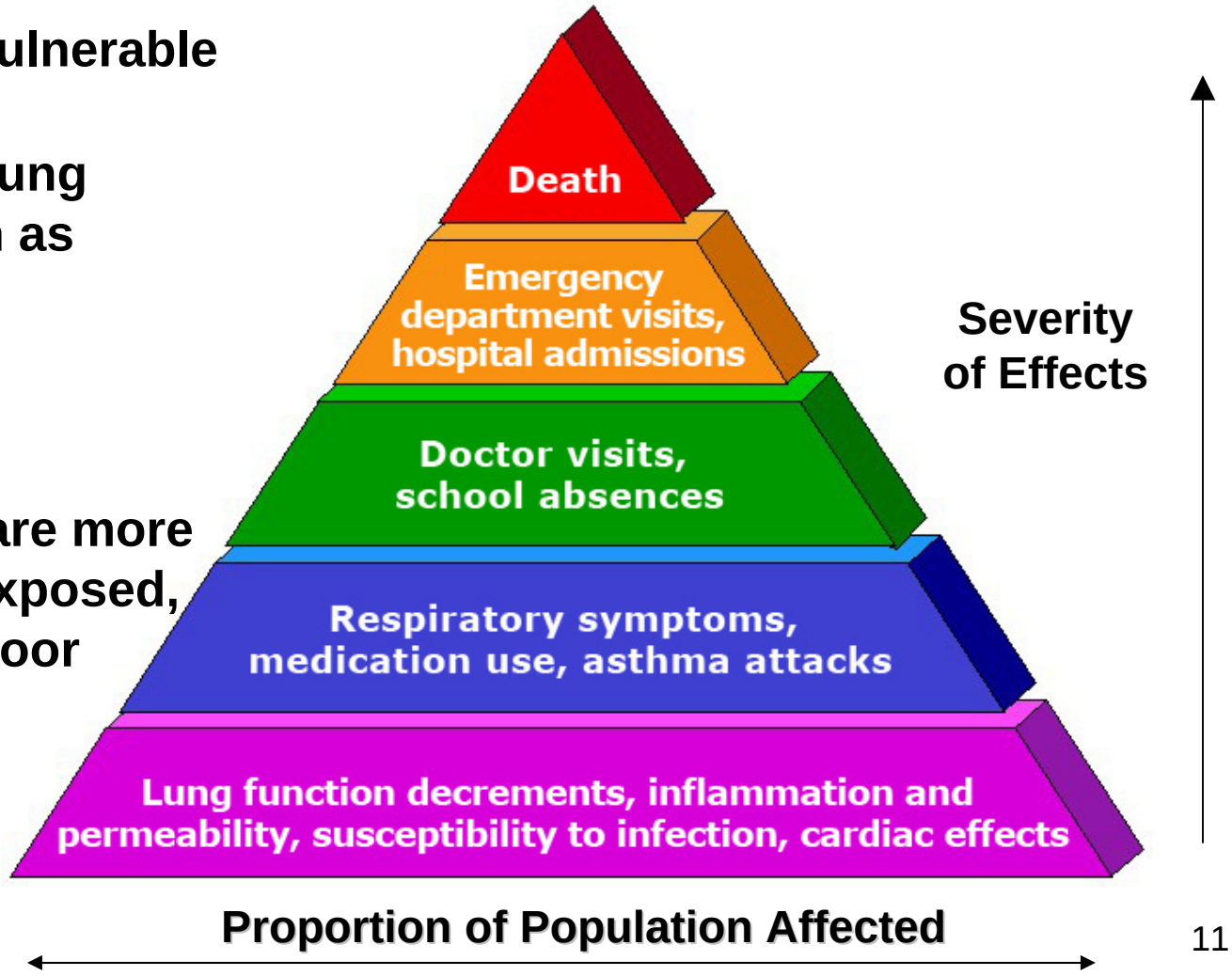
Health Evidence Since the Last Review

What studies show, continued:

