

Regional Haze In Colorado



Every year, hundreds of visitors flock to the most colorful and scenic national parks and wilderness areas throughout the country to view spectacular, panoramic views and landmarks that stretch over thousands of square miles. Unfortunately, on many days of the year, these visitors are not able to see the spectacular views they expect because of an unnatural veil of brown and white haze that hangs in the air, obscuring the view.

Visibility

Visibility, as it relates to visual resources found in national parks and wilderness areas, is generally described as the maximum distance that an observer can see a landscape viewed against the background sky. Visibility also refers to the clarity with which the texture, form, color, and details of the landscape can be seen.

The presence of pollutants in the atmosphere interferes with the observer's ability to see landscape features. In order to monitor and control sources of haze-forming pollution, scientists study how the pollutants interact with light.

Haze appears when light passes through visibility impairing pollution in the atmosphere. The particles and gases in the observer's line of sight absorb some of the light traveling from a scene toward the observer. Other light is scattered away before reaching the observer. The net effect is called "light extinction." The more particles in the air, the more the light is absorbed and scattered. More absorption and scattering of the light reduces the clarity, color, texture, and form of what the observer is seeing.

Small particles in the atmosphere are often a significant component of light extinction. These small particles' ability to affect visibility depends on their chemical make-up; different particle types are more or less efficient at impairing light. For example, elemental or sooty carbon particles are very efficient absorbers of light. In addition, the size of particles is important in determining the effects that they have on a visual resource. Particles in the size range of 0.1 micron to 1.0 micron (a micron is a millionth of a meter) are the most efficient at disturbing light. The angle between the sun and the observer, along with the size of the pollution particles, determines how much of the sunlight is redistributed into the observer's eye. The more sunlight scattered into the viewpath, the more hazy the view appears.

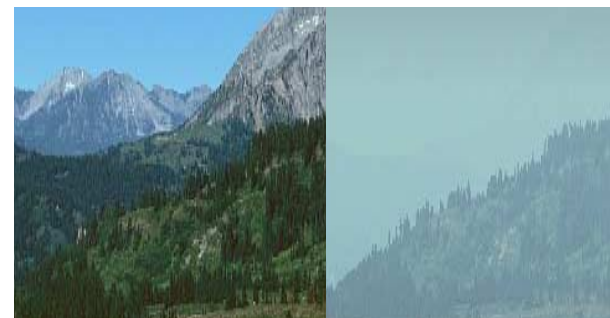


Figure 1. This figure illustrates a scenic view at West Elk Wilderness Area, Colorado, with two levels of visual air quality: natural background (200 km) and visibility on the worst hazy days (8 km). Much of the scenic beauty of the landscape features is lost in the image on the right.

The pictures presented below show the most common types of visibility impairing haze include: uniform haze, layered haze, and plume blight.

*Fig. 1.1 Uniform haze degrades visual air quality at Rocky Mountain National Park. The 20 km distant landscape feature is Elk Ridge. The haze is dispersed evenly across the horizon and extends from the ground to well above the highest features of the landscape. Uniform haze travels long distances and covers a large geographic area, in which case it is called **regional haze**.*



*Fig. 1.2 Elk Ridge showing appearance of **layered haze**. Aerosols are trapped in a stable air mass.*

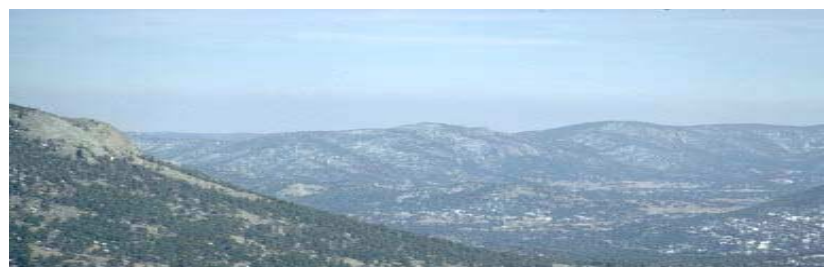


Fig. 1.3. View of a thin, dark **plume blight** on Elk Ridge. Pollution results from a specific source, such as a power plant smoke stack and is emitted into a stable atmosphere.



Sources of Haze-Forming Pollution

Regional haze results from air pollutant emissions from numerous sources, some of which are carried by the wind hundreds, or even thousands, of miles from where they originated. Five types of natural and man-made particles contributing to haze in Colorado include: sulfates, nitrates, organic carbon, elemental carbon, and soil.

Sulfate particles form in the air from sulfur dioxide gas (SO_x). Most of the gas is released from industrial sources including, boilers, coal-burning power plants, and refineries.

Nitrate particles form in the air from nitrogen oxide gas (NO_x). This gas is released from all combustion activities involving cars, trucks, off-road engines, power plants, and other industrial sources. Nitrates scatter more light in humid conditions.

Organic Carbon particles can both be emitted directly from the source (e.g., uncombusted material in forest fire smoke) or be formed later due to reactions of gaseous hydrocarbon emissions in the atmosphere. Organic carbon emissions can occur from vehicle exhaust and refueling, evaporated solvents, as well as natural vegetative emissions (e.g., terpenes) and forest fires.

