Before the United States House Committee on Science, Space, and Technology
Subcommittee on the Environment

History and Implementation of the Clean Air Act Visibility Protection Provisions
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Chairman Bridenstine, Ranking Member Bonamici and Members of the Subcommittee, thank you for the opportunity to testify about the U.S. Environmental Protection Agency's Regional Haze Regulations.

My name is Bruce Polkowsky. I am an independent contractor working with many parties to find innovative ways to implement provisions of EPA's visibility protection requirements and related environmental protection programs. I previously served as a policy analyst with the National Park Service's Air Resources Division, and before that as an Environmental Engineer in the U.S. Environmental Protection Agency's Office of Air Quality Planning and Standards. In both positions, I served under Republican and Democratic Administrations.

The nation's large national parks and wilderness areas are treasures of immense importance to all Americans and the world. Upon visiting the Grand Canyon in 1903, President Theodore Roosevelt remarked, "Leave it as it is. You cannot improve on it. The ages have been at work on it and man can only mar it. What you can do is keep it for you children, and for all who come after you, as the one great sight which every American…should see." Starting with the Organic Act in 1916 creating the National Park Service, expanded by the 1964 Wildness Act and specifically in the 1977 Amendments to the Clean Air Act, the Congress has recognized, with overwhelming bipartisan support, the need to protect the scenic views of large national parks and wilderness areas, leaving them "unimpaired" for the enjoyment of future generations.[1]

Ninety-five percent of the National Park Service visitor studies conducted in the national parks protected by the visibility protection regulations over the last 20 years, covering over 10,000 groups of visitors, list scenic views as extremely important or very important, with 95 percent ranking scenic views as the first, second, or third most important attribute out of 14 total choices. [2]

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[1] 16 U.S.C. § 1, National Park Service Organic Act and Public Law 88-577(16 U.S. C. 1131-1136) Wilderness Act

[2] National Park Service Visitor Values & Perceptions of Clean Air, Scenic Views & Dark Night Skies, 1988-2011, Natural Resource Report NPS/NRSS/ARD/NRR-2013/632

The near 40-year implementation of the Clean Air Act's visibility protection provisions has been based on a careful examination of science, incremental promulgation of regulatory requirements, and extraordinary interagency cooperation that includes other federal agencies, tribes and States. Starting with a monitoring program in 1985, the States have been part of the management and development of science and policy decisions. The Grand Canyon Visibility Transport Commission (1991-1996) provided direct input to the Regional Haze Regulations. The Commission was led by the Governors of eight States and the leaders of four Indian Tribes, with five Federal Agencies having non-voting advisory roles.[3] From 2000 to 2009, EPA provided funding for five Regional Planning Organizations (RPOs) that provided forums for all States and Tribes to build scientific information on the causes of visibility impairment in their region and to develop cooperative strategies to incorporate in State Implementation Plans. The National Park Service, U.S. Fish and Wildlife Service, Forest Service and Bureau of Land Management, all supported the RPO's with technical assistance.

In 1993, the National Academy of Sciences (NAS) reviewed the state of the science for visibility protection and determined that "[p]rogress toward the national goal of remedying and preventing man-made visibility impairment in Class I areas (Clean Air Act, Section 169(a)) will require regional programs that operate over large geographic areas and limit emissions of pollutants that can cause regional haze." The NAS also concluded that "[r]educing emissions for visibility improvement could help alleviate other air-quality problems, just as other types of air-quality improvements could help visibility"[4]. The design and implementation of control strategies for visibility protection should also account for collateral improvements in human health and ecosystem conditions.

