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Executive Director

Utah Department of Environmental Quality

Testimony before the

Energy and Power Subcommittee of the

Energy and Commerce Committee

"A state perspective on implementing the 2015 Ozone standard revision"

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Mr. Chairman Whitfield, Ranking Member Rush, and Members of the Committee:

I am Alan Matheson, the Executive Director of the Utah Department of Environmental Quality. Improved air quality is a high priority for Utah. Under the direction of Governor Gary Herbert, we have taken aggressive action to clean our air: imposing new control requirements; expanding public transportation; implementing travel-reduction strategies and a public education campaign; and conducting research to understand Utah's unique atmospheric chemistry.

In the appropriate pursuit of cleaner air, we need to ensure that our regulatory system is rationally aligned with that goal. Today, I share Utah's concerns with the periodic review cycle of the National Ambient Air Quality Standards (NAAQS), the implementation schedule for the ozone standard, and the challenges our state has in meeting the new 70 ppb threshold.

- In general, extending the 5-year NAAQS review cycle so that it better aligns with the prescribed NAAQS implementation timelines is appropriate. An area designated as moderate nonattainment for ozone has eight years from the date the NAAQS is set to achieve attainment. At the very least, there should be eight years between NAAQS reviews to accommodate this compliance schedule. Extending the review cycle to 10 years would more closely align it with the prescribed planning period of an area designated as serious nonattainment for ozone.

Further, EPA has been unable to provide states with timely and necessary implementation guidance under the current 5-year NAAQS review cycle. The implementation rule for the 2008 Ozone NAAQS was published in March, 2015, only 7 months before the ozone standard was lowered to 70 ppb in October. As another example, new PM2.5 nonattainment areas were designated in 2009; State Implementation Plans for those areas were due to EPA December, 2014, but EPA has yet to promulgate the guidance establishing what is required in the plans. EPA cannot even review for completeness the plans they received.

Extending the timeline for implementing the 2015 Ozone NAAQS will allow better coordination among the State, tribes, and the federal government. One of the areas in Utah expected to be classified as nonattainment is the energy-rich Uinta Basin, which suffers from wintertime ozone. The unique chemistry underlying winter ozone formation differs from the typical summer urban chemistry anticipated by the Clean Air Act (CAA) of 1990. In addition, this region has a complex mix of state, tribal, and EPA air jurisdictions. Utah has coordinated a significant multi-agency study into the causes of winter ozone and is working with EPA and the Ute Tribe in developing a SIP/FIP/TIP for the area. These efforts take an extraordinary amount of time, and an extension of the implementation period is needed. Under the

CAA, another review of the ozone NAAQs will occur in 2020. If EPA sets a new standard then, it will hamper the coordination efforts that are already under way.

- Background ozone levels present an additional challenge in meeting the new 70 ppb standard. International transport can, at times, account for up to 85% of the 8-hour ambient ozone concentrations in western states. Many areas in the west have little chance of identifying sufficient controls to achieve attainment, leading to severe consequences. Utah recommends that EPA work with states to determine what portion of ozone pollution and its chemical precursors is coming from background ozone and to clarify how exceptional events and international transport will affect attainment designations and compliance.

- Making the right choices to improve air quality in ozone nonattainment areas will depend on how well we understand the science; and our understanding of the science needs to improve. The tools available to states to account for non-anthropogenic ozone are administratively burdensome and subject to second guessing, often due to a lack of reliable supporting data. Effort spent analyzing uncontrollable pollution to satisfy EPA's administrative requirements is simply administrative overhead that does nothing to improve air quality or people's health.

The Department of Environmental Quality's mission is to safeguard public health and our quality of life by protecting and enhancing the environment, a mission we take seriously. We must address the public health impacts of ozone with reasoned approaches. As we move forward with this more stringent ozone standard, EPA needs to have in place the necessary tools to allow states to succeed. The remainder of this testimony, submitted in written form, provides more detail regarding Utah's perspective on implementing the 2015 Ozone standard.

Written testimony submitted to the Energy and Power Subcommittee of the Energy and Commerce Committee

"A state perspective on implementing the 2015 Ozone standard revision"

The effect of jurisdictional complexity in the Uinta Basin.