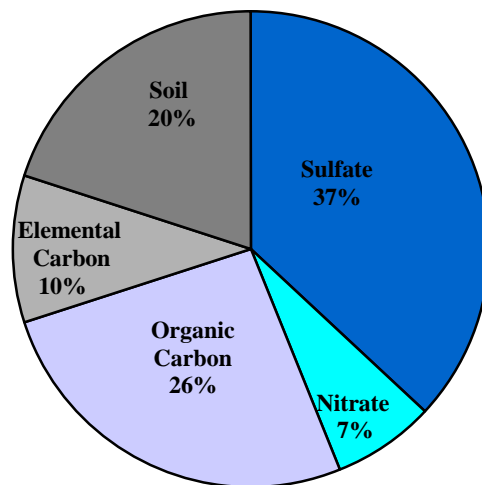
Elemental Carbon particles are similar to soot. They are smaller than most particles and tend to absorb rather than scatter light. These particles are emitted directly into the air as a result of diesel exhaust, fires, and smoke from the burning of wood and wastes.

Major sources of visibility-impairing pollutants:

Stationary and Area:

- Combustion of fossil fuels for heat and power
- Other burning, such as residential woodburning, incineration, and forest fires
- Emissions from industrial/commercial processes
- Evaporative emissions and solvent usage

Soil particles enter the air from dirt roads, fields and other open spaces as a result of wind, traffic, and other surface activities. Soil particles result from the crushing and grinding of larger, earth-born material. Soil particles less than 10 microns are important for disturbing light.



Makeup of fine particles in regional haze in rural Colorado Class I areas.
Source: IMPROVE Report



Mobile:

- On-road vehicles, such as cars, trucks, buses and motorcycles
- Fugitive dust from unpaved roads
- Off-road vehicles, such as aircraft, boats, locomotives, farm equipment, construction machinery and lawn mowers



The sources of emissions effecting visibility in Colorado change during the course of the year. During the warmer months, wind patterns generally from the south and west carry urban and industrial pollution from distant sources. Local sources, including wild fires, contribute as well. As the air travels, particles mix uniformly throughout the atmosphere.

During the colder months, winds are generally from the west. The air from the northwest is usually clean. Emissions from local sources and emissions transported from sources to the west and southwest of Colorado become trapped in valleys and canyons during temperature inversions, creating layered haze. Large masses of clean air or weather events like rain or snow are necessary to wash away the resulting haze.

Background of the Federal Regional Haze Rule

Amendments to the Clean Air Act in 1977 added Section 169A setting forth the following national visibility goal:

Congress hereby declares 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 man-made air pollution.

EPA has divided its visibility protection program into two phases. The first phase addressed impairment from existing or proposed major stationary sources. EPA promulgated visibility regulations for the first phase in 1980 (40 CFR 51.300-51.307). The federal regulations require states with Class I areas to prepare a State Implementation Plan (SIP) to include a monitoring strategy, address existing impairment from major stationary facilities, prevent future impairment from proposed facilities, consult with the Federal Land Managers (FLMs) in the development or change to the SIP, develop a long-term strategy to address issues facing the state, and review the SIP every three years.

In 1980, EPA declined to promulgate regulations to address phase two of the visibility program - regional haze. EPA cited the need for additional information in a number of areas in order to be able to construct a regulatory program for regional haze. However, by the late 1980s, it became clear that pollutants transported hundreds of miles are the major component of visibility impairment, and therefore, no one state or tribe can fully protect Class I areas within its boundaries from the emissions transported from other states. When the Clean Air Act was amended in 1990, Congress added Section 169B, authorizing further research and assessment reports to Congress regarding regional haze. Congress also authorized EPA to create visibility transport commissions and mandated creation of the Grand Canyon Visibility Transport Commission (GCVTC) to make recommendations to EPA on Grand Canyon National Park visibility issues. A report was required from any transport commission within four years from the date of its creation. Finally, EPA is required by 169B to carry out its regulatory responsibilities under Section 169A (i.e., issue draft regulations requiring SIPs) within 18 months of receiving such a report.

In late-1991 EPA officially established the GCVTC. EPA defined the region affecting visibility at Grand Canyon to be nine states (Oregon, California, Idaho, Nevada, Utah, Arizona, Wyoming, Colorado and New Mexico), though Idaho chose not to join the GCVTC, and included the 16 Class I areas on the Colorado Plateau as being affected (six of which are in Colorado). GCVTC members were the governors of the eight states as well as the leaders of four tribal nations in the West and representatives of Federal Land Management agencies. The GCVTC submitted its report to EPA in June 1996, following four years of research and policy development.

The GCVTC report, as well as the many research reports prepared by the GCVTC, contributed invaluable information to EPA in its development of the federal regional haze rule. The draft rule was issued in 1997 and the final rule on July 1, 1999 (40 CFR 51.308-51.309). The final rule created two planning alternatives known as Section 308 and Section 309. The 308 alternative follows a more traditional SIP planning process, with the requirement that BART be established for existing major stationary sources. Additional control strategies will be selected as determined necessary. Under the 309 process, a regional planning approach is taken, using voluntary controls and market-based approach for reducing stationary source emissions. The aim of the rule is to return the visibility condition in mandatory federal Class I areas to their “natural” conditions within 60 years. Natural is a term used by the Clean Air Act, to mean that no human-caused pollution can impair visibility.