- ***Asthmatics have stronger response:*** Studies of people with asthma – especially children -- indicate they experience larger and more serious effects that last longer than responses in healthy individuals
- Studies of healthy subjects likely underestimate ozone-related effects on asthmatics and other sensitive groups, including: children; older adults; people who are active outdoors; and outdoor workers

Ozone Health Impacts: " Pyramid of Effects"

- **Susceptible & vulnerable groups include:**
  - **People with lung disease such as asthma**
  - **Children**
  - **Older adults**
  - **People who are more likely to be exposed, such as outdoor workers**



Ozone and the Environment

- Ground-level ozone is absorbed by the leaves of plants, where it can:
  - Interfere with the ability of sensitive plants to produce and store food (can lead to reduced growth, biomass production and/or yields)
  - Make sensitive plants more susceptible to certain diseases, insects, harsh weather, other pollutants, and competition
  - Reduce or change the diversity of plant species, which can lead to damage to ecosystems dependent on those species
  - Visibly injure the leaves of plants, affecting the appearance of vegetation in national parks, recreation areas and cities

Ozone & The Environment, cont.

- Current ambient concentrations in many areas of U.S., including areas that meet the 1997 standard, are sufficient to cause adverse impacts
- Important new scientific information has been developed since 1997, however many significant uncertainties remain
- While EPA agrees with CASAC that cumulative, seasonal exposures are the most biologically relevant, the remaining uncertainties over how to best protect vegetation led the Administrator to conclude the secondary standard should be set equal to the primary standard, at 0.075 ppm.

Benefits & Costs

- The Clean Air Act bars EPA from considering costs in setting or revising any NAAQS
- EPA conducted a Regulatory Impact Analysis (RIA) to analyze the benefits and costs of reducing pollution to meet alternative ozone standards
- The RIA is required by Executive Order 12866 and OMB guidance
  - The RIA is an illustrative analysis and provides information regarding example control strategies, air quality impacts and public health improvements
  - The benefit and cost analysis is not used when selecting the proposed ozone standards

Benefits and Cost Estimates

- EPA estimates that meeting the new standard will prevent, in 2020:
  - 380 cases of chronic bronchitis
  - 890 nonfatal heart attacks
  - 1,900 hospital and emergency room visits
  - 1,000 cases of acute bronchitis
  - 11,600 cases of upper and lower respiratory symptoms
  - 6,100 cases of aggravated asthma
  - 243,000 days when people miss work or school
  - 750,000 days when people must restrict their activities
- Analysis shows benefits are likely greater than costs
  - EPA estimates the value of these and other health benefits would range from a low of $2 billion to a high of $19 billion per year in 2020
  - EPA estimates the costs of implementing a standard of 0.075 ppm would range from a low of $7.6 billion to a high of $8.5 billion in 2020

Expected Implementation Timeline

Milestone	Date
Signature—Final Rule	March 12, 2008
State Designation Recommendations to EPA	No later than March 12, 2009
Final Designations	No later than March 12, 2010*
Attainment Demonstration SIPs Due	2013*
Attainment Dates	2013-2030 (depends on severity of problem)

** In the event the Administrator has insufficient information to promulgate the designations by March 12, 2010, the date of final designations may be extended up to one year, but no later than March 12, 2011. SIPs will be due three years from final designations.*

Implementation Considerations

- Designations
  - No later than one year after EPA revises a standard, the Clean Air Act requires states (and gives tribes the option) to recommend boundaries for areas that **are** & **are not** meeting the new standards
  - EPA is required to issue final designations within two years after establishing revised standards, but may take up to another year if insufficient data is available for designation
  - EPA is reviewing existing designations guidance, will communicate with states and tribes if additional guidance is needed.
- What about the 1997 standards?
  - For now, the 1997 8-hour ozone standards and all the associated regulatory requirements remain in place
  - States should continue their plans for implementing the 1997 standards
  - EPA will address any transition issues in a separate rulemaking