The Uinta Basin lies in the northeast corner of Utah and is bounded on the north by the Uinta Mountains, on the south by the Tavaputs Plateau, on the west by the Wasatch Range, and on the east by elevated terrain that separates it from Piceance Basin in Colorado. Duchesne and Uintah Counties occupy most of the Basin, and the Uintah and Ouray reservation covers a significant portion of Basin lands.

Increased oil and gas exploration and production in the Uinta Basin has contributed to the increase in the precursor gases that lead to the formation of ozone during wintertime temperature inversions. Most scientific studies of ozone have focused on summertime ozone in urban areas; and the summer ozone-formation chemistry is well characterized. Wintertime ozone, on the other hand, is a relatively new phenomenon, limited to a few isolated basins in the intermountain west, and its causes are not fully understood. Preliminary evidence suggests that high concentrations of ozone in the Basin during the winter only occur when the ground is snow-covered, a temperature inversion traps emissions close to the ground, and the skies are sunny. The traditional strategies for solving summertime ozone pollution will not work in the Uinta Basin because of the unique nature of wintertime ozone.

The Utah Division of Air Quality (DAQ) is leading a multi-year effort to bring together knowledgeable scientists to study the wintertime ozone phenomenon. DAQ has partnered with local governments, industry, local health departments, the Bureau of Land Management (BLM), EPA, the Ute Tribe, National Oceanic Atmospheric Administration (NOAA), Utah State University, University of Utah, and a number of other universities in both the United States and Canada to determine the causes of wintertime ozone, identify control strategies to reduce emissions, and encourage industry to take proactive steps to cut emissions.

The Uinta Basin Winter Ozone Study (UBOS) began in 2011 to characterize emission sources, identify chemical pathways unique to the Basin, and develop effective mitigation measures. This collaborative study continues to bring together the best and the brightest in the fields of atmospheric research, air modeling, emissions source testing, and analysis.

This ongoing study is important for understanding the atmospheric chemistry responsible for winter ozone and developing control strategies that reduce the precursor gases that contribute to its formation. Over the past few years of study, much has been learned about the unique winter chemistry that exists in the Basin. Research has shown that VOCs are the ozone precursor most likely to produce ozone in the region. Scientists are working to determine which VOCs are key to forming ozone in the Basin, where these emissions are located in the atmosphere, how their location impacts their ability to mix and react, and which meteorological conditions set the stage for the formation of ozone.

Due to the complex chemistry that creates ozone and the vast variation in VOC reactivity, ozone-control strategies must target reductions of specific emissions. Otherwise, there is the potential that emissions reductions will not be effective or can even be counterproductive. Research continues in the Uinta Basin today.

In combination with understanding the chemistry, a significant effort is underway to collect an emissions inventory for the oil and gas production in the Basin. This has required coordination with the oil and gas producers, EPA, the Ute Tribe, and the BLM. The goal is an emissions inventory that spatially, temporally, and chemically characterizes the entire Basin. This inventory will allow development of appropriate and effective mitigation strategies for ozone and other air pollutants that can form via this unique wintertime chemistry. This effort has required multiple resources, immense coordination, and will require continued support to maintain.

Jurisdictional issues complicate air pollution regulation in the Basin. Energy production areas are scattered over federal, state, and tribal lands. Each of these agencies has jurisdiction over the production areas located on their respective lands, and each has differing air regulations that apply depending on the amount of pollution emitted. Utah has jurisdictional responsibility for the lands outside of Indian Country, where approximately 90 percent of the population is located.

Approximately two-thirds of currently producing oil and gas wells, three quarters of the gas production, and half of the oil production in the Uinta Basin are located in Indian Country where the tribes and the EPA have regulatory authority. The Tribe is challenged with educating and training staff to support the increased need for an air program and increased regulation. As EPA looks to develop site-specific rules in the form of a Federal Implementation Plan, its resources to support implementation of a minor source permitting program are also limited.