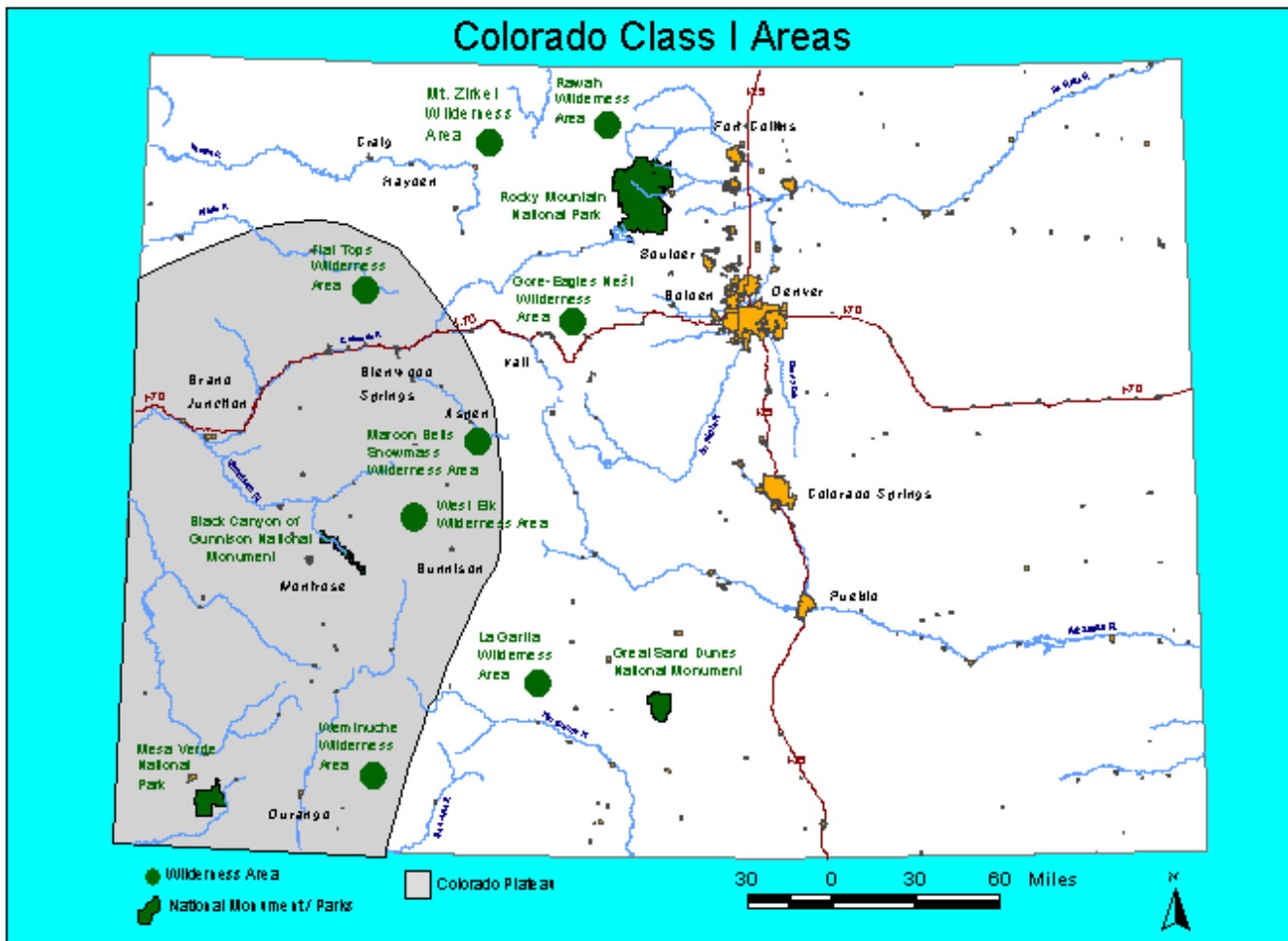
The nine states affecting the Grand Canyon formed the Western Regional Air Partnership (WRAP). The purpose of WRAP is to provide a forum in which states coordinate to reduce emissions, and make discernible visibility improvements in national park and wilderness areas across the Colorado Plateau by 2018. Within the framework of the national program, WRAP’s ultimate plan is to return these national parks and wilderness areas to their natural conditions of visibility from current levels to natural levels by the year 2064.

Mandatory Class I Federal Areas in Colorado

Mandatory Federal Class I areas are those specified as Class I by the Clean Air Act on August 7, 1977. The EPA determined that visibility, which can be diminished by haze, is an important value for these areas:

- International Parks
- National parks exceeding 6,000 acres in size
- National Wilderness Areas (Including certain national wildlife refuges and national monuments) exceeding 5,000 acres in size, and
- National memorial parks exceeding 5,000 acres in size

<u>Mandatory Class I Federal Areas in Colorado</u>	Acres	Federal Land Manager
Black Canyon of the Gunnison Wilderness Area	11,180	National Park Service
Eagles Nest Wilderness Area	133,910	Forest Service
Flat Tops Wilderness Area	235,230	Forest Service
Great Sand Dunes Wilderness Area	33,450	National Park Service
La Garita Wilderness Area	48,486	Forest Service
Maroon Bells-Snowmass Wilderness Area	71,060	Forest Service
Mesa Verde National Park	51,488	National Park Service
Mount Zirkel Wilderness Area	72,472	Forest Service
Rawah Wilderness Area	26,674	Forest Service
Rocky Mountain National Park	263,138	National Park Service
Weminuche Wilderness Area	400,907	Forest Service
West Elk Wilderness Area	61,412	Forest Service



Measuring Visibility

In the mid 1980's the National Park Service, United States Fish and Wildlife Service, Bureau of Land Management and United States Forest Service entered into a cooperative relationship with the EPA to establish the IMPROVE Program (Interagency Monitoring of Protected Visual Environments). In 1991, additional organizations that joined included: State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (STAPPA/ALAPCO), Western States Air Resources Council (WESTAR), and Northeast States for Coordinated Air Use Management (NESCAUM).

The IMPROVE Program collects and analyzes visibility data from Class I area monitoring sites through the United States. Colorado has six of these monitoring sites. Land managers, industry planners, and air quality regulators use the data gathered at these sites to understand and protect the air quality in Class I areas. The IMPROVE Program scientifically documents the visual air quality of the wilderness areas and national parks for American citizens.