Monitoring Considerations

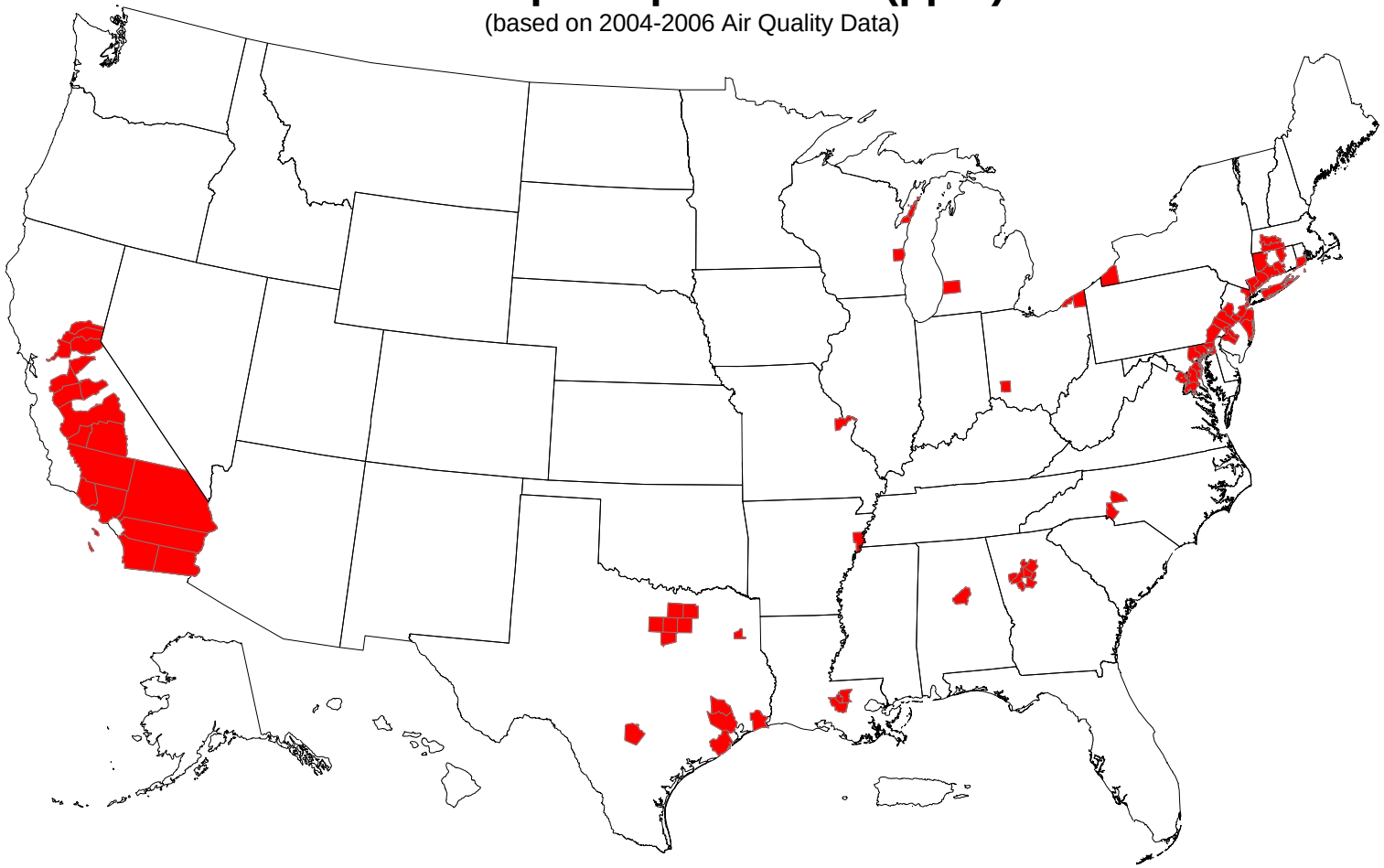
- EPA will consider the following issues in a proposed monitoring rule in June 2008, and a final rule in approximately March 2009
  - Requirements in urban areas, including whether to require ozone monitors in smaller Metropolitan Statistical Areas (cities) of between 50,000 and 350,000 population that do not currently have monitors
  - Requirements in rural areas to address the large spatial gaps that exist in the current network, including whether to require a minimum number of rural monitors per state
  - The length of the required ozone monitoring season, including whether the season should be lengthened in some areas to capture relevant measurements in calculating the revised NAAQS and the Air Quality Index