Significant time and effort is required to address the co-challenges of a fairly new and complex winter ozone issue that is just beginning to be understood, and coordinating a sound regulatory approach among different agencies with sometimes-unclear jurisdiction within the same airshed. The ozone pollution issue in the Basin was just being discovered when the 2008 ozone standard was promulgated. EPA designated the area as unclassifiable due to a lack of certified air monitoring data. Nevertheless, the state began to address the ozone levels in the Basin. The Division of Air Quality performed scientific studies, developed new statewide rules, joined the Ozone Advance program, and established voluntary seasonal ozone controls. H.R. 4775, Ozone Standards Implementation Act of 2016, which would change the mandatory review of ozone NAAQS from 5 to 10 years, would allow time for additional research, appropriate coordination among the jurisdictions, and full operation of the proactive ozone-reduction measures prior to the next designation process. With the promulgation of the 2015 ozone standard, EPA stated that with the implementation of recent regulations, the majority of areas that would be nonattainment for that standard would reach attainment by 2025. The additional time provided by H.R. 4775 would allow resource-limited states to focus on attainment strategies before having to evaluate their air monitoring data for the next designation process.

Recent scientific developments regarding background ozone levels in the United States, including summaries of the relevant portions of EPA's Integrated Science Assessment of Ozone and Related Photochemical Oxidants.

The EPA has been studying ozone in the eastern U.S. for decades, and the mechanisms of ozone formation and transport pathways are well understood there. This process is just beginning in the western U.S. where mountainous topography, unique meteorology, forest fires, stratospheric intrusion, distinct emissions sources, highly variable emissions density, and international transport play an important role in ozone formation. Unfortunately, just at the time when improved models, emission inventories, and research on western ozone issues are needed, EPA is facing funding constraints that will limit its ability to support new technical work, and will likely decrease its current efforts. Funding is also decreasing for important research activities at the National Oceanic and Atmospheric Administration (NOAA) and for grants to support research at universities. States such as Utah do not have the resources to make up for the decreases in federal funding for these important technical tools.

Emissions from Asia are affecting ozone levels in the western U.S., especially in the spring, and this impact is increasing. Cooper, 2010 estimated an increase of 0.63 ppbv per year, which would be around 6 ppb over ten years. This Asian impact is often cited as the reason the west is not seeing the reductions in ozone trends over the last 20 years that have been observed in the eastern states.

- I*ncreasing springtime ozone mixing ratios in the free troposphere over western North America*, O. R. Cooper, et al., published in Nature (Vol 463, January 21, 2010) examines the influence of Asian transported ozone on western North America. The rate of increase in ozone concentrations over the last 20 years is greatest when measurements are more heavily influenced by direct transport from Asia with an average increase of 0.63 ppbv/yr. The paper suggests that western North America is particularly sensitive to rising Asian emissions and that the observed increase in springtime background concentrations may hinder compliance with its ozone air quality standard.

- *Long-term ozone trends at rural ozone monitoring sites across the United States, 1990–2010*, Cooper, O. R., R.-S. Gao, D. Tarasick, T. Leblanc, and C. Sweeney (2012), J. Geophys. Res. (Vol 117, Issue D22, 27, November 2012), reports on long term ozone trends (1990-2010) across the U.S. and finds that while eastern sites are generally seeing decreases in ozone concentrations as a result of national emissions controls, the western sites are not. The paper discusses the concept that increasing background ozone flowing into the western U.S. is counteracting domestic emission reductions.

Western wildfires significantly affect ozone levels throughout the intermountain west. This impact is highly variable and can positively, or in some cases negatively, effect ozone formation as the fire emissions plume ages. Though complex, understanding this impact is increasingly important as the ozone standard becomes more stringent.[1] Ozone levels can increase significantly due to "stratospheric intrusions" under specific meteorological conditions. This phenomenon typically occurs in spring and summer seasons in mountainous terrain where energetic storm systems can fold a pocket of stratospheric ozone into the lower troposphere (ozone levels are much higher in the stratosphere). This entrained ozone can radically increase ozone levels locally and significantly increase surface level ozone over multi-state regions downwind of the event. Researchers have found that stratospheric intrusion can play a major role (at times reaching 50 to 60 percent) in elevating springtime ozone events over high altitude regions in the western U.S., posing a challenge for meeting the ozone standards.[2] Ozone increases with elevation because its concentration increases vertically through the lower atmosphere (troposphere). Near-surface ozone tends to be titrated by oxides of nitrogen released from sources at the surface and subject to other scavenging processes, while ozone aloft can be enhanced by stratospheric ozone intrusion and ozone that has been transported long distances without loss. Mountainous terrain pushing into this higher-elevation ozone band can, therefore, experience higher ozone concentrations that cannot be controlled by local actions.