Protection of visibility at our most treasured parks and wilderness areas drives economic progress in those regions and nationally. The National Park Service estimates the national park system received over 292 million recreational visits and those visitors spent $15.7billion in local gateway communities. The contribution of this spending to the national economy was 277 thousand jobs, $10.3 billion in labor income, $17.1 billion in added value, and $29.7 billion in output.[5] As noted above the vast majority of these visitors generating this economic benefit value the protection of scenic views. A Clean Air Task Force report estimates that improving visibility at national parks would increase spending significantly. [6]

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[3] The Grand Canyon Visibility Transport Commission, Recommendations for Improving Western Vistas, June 10, 1996

[4] Protecting Visibility in National Parks an Wilderness Areas, National Research Council, National Academy Press, Washington, D.C. 1993

[5] 2014 National park Visitor Spending Effects, NPS, Natural Resource Report NPS/NRSS/EQD/NRR-2015/947

[6] Out of Sight: The Science and Economics of Visibility Impairment, Abt Associates, Inc., 2000

The visibility protection program is built on firm science and has reflected a data driven approach to protecting our nation's grand vistas anchored in a partnership with federal agencies, states and tribes. Nearly 40 years after Congress established the national goal of preventing and remedying air pollution to protect scenic vistas in our national parks, EPA is moving ahead with the long overdue measures to address the regional haze impairment.

I. 1977 Clean Air Act Amendments establish a National Goal and mandate EPA Regulations in Section 169A

The 1977 Clean Air Act Amendments declared as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory class I Federal areas which impairment results from manmade air pollution.[7] Congress specifically recognized that the "visibility problem is caused(?) primarily by emission into the atmosphere SO_2, oxides of nitrogen, and particulate matter, especially fine particulate matter from inadequate[ly] controlled sources." [8]

The 1977 amendments recognized that the national ambient air quality standards would not prevent air quality in very clean areas, such as the desert southwest, from serious degradation which would threaten the character of the region as well as the scenic qualities that were behind formation of many of the nation's national parks and wilderness areas. In its 1979 Report to Congress on the nature and causes of visibility impairment, EPA stated that due to the physics of light transmission through the atmosphere, a very small amount of fine particulates added to a clean atmosphere will degrade the vista more than the same amount added to an already impaired atmosphere. The addition of 1 microgram per cubic meter of fine particles, spread throughout the viewing path, to a clean atmosphere could reduce visual range by about 30 miles, from approximately 200 to 170 miles. Adding the same amount of fine particles to conditions of 20-mile visibility would decrease visual range less than 1 mile.[9] So while the pollutants of concern are the same for protection of visibility as those for the protection of human health, it is necessary to have a regulatory structure that specifically addresses visibility protection to assure that appropriate strategies address the full spectrum of atmospheric conditions and advance the objective of restoring natural air quality to protected public lands.

In 1980, the EPA promulgated regulations to address manmade impairment associated with specific sources located near class I Federal areas, but delayed action on impairment associated with emissions from multitudes of sources over broad geographic areas until the science of visibility monitoring and regional-scale air quality modeling advanced.[10]

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[7] 42 U.S.C. § 7491(a)(1).
[8] H.R. Rep. No. 95-294 at 204 (1977).
[9] "Protecting Visibility, An EPA Report to Congress" 1979
[10] 45 FR 80086.

The 1980 regulations established requirements for the 35 States and one territory containing mandatory class I Federal areas to address visibility protection. The visibility program follows the long established structure of having States develop plans with EPA retaining oversight. A unique aspect of the visibility protection plans is that States consult with the class I Federal land management agencies during the development of implementation plans affording an exchange of technical expertise.

II. 1990 Clean Air Act Amendments focus attention on regional haze

By adding Section 169B to the Clean Air Act in 1990, Congress required EPA to conduct research on regional haze impacts in cooperation with the National Park Service and other Federal agencies. Section 169B required the establishment of a Visibility Transport Commission focused on the region affecting the Grand Canyon National Park. The Commission issued its final report in 1996.[11] Section 169B required EPA to issue regulations to address regional haze at mandatory class I Federal areas within 18 months of receiving the Commission's report. EPA issued final Regional Haze Regulations on July 1, 1999.[12]

The implementation of the Regional Haze Regulations was coordinated with implementation of the new fine particulate national ambient air quality standards as required by the Transportation Equity Act for the 21st Century, Public Law 105-178. EPA adjusted the SIP deadline so that States participating in regional planning organizations could coordinate technical and policy assessments with efforts to implement the fine particle national ambient air quality standard.[13] With participation in regional planning activities States had to submit regional haze plans to EPA by December 17, 2007.