Progress Toward Clean Air

- Ozone's impacts on human health and the environment are more damaging than previously understood, and occur at lower ozone concentrations
- But EPA, states and tribes have been making steady progress to lower the amount of ozone in the air. For example:
  - Ground level ozone declined 9% nationwide between 1990 and 2006
  - Nationwide, 89 of the original 126 areas designated nonattainment for the 1997 standard met that standard during the 2004-2006 period
  - Rules already on the books – including the Clean Air Interstate Rule (CAIR), clean diesel rules and the recently issued Locomotive & Marine Rule – will help continue this progress by reducing NOx emissions

Counties with Monitors Violating the 1997 8-Hour Ozone Standard of 0.08 parts per million (ppm)

(based on 2004-2006 Air Quality Data)



Notes:

[1] 85 monitored counties violate.

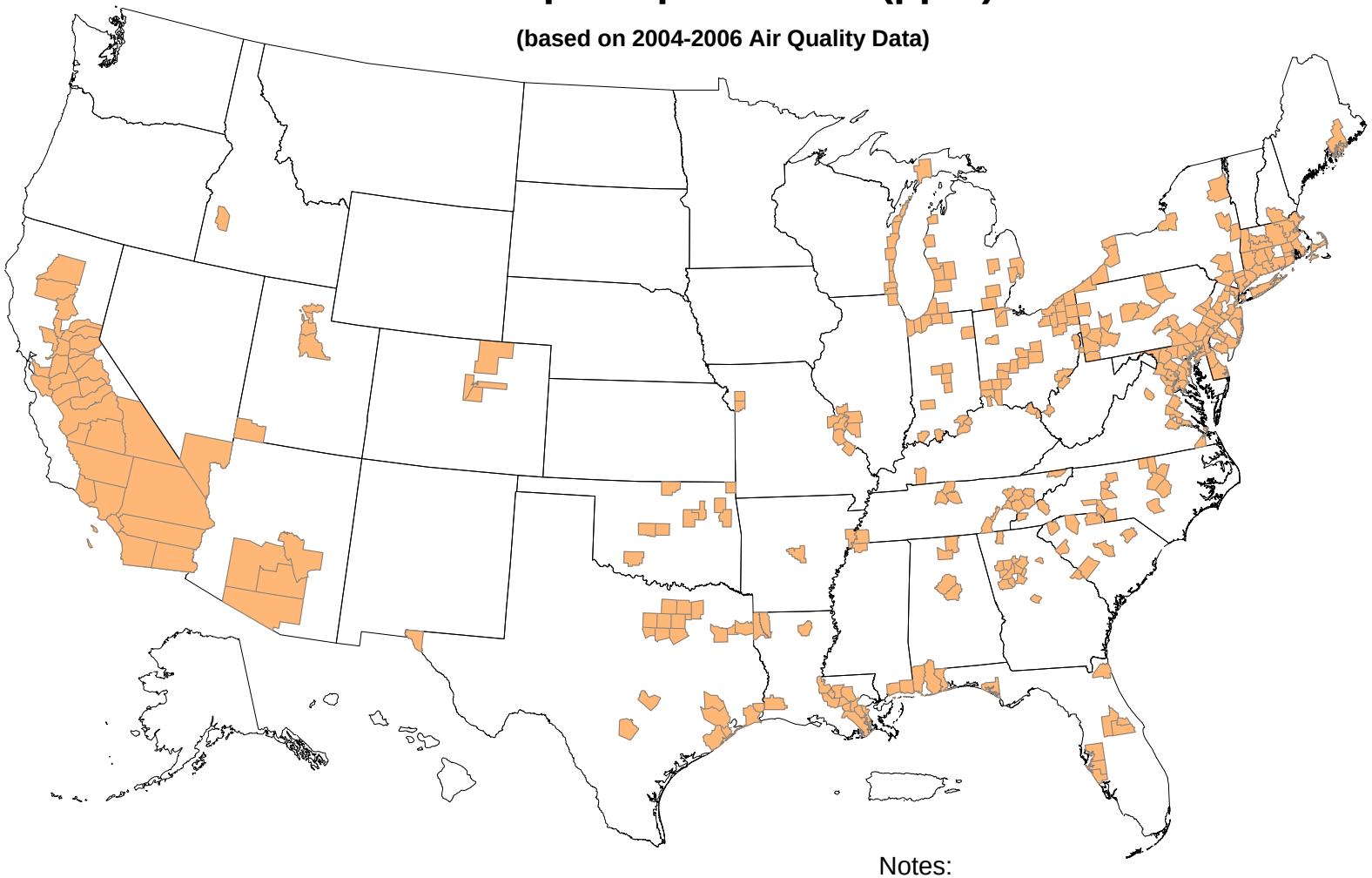
[2] Monitored air quality data can be obtained from the AQS system at http://www.epa.gov/ttn/airsaqs/