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[1] *Ozone production from wildfires: A critical review*, Daniel A. Jaffe and Nicole Wigder, Atmospheric Environment, Vol 51 (2012) 1-10.

[2] *Springtime high surface ozone events over the western United States: Quantifying the role of stratospheric intrusions*, Lin M., A. M. Fiore , O. R. Cooper , L. W. Horowitz , A. O. Langford , Hiram Levy II , B. J. Johnson , V. Naik , S. J. Oltmans , C. Senff, *Journal of Geophysical Research*, Vol 117, November 2012.

The interpretation of background and "policy relevant background" for ozone in the NAAQS process.

Background ozone is important to consider in addressing ozone. In general, it refers to the level of ozone that is not controllable by a regulatory agency and would include ozone precursor emissions from biogenic and other non-anthropogenic sources. It could also include precursor emissions from anthropogenic international sources. This latter definition is termed policy relevant background (PRB). PRB is determined using a photochemical transport model.

PBR from non-anthropogenic sources is not constant. It varies from season to season and from episode to episode. It also varies from place to place. In the Integrated Science Assessment for the current ozone NAAQS review, EPA uses the mean PRB for broad regions and this may not be reflective of the PRB that is occurring during high ozone episodes in the intermountain west. PRB also increases with elevation. Higher ozone levels in the upper troposphere are more readily mixed to ground level at higher elevations and this could be an important factor in ozone levels in mountain communities and also higher-elevation forests.

While the concept of PRB considers the impact from international sources, there is no domestic mechanism to address this increasing impact. Asian emissions are increasing background ozone concentrations in the intermountain west in the spring. Cooper (Nature, 2010) estimated an average increase of 0.63 ppbv/yr from 1995-2008. EPA has considered the current impact from Asia through the concept of PRB, but the final NAAQS is a fixed standard even though the PRB continues to increase. Modeling to determine PRB has shown the highest values occur in the intermountain west where the 4th high values are estimated to be 50 to 60 ppb.[3]

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[3] *Improved estimate of the policy-relevant background ozone in the United States using the GEOS-Chem global model with ½ x ⅔ horizontal resolution over North America*, Atmospheric Environment, Vol 45, (2011) 6769-6776.

The Utah Department of Environmental Quality's assessment of background ozone concentrations and their importance relative to the NAAQS, including the consequences of a "nonattainment designation."

Ozone levels in the intermountain west are not decreasing as much as would be expected based on the significant emission reductions that have occurred over the last twenty years. Figure 1 shows ozone trends at rural western national parks. Many of these parks, such as Canyonlands in Utah, are located far from any significant emission sources. The current ozone standard is shown. As can be seen from this figure, ozone values have remained fairly constant over the last 20 years and are routinely above the 70 ppb standard. It is also apparent from this figure that the problem is widespread throughout the intermountain west and is not limited to parks that are close to urban areas or to energy-producing areas.