Any state with one or more Class I areas, is required to establish and update three important visibility parameters for the 20% best and 20% worst visibility days at each Class I area within the state.

- **Baseline conditions**, representing visibility for the 20% best and worst days calculated from monitored data collected during the initial 5-year period of the regional haze program.
- **Current conditions**, representing visibility on the best and worst days, based on the most recent 5-year block of monitored data. Current conditions for each Class I area are revised every 5 years at the time of each SIP revision. They are used to evaluate the amount of progress made in relation to progress goals; the amount of progress made since the last 5-year progress review; and the amount of progress made from the baseline period of the program.

- **Estimate of natural visibility conditions** to improve visibility on the worst days and prevent degradation on the best days by eliminating all human-caused pollution.

The IMPROVE air quality monitoring underway to support progress towards improving visibility in Colorado includes aerosol monitoring of particulate matter mass and its chemical components, optical monitoring of light scattering or overall light extinction and photographic monitoring, and on-site monitoring of relative humidity.



Fig. 2.0 Modular Aerosol Sampler, used for representation of physical properties of ambient atmospheric aerosols, including their concentration, and chemical composition



Fig. 2.1 Optec NGN-2 integrating nephelometer, used to estimate the atmospheric scattering coefficient (b_{scat}) by measuring light scattered by aerosols and gases in a sample air volume

Metric Used for Setting Visibility Goals and Tracking Progress

For each IMPROVE monitoring site, one 24-hour sample is collected every 3 days, which allows for a total of 121 samples each year. States and federal land managers can evaluate changes in visibility impairment, and identify the principal types of emission sources contributing to impairment there.

Baseline visibility conditions, progress goals, and changes in visibility must be expressed in terms of deciviews (dv). The deciview is a haze index designed to be linear with respect to human visibility. A deciview change in haziness corresponds to a small, visibly perceivable change in the scene's appearance. Higher deciview values indicate more light extinction and decreased visual range because of increased haziness.

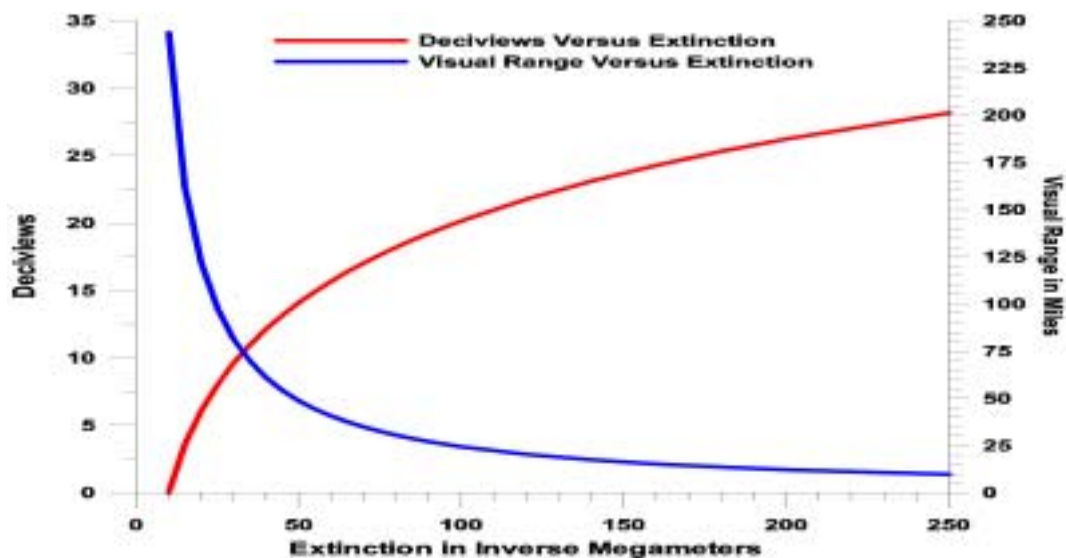
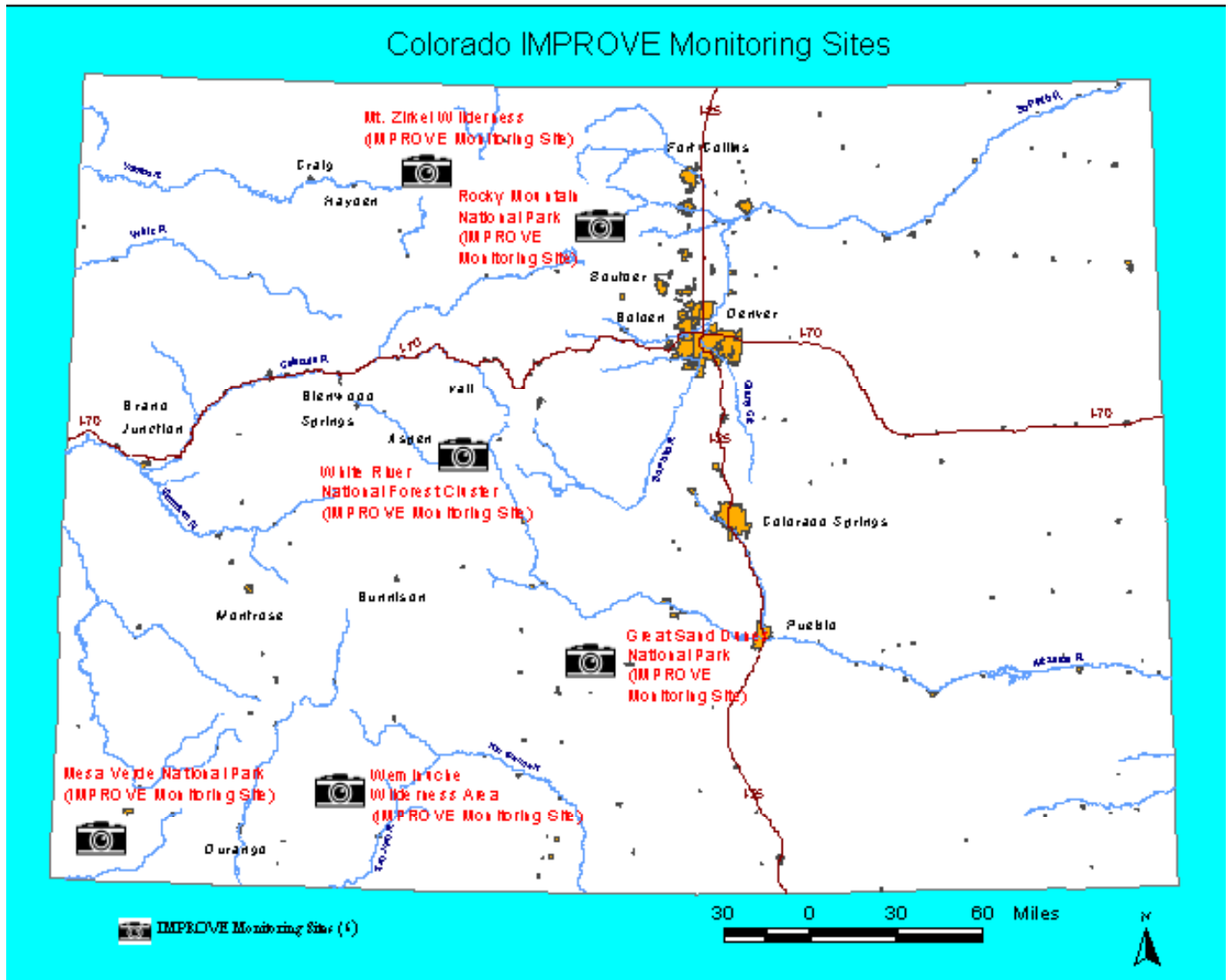