III. Implementation of the Regional Haze Rules

From 2001 to 2008, most States and many Tribes participated in five regional planning organizations (RPOs), supported by EPA funding for technical analysis and policy consultation. The EPA and the class I area Federal land management agencies participated in the RPOs providing technical expertise and working in partnership with States and Tribes on the development of the regional haze plans, consistent with statutory requirements calling for plan development in consultation with the Federal Land Managers.

IV. EPA's Partnership with States, Tribes and Federal Land Managers

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[11] Grand Canyon Visibility Transport Commission, Recommendations for Improving Western vistas, Report to U.S. EPA, June 10, 1996.
[12] 64 FR 35714
[13] 64 FR 35724

Beginning with the 1980 rules, through a multi-agency collaboration in the collection of visibility monitoring data in mandatory Federal Class I areas, and including development of the Regional Haze Rules, EPA has had a long partnership with the States, Tribes and Federal Land Managers in designing the visibility protection program. Yet, EPA must provide safeguards when necessary to protect human health and the environment including the grand vistas of our national parks. EPA has shown flexibility in approving State regional haze plans when those plans meet the requirements of the regional haze program. As exemplified in the following cases, several plans are illustrative of a broad, forward-looking stakeholder approach;

A. Colorado's Clean Air Clean Jobs Act.

In 2010 Colorado undertook an approach that examined current and reasonably foreseeable air quality requirements, such as new ambient air quality standards for ozone, safeguards to address carbon pollution, efforts to address hazardous air pollution, such as mercury and regional haze. Consideration was given to emerging scientific concerns with nitrogen deposition at high altitude lakes in Rocky Mountain National Park. The Colorado General Assembly enacted a coordinated multi-pollutant, energy and air quality strategy to address emissions from the electric utility sector over a large area of the State. The resulting air quality management plan, adopted by the Colorado Air Quality Control Commission, addressed the best available retrofit technology (BART) requirement for most sources in the state. The local power company developed cost-effective, integrated solution that included the installation of control technologies, a transition to inherently clean energy resources, and repowering to natural gas.

The costs for the program underwent review by the Public Utilities Commission. The plan was submitted to EPA in 2011 with bi-partisan support of the State legislature, Governor, and the full Colorado Congressional delegation.[14] The EPA proposed approval of the Colorado regional haze plan in March, 2012, and completed approval in December, 2012.[15]

B. BART for nitrogen oxide emissions from Navajo Generating Station.

In February 2013, EPA proposed a BART emission limitation to reduce emissions of nitrogen oxides (NOx) from Navajo Generating Station (NGS), located on the Navajo Nation, building from an action years earlier to limit the plant's sulfur dioxide contributing to pollution of the Grand Canyon. The EPA determined that NOx emissions from NGS significantly degraded visibility at 11 class I areas. EPA simultaneously proposed a "BART Alternative" as well as a framework to evaluating

[14] Letter to Administrator Jackson, December 16, 2011, from Senators Udall, Bennett, Representatives Degette, Lamborn, Perlmutter, Coffman, Polis, Gardner, Tipton.
[15] 77 FR 76871

other BART alternatives related to an emissions cap. EPA's proposed alternative to BART encouraged the submittal of other solutions to address the plant's visibility-impairing emissions consistent with EPA's emissions framework under its Clean Air Act responsibilities. After consideration of further public comment and input, EPA adopted an approach jointly recommended by diverse interests including the Salt River Project, the U.S. Department of the Interior (DOI), the Gila River Indian Communities, the Navajo Nation, the Central Arizona Water Conservation District, Environmental Defense Fund, and Western Resource Advocates. The recommendations of this joint technical working group included a combination of solutions to reduce multiple pollutants at the plant, support the development of clean energy for the affected Indian Tribes, reduce water consumption, and address local impacts on families and communities in the vicinity of the plant and its coal mine.