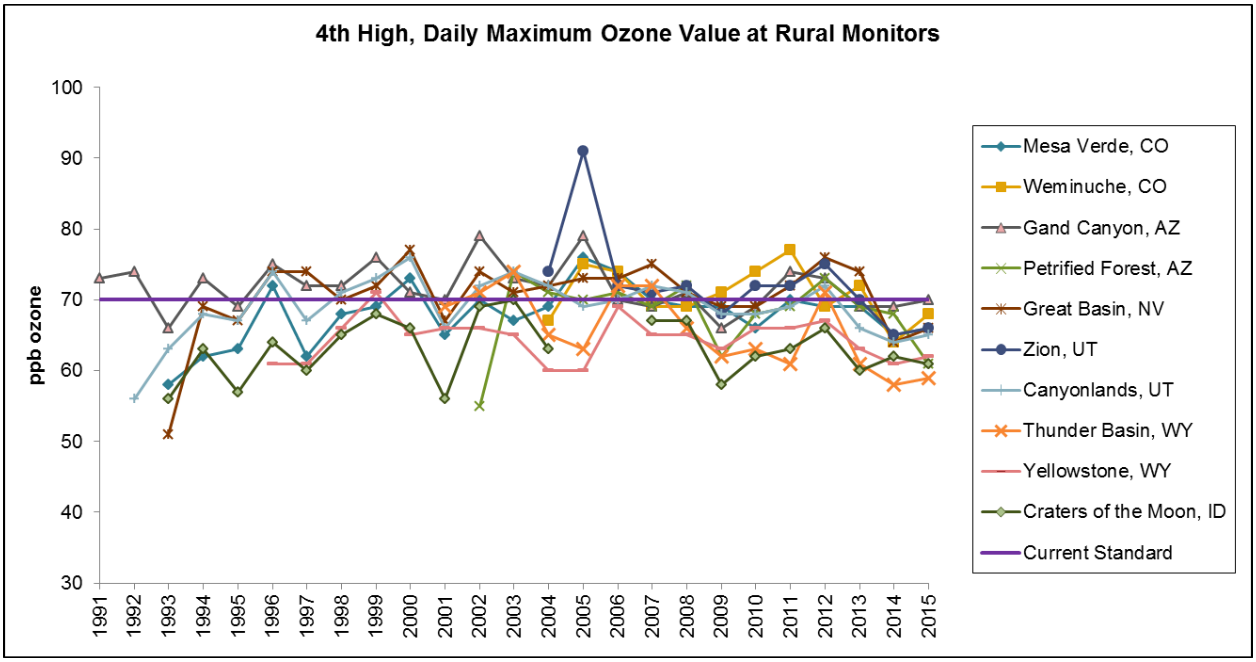

Figure 1 Source: EPA Air Quality System

Additionally, the Utah Division of Air Quality (DAQ) conducted a special ozone study focused on monitoring ozone in three regions of Utah: the mountain valleys east of the Wasatch Front with a focus on the Park City area; the Tooele Valley; and rural western Utah. Ozone concentrations at the mountain valley sites during 2012 were moderate to high with eight of ten sites having at least one day when ozone concentrations exceeded 75 ppb. The highest ozone was found at three sites in the Park City area (Parleys Summit, Snyderville and Silver Summit) and Heber where there were four to ten days with ozone exceeding 75 ppb. For comparison, Salt Lake City experienced seven days with ozone exceeding 75 ppb. In general, ozone in the Park City area of Summit County was equal to or higher than ozone in Salt Lake City and at other urbanized Wasatch

Front sites. Ozone in Morgan and Huntsville was moderately high, but generally lower than ozone observations at the DAQ site in Harrisville. High ozone in the Park City area was most strongly influenced by transport of ozone and ozone precursors from Salt Lake City. Analysis of dominant wind patterns and timing of maximum daily ozone suggests clear transport of pollutants from Salt Lake City, up the Parleys Canyon corridor and into the Park City area and Kamas. Ozone formation at all mountain valley sites was also likely enhanced by increased ultraviolet radiation at higher elevation sites, which is supported by solar radiation data. Smoke from wildfires and biogenic emissions volatile organic compounds in mountain forests also may have impacted ozone at mountain valley sites.

In the Tooele Valley, ozone concentrations in Erda and East Erda were significantly higher than ozone at the DAQ site in Tooele. Erda was one of the highest ozone sites in all of Utah during 2012 and the three-year average of the 4th highest 8-hour ozone concentrations was 77 ppb, equaled only by the DAQ site in Salt Lake City. High ozone in the northern portion of the Tooele Valley was likely influenced by Great Salt Lake; high albedo off the lake surface likely enhanced ozone formation and routine off-shore lake winds blew air from Great Salt Lake into Tooele Valley. Ozone concentrations at Badger Island, a site on a causeway in the middle of Great Salt Lake, were the highest observed in Utah with thirteen days exceeding 75 ppb. Ozone concentrations at Badger Island typically formed earlier in the day and persisted longer into the afternoon than at Tooele Valley sites.

Ozone concentrations at rural Utah sites, except at Antelope Island where ozone was very high, were typically lower than other Utah sites. Peak seasonal ozone concentrations occurred in May and early June at all rural sites and maximum 8-hour ozone concentrations exceeded 75 ppb at least once at all sites except Nephi where ozone concentrations peaked at 75 ppb. Badger Springs, in extreme southwestern Utah, was one of the highest ozone sites in Utah; 8-hour ozone concentrations exceeded 75 ppb on ten days. The 4th highest 8-hour ozone concentration exceeded 70 ppb at all rural Utah sites. High ozone concentrations in rural Utah were potentially influenced by regional transport of ozone, springtime emissions of biogenic volatile organic compounds, stratospheric ozone intrusion and wildfire smoke.