Fig. 2.2 Optec LPV2 transmissometer, which measures the ability of the atmosphere to transmit light. Two primary components: a light source (transmitter), and a light detector (receiver).

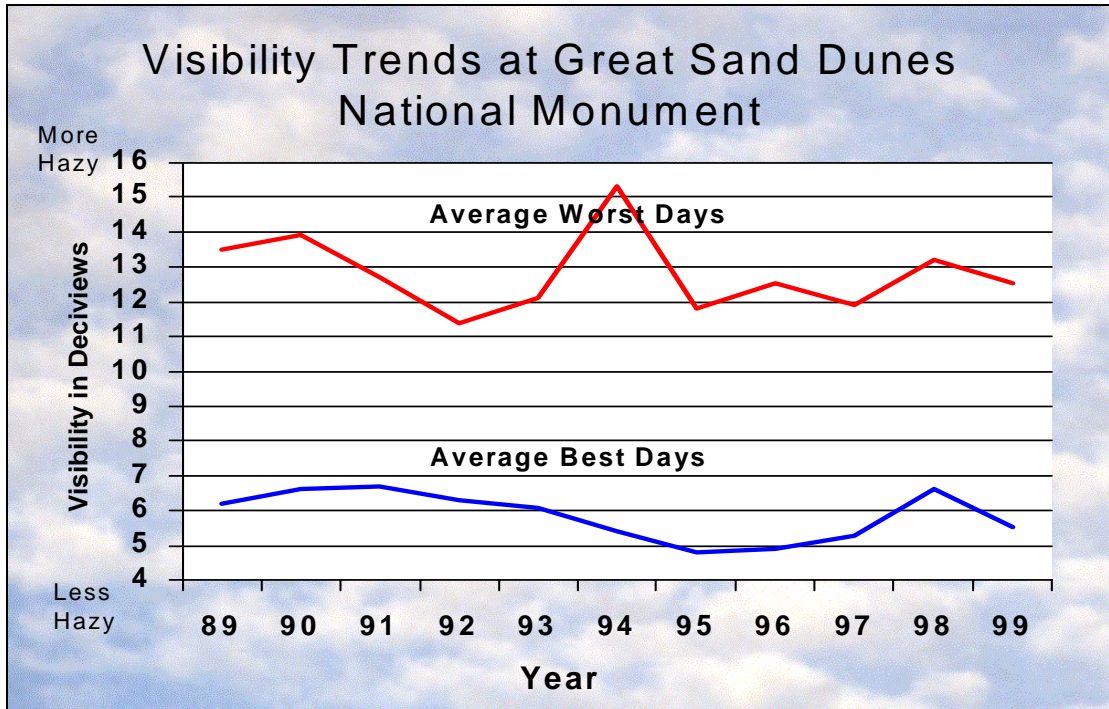
The deciview is expressed by the following formula: $dv=10 \ln(b_{ext}/10)$, where b_{ext} represents total light extinction (loss of light due to scattering and absorption as it passes through a medium) expressed in inverse megameters (i.e., $Mm^{-1}=10^{-6} m^{-1}$), with 10 representing pristine conditions.

Once deciviews are calculated for daily samples, the deciview values for each year are ranked from lowest to highest. The lowest 20% of the deciview values for the year (e.g., the best 20% of the days in terms of visibility) are averaged to produce an annual average deciview value for the best 20% of days. The highest 20% of the deciview values for the year (e.g., the worst 20% of the days in terms of visibility) are averaged, thus giving the annual average deciview value for the worst 20% of the days. This process is repeated for each year of data available. The annual average deciview values for the 20% best and 20% worst visibility days in each year are then averaged over the five-year periods specified in the regional haze rule. Within any specified five-year

period, there should be at least three complete years of data from which annual averages are drawn to calculate the five-year average. These averages are the basis against which visibility improvements are determined.