C. BART for nitrogen oxide emissions from Four Corners Power Plant.

On October 19, 2010 EPA proposed a BART determination for the Four Corners Power Plant (FCPP), located on the Navajo Nation, that required an 80 percent reduction in emissions of nitrogen oxides. At the time of proposal the FCPP was the largest single source of nitrogen oxides emissions in the country. The nitrogen oxide emission from FCPP degraded visibility at 16 national parks and wildness areas. After the EPA proposal, Arizona Public Service (APS), the operator of the FCPP, proposed an alternative providing greater emissions reductions than EPA's proposal but over a longer time period. This approach had the added benefit of reducing sulfur dioxide, more particulate matter, mercury and CO2 as well as reducing water consumption at the plant. On August 24, 2012 EPA promulgated the APS alternative.[16]

As demonstrated in part by the above examples, States, Tribes and EPA are effectively carrying out vital responsibilities to protect scenic vistas in national parks – lifting the veil of haze polluting our nation's grand vistas -- while working in partnership with all stakeholders.

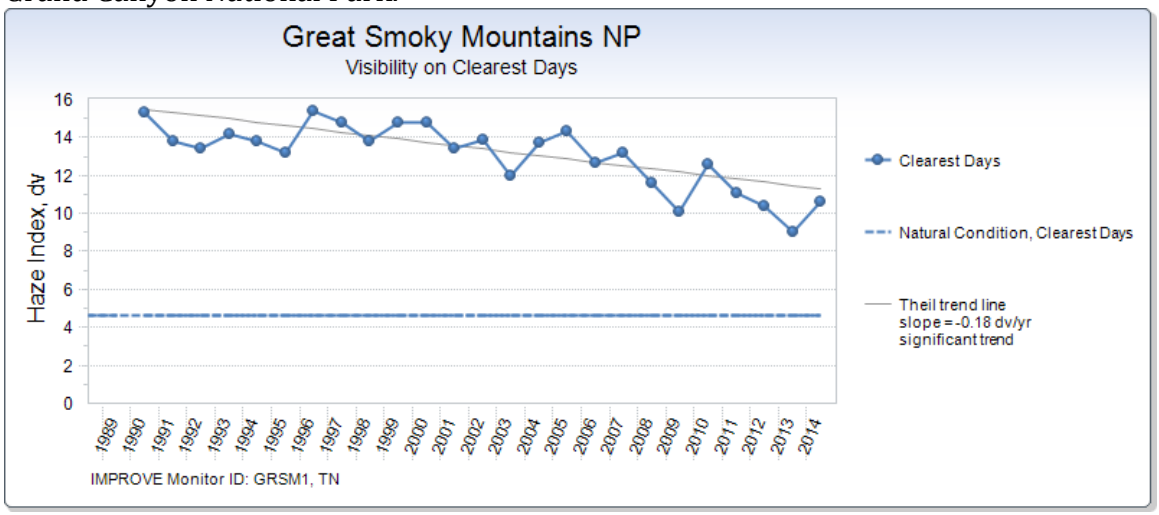
V. Building on the Foundation of Science and Intergovernmental Partnerships to Protect the Grand Visas in America's National Parks and Wilderness Areas