The eastern U.S. has seen significant improvements in ozone levels. One of the major strategies to reduce regional ozone levels in the eastern U.S. has been to reduce nitrogen oxide (NOx) emissions from power plants. Federal motor vehicle standards and non-road engine standards have also reduced NOx emissions substantially throughout the country. As a result of these significant emission reductions, ozone levels have been improving throughout the eastern U.S.. Equivalent NOx emission reductions have also been occurring at western power plants as can be seen in Figure 2, and mobile source emission reductions have also been substantial, but there have not been corresponding decreases in ozone levels in the west.

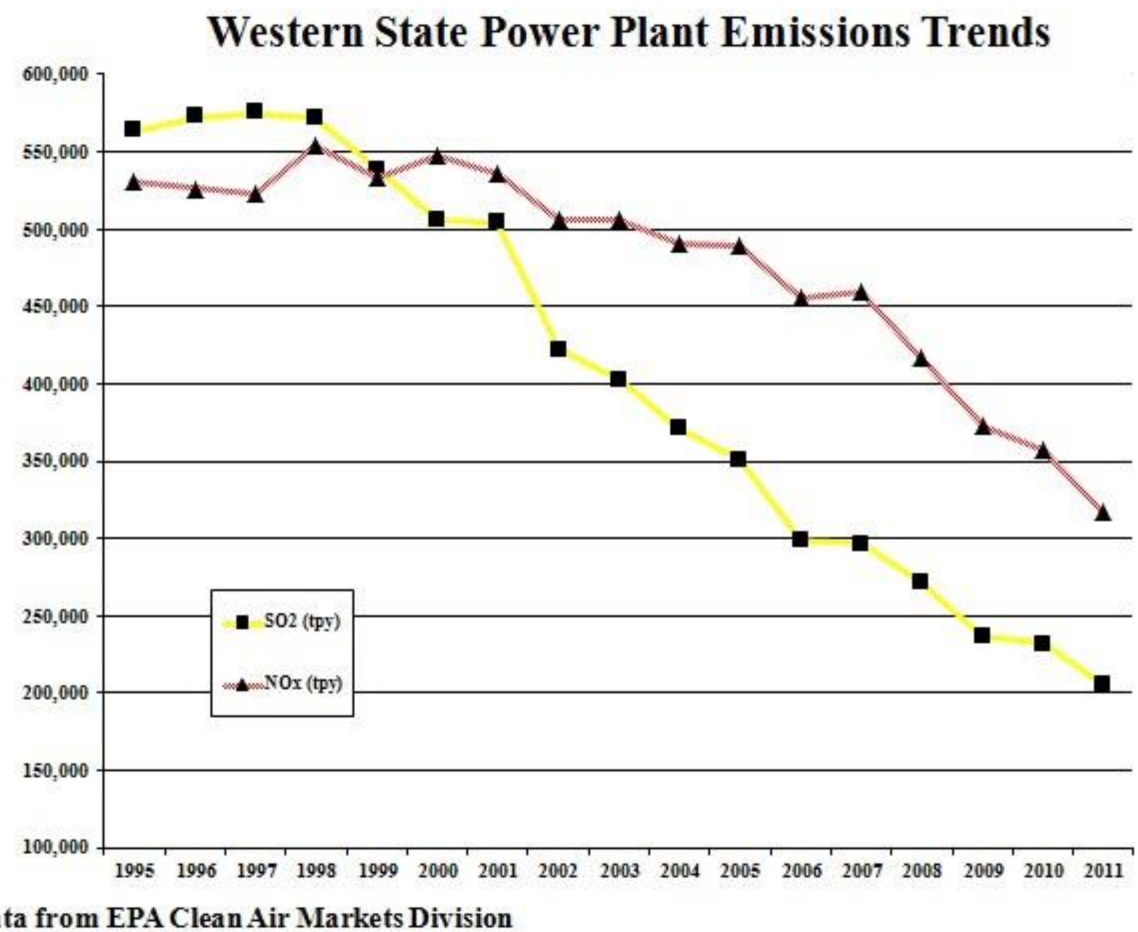

Figure 2

One explanation of ozone trends in the intermountain west is that U.S. anthropogenic emissions are only part of the problem. Current research suggests that increased international ozone transport is counteracting domestic emissions reductions in the west (Cooper, et. al. *Long-term ozone trends at rural ozone monitoring sites across the United States, 1990-2010*, J. Geophys. Res., 117).