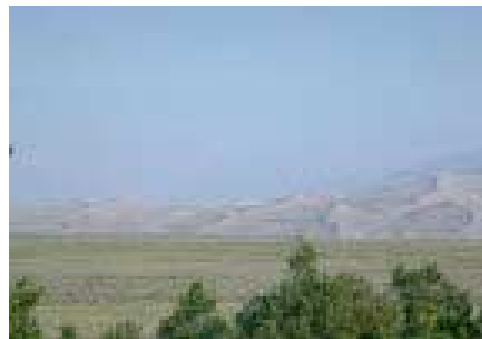
The following photographs and graphs present historical Regional Haze conditions at select Class I areas in Colorado.



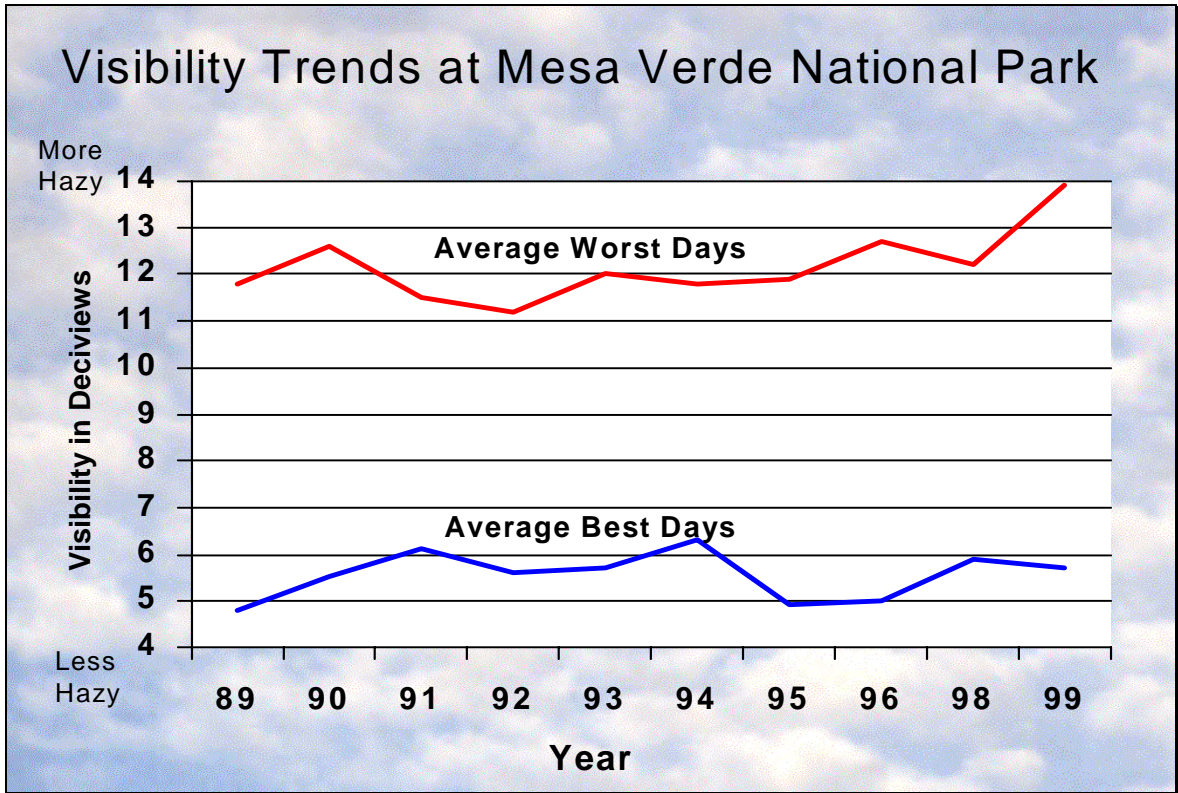
Source: IMPROVE
Vista Reference = Gibson Peak
Deciview = 1
B_{ext} = 12
Visual Range = 340 km



Source: IMPROVE
Vista Reference = Gibson Peak
Deciview = 14
B_{ext} = 39
Visual Range = 100 km



Source: IMPROVE
Vista Reference = Gibson Peak
Deciview = 23
B_{ext} = 98
Visual Range = 40 km