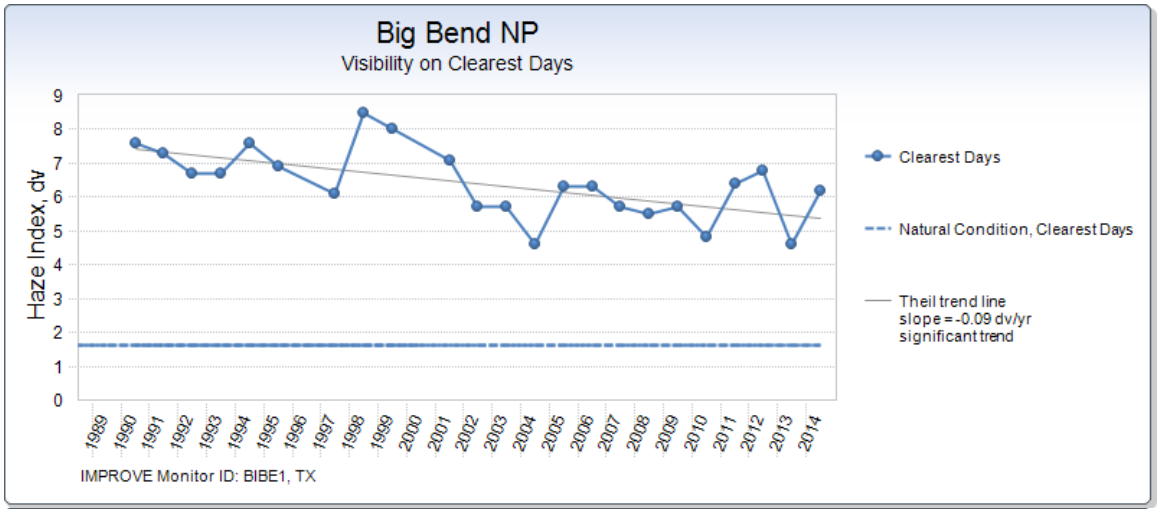
As we near the end of the first implementation period of the regional haze rules, there are lessons for states, tribes and EPA as government policymakers work together on the next round of plan revisions that will focus on ongoing "reasonable progress" toward the national visibility goal.

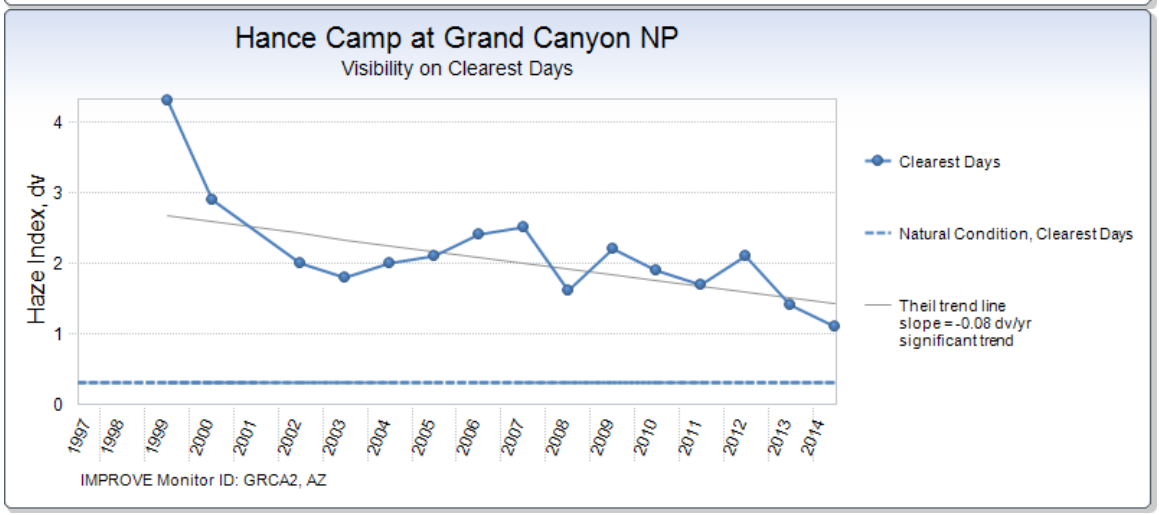
One of the most interesting developments over the years since the promulgation of the regional haze rule is that in almost every mandatory Federal Class I area there has been a statistically significant trend of improvement in visibility on the clearest

[16] 77 FR 51620

20 percent days. As shown the following graphs this is true at mandatory locations as varied as Great Smoky Mountains National Park, Big Bend National Park and Grand Canyon National Park.