The consequences prescribed in the CAA for a nonattainment area are significant. Nonattainment area permitting rules require offsetting emission reductions for any new major source in a nonattainment area. The reductions must occur within the nonattainment area. These rules would effectively prevent development in rural areas that are designated nonattainment because there are no existing sources that could provide this offset. For example, the monitor in Canyonlands National Park, located in San Juan County, Utah, has measured ozone levels above 70 ppb. San Juan County is the largest county in the state measuring 7,933 square miles. This is close in size to the entire state of New Jersey (8,722 sq miles). San Juan County's population was 15,772 in 2015.[4] The point source inventory for the entire county is less than 400 tons/yr NOx and less than 100 tons/yr VOC. Economic opportunity in this part of Utah, including portions of the Navajo Nation, could be stifled because there would be no possibility to construct a new major source even though ozone levels at Canyonlands are not caused by local emissions.

Mandatory measures are established for moderate, serious, severe, and extreme ozone nonattainment areas.[5] If an area starts as a marginal area but is not able to attain the standard, it is progressively bumped up to a higher classification over time, requiring progressively more stringent control measures, even if those measures do not help the ozone problem in the area.[6] These measures include a 15% mandatory VOC reduction for moderate areas followed by a 3% reduction per year for serious and above areas, vehicle emission and inspection programs, fuel reformulations, reasonably available control technology requirements for stationary sources, and traffic control measures.[7] These measures make little sense in rural western counties, may be impossible to implement, and may do little to reduce ozone levels even in the urban areas where background levels are high. In rural areas where biogenic (natural source) emissions are the majority of the inventory, the mandatory VOC reductions are especially problematic because reductions in anthropogenic VOC are unlikely to have any effect on ambient ozone concentrations.

If an area is unable to attain a NAAQS, mandatory sanctions apply to highway funding for the state.[8] These sanctions would have severe consequence on an area that had no ability to solve the underlying ozone problem.

Another consideration in meeting the ozone standard in the western states is a significant correlation between high wildfire years and high ozone years. EPA has indicated that this impact could potentially be addressed through the exceptional event process used to exclude infrequent exceedances of the standard that do not have an

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[4] "State & County Quick Facts", United States Census Bureau (retrieved April 7, 2016).

[5] 42 U.S.C. § 7511a (2015).

[6] 42 U.S.C. § 7511.

[7] 42 U.S.C. § 7511a.

[8] 42 U.S.C. § 7509(b).

anthropogenic origin.[9] This approach is problematic for several reasons, even with the recently promulgated rule revisions and guidance for exceptional events.

- The technical demonstrations that are required to show that high pollution levels are due to an exceptional event are extensive; and it has been very difficult to get EPA's concurrence, even for relatively straightforward cases of particulate matter exceedances caused by high-wind events. Utah does not have the resources to develop an exceptional event demonstration for every potential event during a high fire year. EPA would need corresponding resources to review the demonstrations and would also need to implement internal policies to ensure that demonstrations could be approved.
- During a high fire year, it is likely that many days or weeks could be affected by fire smoke and it would strain the exceptional event process to address longer-term events.
- During high fire years, it is likely that regional impacts affect multiple states. However, the current exceptional event process is best suited to address local impacts within a single state's jurisdiction.

Recommendation

Mechanisms to account for background ozone that cannot be controlled should have been put in place, including technical and regulatory tools, before the more stringent ozone standard was implemented. Funding is also needed to improve the technical tools that are available to western states when developing their SIPS, as well as to support the important research currently underway to better understand the causes of background ozone in the intermountain west. Otherwise, states such as Utah will not be able to develop successful state implementation plans and will be set up to continuously violate the ozone standard.

[9] U.S. Envtl. Prot. Agency, *Overview of EPA's Updates to Air Quality Standards For Ground-Level Ozone* 1 (Oct. 1, 2015); *see also* 40 C.F.R. § 50.14 (Dec. 28, 2015).