[3] The 1997 national ambient air quality standard (NAAQS) for ozone of 0.08 ppm is effectively expressed as 0.084 ppm when data handling conventions are applied.

Estimates are based on the most recent data (2004 – 2006). EPA will not designate areas as nonattainment on these data, but likely on data from 2006 – 2008 or later, which we expect to show improved air quality.

Counties with Monitors Violating the 2008 8-Hour Ozone Standard of 0.075 parts per million (ppm)

(based on 2004-2006 Air Quality Data)

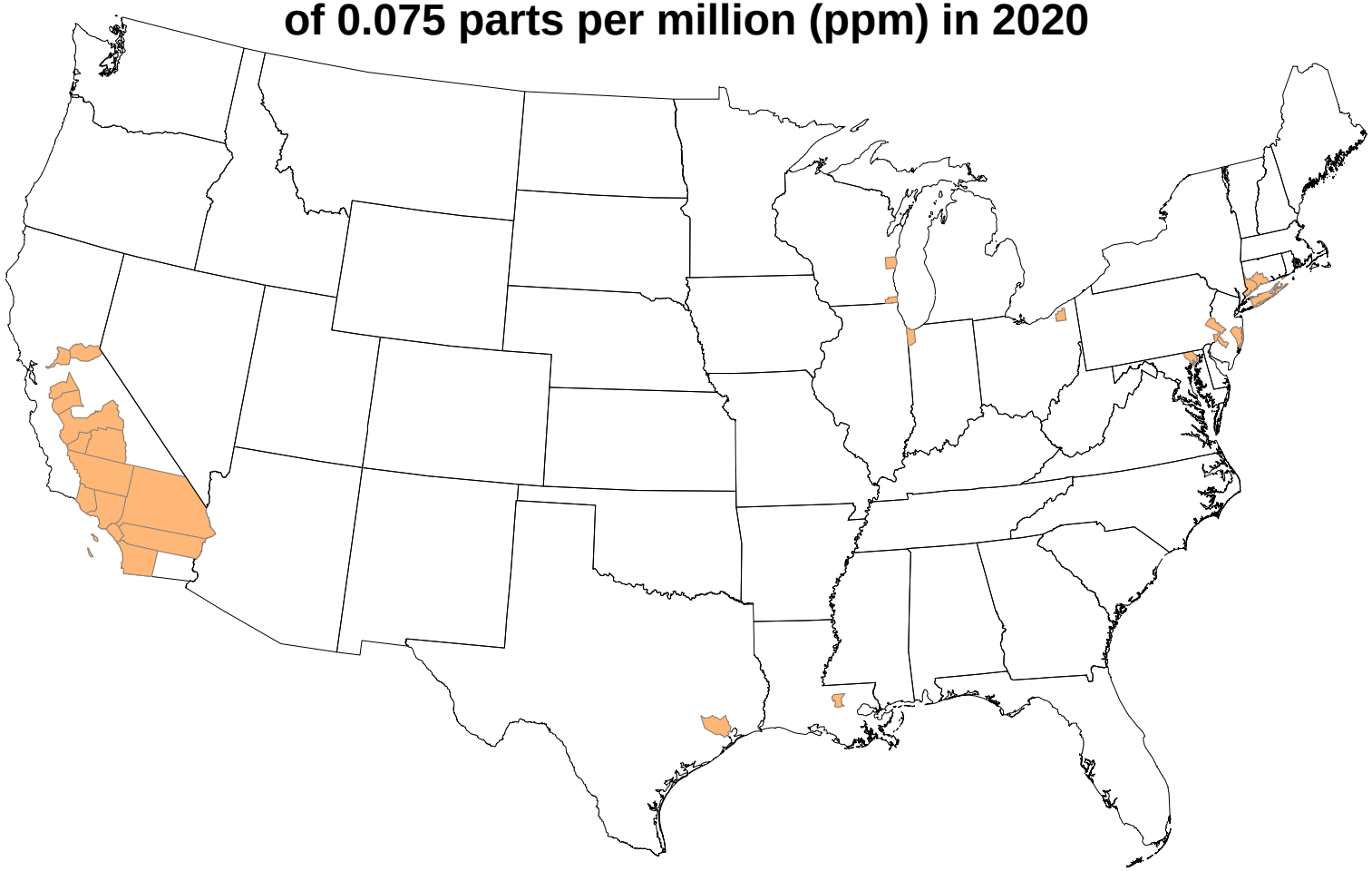


Notes:

[1] 345 monitored counties violate the 2008 8-hour ozone standard of 0.075 parts per million (ppm).

[2] Monitored air quality data can be obtained from the AQS system at http://www.epa.gov/ttn/airsaqs/

Counties with Monitors Projected to Violate the 2008 8-Hour Ozone Standard of 0.075 parts per million (ppm) in 2020



Notes:

[1] 28 counties are projected to violate the 2008 8-hour ozone standard of 0.075 parts per million (ppm).

[2] Future ozone levels were projected only for counties with monitoring data and within the contiguous 48 states.

[3] Modeled emissions reflect the expected reductions from federal programs including the Clean Air Interstate Rule, the Clean Air Mercury Rule, the Clean Air Visibility Rule, the Clean Air Nonroad Diesel Rule, the Light-Duty Vehicle Tier 2 Rule, the Heavy Duty Diesel Rule, proposed rules for Locomotive and Marine vessels and for Small Spark-Ignition Engines; as well as illustrative state and local level mobile and stationary source controls identified for the purpose of attaining the 1997 ozone and 2006 PM2.5 standards. States may choose to apply different control strategies for implementation.