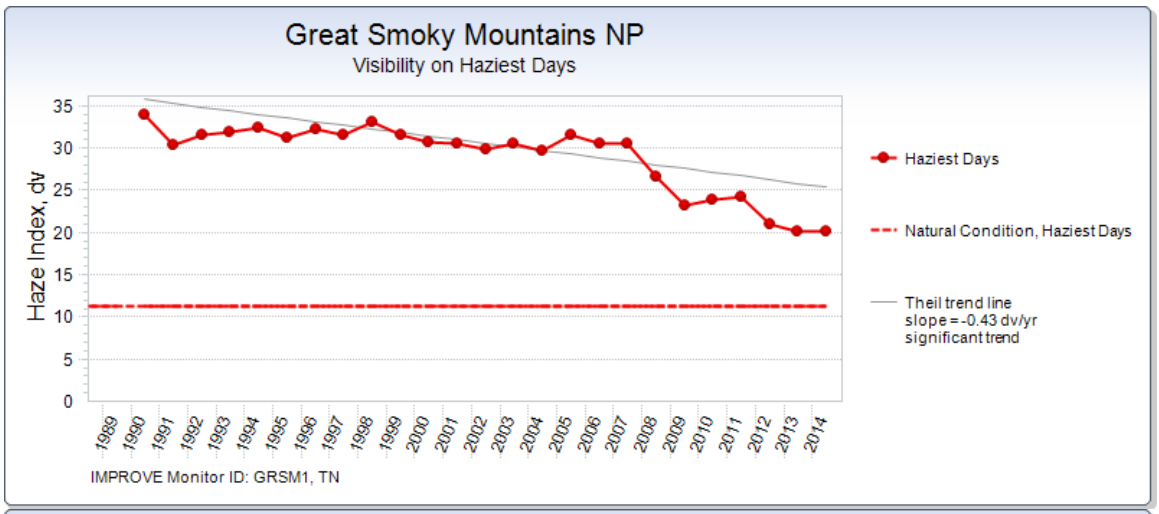


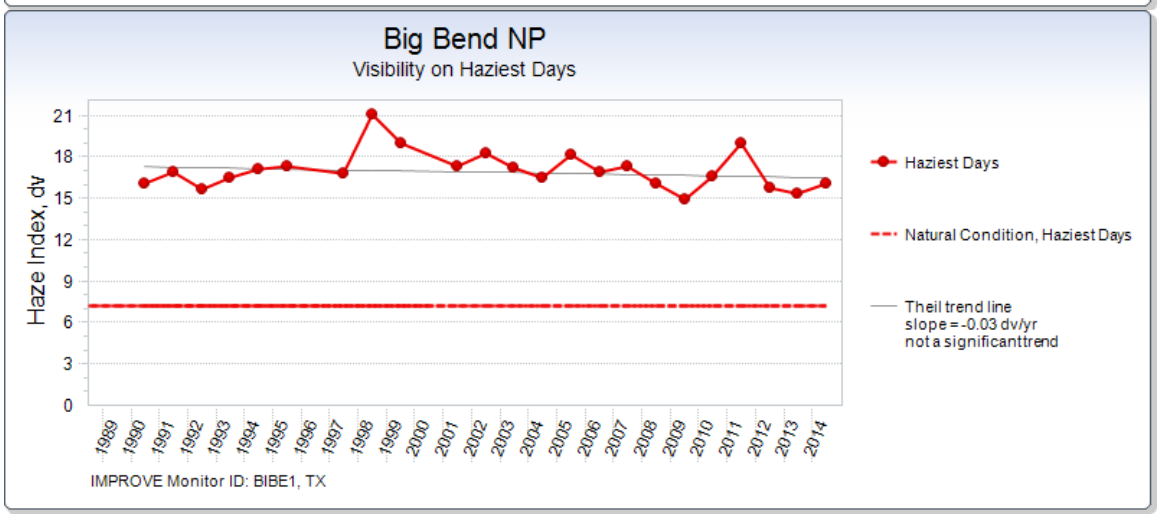


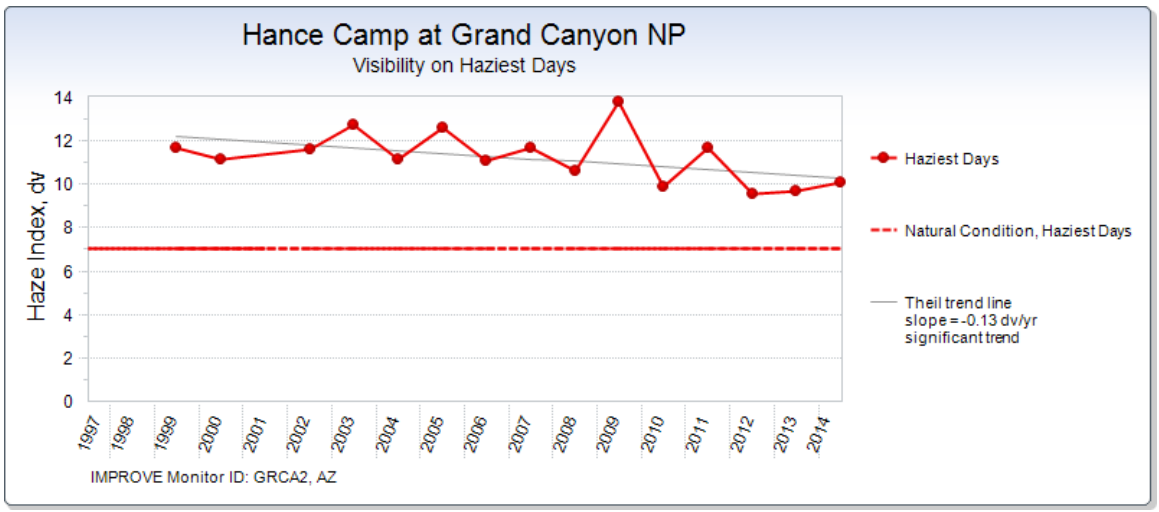


Looking at the constituents of the fine particulate matter at these locations, these trends are likely due to national decreases in ammonium sulfate concentrations. Ammonium sulfate particles are predominantly formed from emissions of industrial and mobile sources of sulfur dioxide. These emissions have declined dramatically over the last 20 years. Since small changes in fine particle concentrations will improve clearer atmospheric conditions more than hazier days, this result indicates that the regional pollution reductions will shift the entire distribution of visibility by increasing the number of clearer days per year.

Making progress toward the natural conditions on the haziest days is more of a challenge, particularly for the parks and wilderness areas of the intermountain west as the graphs for the haziest days in the same three locations indicate:







Examination of the fine particle components measured at these locations on the most impaired days also show decreases in ammonium sulfate at Great Smoky Mountains NP and Grand Canyon NP. The regional programs emissions programs for NAAQS and acid rain plus national reductions in the sulfur content of fuels are the likely the reason