Source: IMPROVE

Vista Reference = Beautiful Mountain Vista

Deciview = 0

B_{ext} = 10

Visual Range = 380 km



Source: IMPROVE

Vista Reference = Beautiful Mountain Vista

Deciview = 7

B_{ext} = 21

Visual Range = 190 km



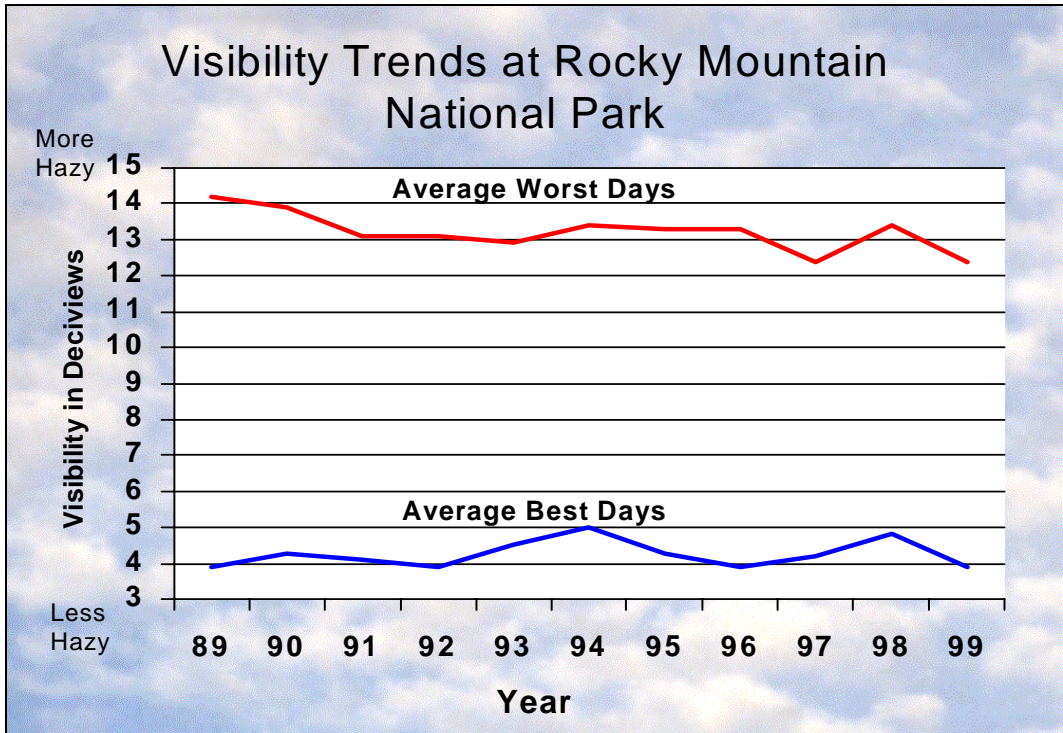
Source: IMPROVE

Vista Reference = Beautiful Mountain Vista

Deciview = 22

B_{ext} = 87

Visual Range = 45 km



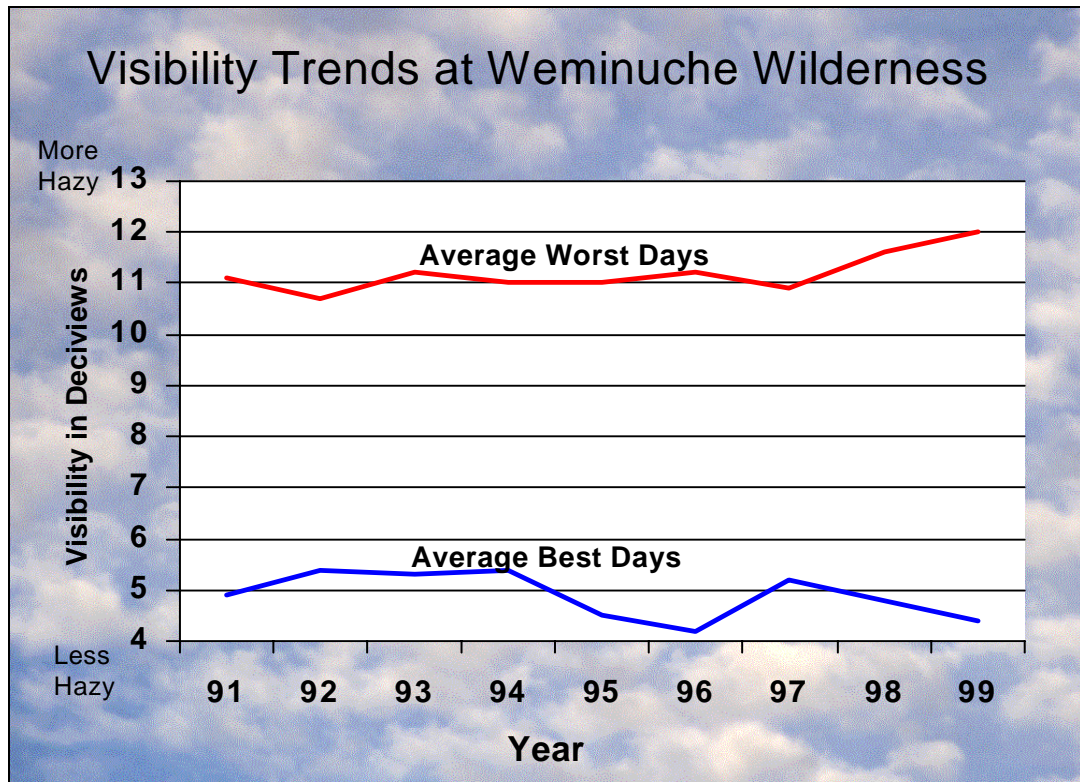
Vista Reference = Elk Ridge
Deciview = 3
B_{ext} = 13
Visual Range = 300 km



Vista Reference = Elk Ridge
Deciview = 11
B_{ext} = 30
Visual Range = 130 km



Vista Reference = Elk Ridge
Deciview = 30
B_{ext} = 196
Visual Range = 20 km



Vista Reference = Indian Trail Ridge
Deciview = 1
 B_{ext} = 11
Visual Range = 370 km



Vista Reference = Indian Trail Ridge
Deciview = 8
 B_{ext} = 22
Visual Range = 180 km



Vista Reference = Indian Trail Ridge
Deciview = 22
 B_{ext} = 87
Visual Range = 40 km

The State Implementation Plan

The Air Pollution Control Division is now focusing on Regional Haze planning activities in preparation to meet the requirements of the 1999 Regional Haze Rule. Colorado, in partnership with surrounding states, is evaluating technical information to understand how states can reduce haze in the mandatory Class I federal areas throughout the West. For Colorado's Class I areas, the plans will address human and natural sources of haze, document the visibility conditions, and recommend the appropriate strategies to meet the long-term visibility goals. The way in which Colorado and other states will comply with the Regional Haze regulations is develop and implement State Implementation Plans (SIPs). The first planning period for the SIPs is to extend to 2018. At that time, a revised SIP, with new reasonable progress goals is required for the next 10-year period. A periodic report on progress is due every five years. The process continues over time and EPA estimates the program will continue through 2064. The SIPs for each Class I area will include two major provisions:

Provision 1

1. Show how to improve visibility on the haziest (i.e., 20% worst days) over the period of the implementation plan, and
2. Ensure no degradation of visibility on the clearest (i.e., 20% best) days over the same period.