Revised Ozone AQI

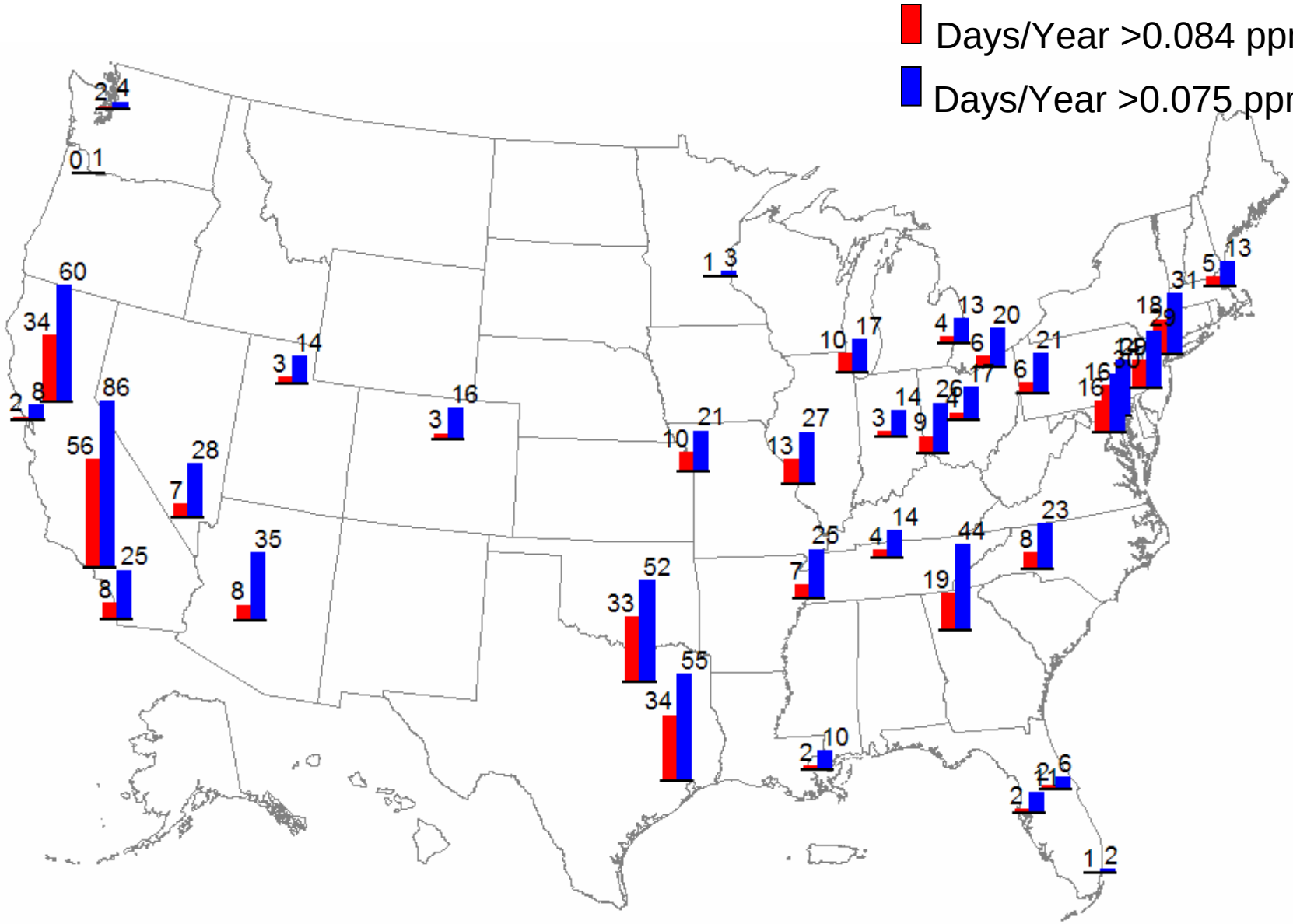
- Air Quality Index (AQI) changed to reflect new primary standard
- 100-level (upper end of the “moderate” category) adjusted to be to equal the new 0.075 ppm standard
- Proportional changes to other AQI values
- EPA encourages states to use the new AQI breakpoints for air quality forecasting by the beginning of ozone season.

Revised Ozone AQI

- EPA is changing the Air Quality Index (AQI) to reflect the new primary standard
- The AQI is EPA's color-coded tool designed to inform the public about daily air pollution levels in their communities
- EPA is adjusting the 100-level, which is the upper end of the "moderate" category, to equal the new 0.075 ppm standard, and making proportional changes to other AQI values
- EPA encourages the States to use the new AQI breakpoints for air quality forecasting by the beginning of ozone season. In many areas this date is May 1, 2008

Category	AQI Value	1997 8-hour (ppm)	2008 8-hour (ppm)
Good	0-50	0.000-0.064	0.000-0.059
Moderate	51-100	0.065-0.084	0.060-0.075
Unhealthy for Sensitive Groups	101-150	0.085-0.104	0.076-0.095
Unhealthy	151-200	0.105-0.124	0.096-0.115
Very Unhealthy	201-300	0.125-0.374	0.116-0.374
Hazardous	301-400	No Change	No Change
	401-500	No Change	No Change

Comparison of Average Number of Days per Year Greater than Moderate for USA Today Cities (May-September 2004-2006)



More Info

- www.epa.gov/groundlevelozone
- www.epa.gov/airnow/ozone/aqi_memo.pdf