for sulfate reductions at Great Smoky Mountains. The improvement in sulfate concentrations at Grand Canyon NP likely resulted from controls at Navajo Generating Station and the national fuel program. The lack of a significant trend at Big Bend NP reflects little change in ammonium sulfate levels in this region.

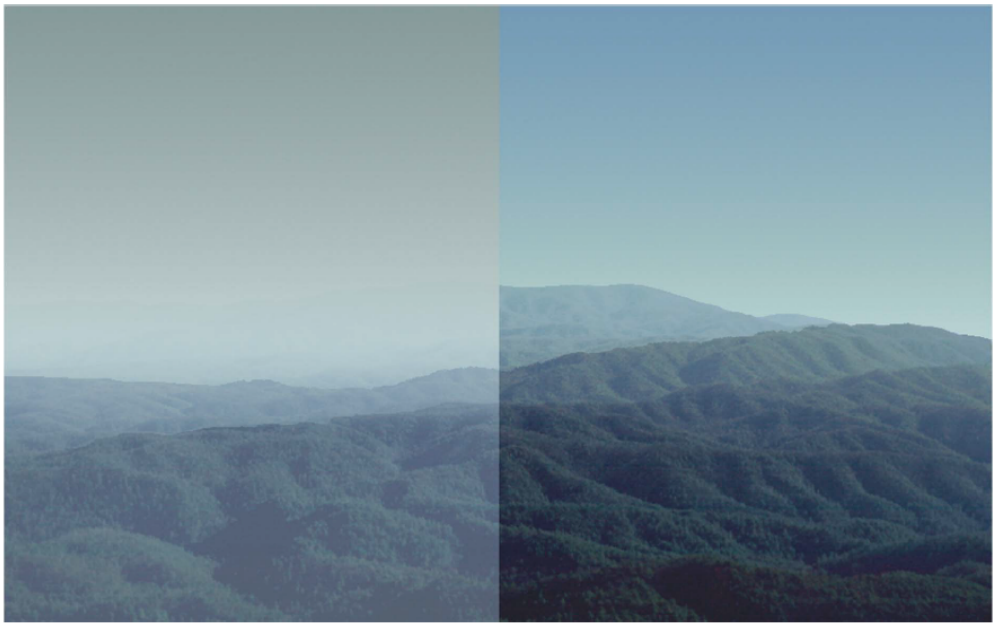
The visibility protection program to date has been a cost-effective, cooperative effort that has reduced degradation of the clearest days and has both tracked significant improvement driven by other air quality programs and contributed to significant improvement in select areas. The implementation of the regional haze strategies is just beginning and must provide continued protection and improvement. It is important to note that while overall the trend is positive, there is not a single Class I area national park or wilderness in the country that has achieved the natural air quality conditions goal of the Clean Air Act. Through policy anchored in science, clean air solutions, and intergovernmental partnerships, we have made important progress in protecting and enhancing premier scenic vistas. We need to continue to build from this foundation to fulfill the national goal of both preventing and remedying air pollution impairing protected national parks and wildernesses.

The following images illustrate the progress of addressing visibility impairment of the 20 percent most impaired days at the three Class I areas.[17] The left side of the

[17] Winhaze images for the mean 20% haziest Days 1989-2012, Jenny Hand, Air Resources Specialists, March 13, 2014 http://www.air-resource.com/resources/downloads.html, Note: figure for Grand Canyon is Hopi Point monitoring station, the older station no longer used for trends. Data for 2012 is very similar to Hance Camp data, so image is reflective of the air quality change.

image shows the average visibility conditions of most impaired days in 1990 based on the average fine particulate concentrations measured on those days. The right side of the image shows the average visibility conditions for the 20 percent most impaired 20 days in 2012.[18]

Great Smoky Mountains National Park, TN
1990-2012



A change from 34 deciviews to21 deciviews.

[18] Review of Federal Land Manager Environmental Database found at http://views.cira.colostate.edu/fed/SiteBrowser/Default.aspx

Big Bend National Park, TX
1990-2012

Both years averaged 16 deciviews.

Grand Canyon National Park, AZ
1990-2012

A change from 13 deciviews to 10 deciviews .

Going forward EPA has the opportunity continue its cooperative approach to protecting visibility. EPA can work with States and Tribes in using the next generation of air quality modeling in conjunction with the now rich national database on the composition of fine particulate matter to explore effective strategies for protection and improvement of visibility.

VI. Conclusion

Our nation has a tremendous bipartisan tradition of protecting our iconic natural places as a legacy for current and future generations. Together, we have made important progress. But our work is not done. Our nation must continue to work together to protect our national parks and wilderness areas – and the grand vistas that are integral to their preservation and enjoyment.

Many of economic valuation studies from 1980 through 2000 show large economic benefits attributed to increased recreational use, to preservation of recreational use for future generations, to value of urban visibility improved as a result of multiple air quality programs. While summarizing the results of studies across many regions of the country is difficult, a review of the various valuation studies found that protection of recreational visibility benefits had a value that ranged from $358 million to approximately $6 billion.[19]

It is also important to recognize that any pollution control required for protection of visibility will have collateral benefits for public health by reducing human exposure to fine particulate matter. Controlling emissions of nitrogen oxides for visibility in areas of the west where ozone formation is limited by availability of nitrogen oxidants would also result in lowered human exposure to ozone and its associated health effects. Since both ozone and fine particulate matter are non-threshold pollutants for human exposure, there will be health-related benefit even in areas attaining the national ambient air quality standards.

EPA's regional haze program provides a vital and enduring framework, anchored in science and reflecting years of intergovernmental partnership, for States, Tribes and stakeholders to work toward the common goal of improving and protecting the scenic treasures of America's most precious lands.

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[19] Out of Sight: The Science and Economics of Visibility Impairment, Abt Associates, Inc. 2000