Provision 2

1. Develop long-term (10-15 year) strategies including enforceable measures designed to meet reasonable progress goals. The first long-term strategy will cover 10 to 15 years, with reassessment and revision of those goals and strategies in 2018 and every 10 years thereafter. State strategies should address visibility problems in Class I areas within as well as outside the state boundaries.
2. In identifying the emission reduction measures, Colorado will address all types of human-caused emissions and their impacts on visibility in Class I areas, including emissions from mobile sources, stationary sources, and area sources.

After spending two years researching the options and holding public discussions to determine the best approach, Colorado chose the development of SIPs under the Regional Haze Rule Section 51.308 where Colorado would partner with surrounding states to address the Regional Haze issues and develop SIPs.

Pursuant to the requirements of 51.308, the State of Colorado is to submit to EPA Regional Haze SIP elements for the 12 mandatory Class I federal areas within the State's boundaries as well as for each mandatory Class I federal area located outside the State which may be affected by emissions from Colorado. For each Class I area in Colorado, the SIP must establish a reasonable progress goal for the most impaired days and ensure no degradation in visibility for the least impaired days for the same planning period. For the first planning period, the SIP must also address Best Available Retrofit Technology (BART) requirements of section 51.308(e). Colorado is responsible for the preparation of technical information (regional emission inventories, regional modeling, source attribution and BART determinations for applicable sources, and the determination of background, baseline, and natural visibility conditions in each Class I area within the state) to be utilized in constructing the SIP. Technical information prepared by the Regional Planning Organization as designated by EPA for this section of the country, the Western Regional Air Partnership (WRAP), is planned to be available for Colorado's use in SIP preparation. Colorado is also responsible for preparing a long-term strategy that ensures reasonable progress for regional haze over the planning period for each of Colorado's Class I areas as well as areas its emissions affect.

The SIP elements for each Class I area are due following EPA's designations for the PM_{2.5} standards. If there are no PM_{2.5} nonattainment areas in Colorado, then the SIP elements are due 12 months after the designation (which EPA intends to publish by December 15, 2004). If there are one or more PM_{2.5} nonattainment areas, then the SIPs are due within three years of the designations, but no later than December 31, 2008. The implementation of control strategies, including BART, are to be phased in through 2018 in order to meet the reasonable progress goals established for each Class I area.

If it is determined that there is interstate transport of emissions that impact visibility in Colorado's Class I areas, or if emissions from Colorado impact visibility in other states' Class I areas, Colorado may submit its 308 SIP elements utilizing a regional planning process with one or more surrounding states. The Regional Planning process is to address the process, goals, objectives, management and decision-making structure, deadlines for completing significant technical analysis and developing emission management strategies and a regulation implementing the recommendations of the regional group.

The SIP requirements include:

- **General Plan Provisions:** Plan elements are to be generally described for the 12 Colorado Class I areas, as well as for each Class I area located outside the state, which may be affected by emissions from Colorado.
- **Options for Regional Planning:** A demonstration must be made that Colorado is participating in a regional planning process, such as the WRAP, and commitments are to be made to continue the participation through future SIPs. A showing is necessary that Colorado is either impacted by or is impacting visibility in another state.
- **Reasonable Progress Goals:** Goals must be established that provide for reasonable progress towards achieving natural visibility conditions for the most impaired days and ensuring no degradation in visibility for the least impaired days for each of the 12 Class I areas within the state (expressed in deciviews). Baseline visibility conditions for the 20% most impaired days during 2000-2004 are to be compared to natural conditions, and a uniform rate of progress necessary to achieve natural conditions by 2064 is to be determined. For this SIP, the amount of progress (expressed in deciviews) to be achieved for each Class I area through 2018 (according to the uniform rate of progress) is to be documented. Emission control measures are then to be identified that will achieve the necessary progress through 2018.
- **Long-Term Strategy:** Consultation between Colorado and surrounding states, tribes, and federal land managers (FLMs) is to be documented where emissions from other states impact Colorado's 12 mandatory Class I federal areas and/or mandatory Class I federal area located outside Colorado are affected by emissions from Colorado. Colorado is to demonstrate through modeling, monitoring and emissions information that it has included all measures necessary to obtain its share of emission reductions needed to meet the reasonable progress goal for each area (in-state and out-of-state Class I areas). All anthropogenic sources of visibility impairment are to be identified, including major and minor stationary sources, mobile sources and area sources. Seven specific factors must be considered in developing the long-term strategy:
 - Emission reductions due to ongoing air pollution control programs;
 - Measures to mitigate the impacts of construction activities;
 - Emission limitations and schedules of compliance;
 - Source retirement and replacement schedules;
 - Agriculture and forestry smoke management;
 - Enforceability of emission limitations and control measures; and
 - Anticipated net effect on visibility due to projected changes in emissions.
- **Monitoring Strategy and Emission Inventories:** A monitoring strategy is to be included in the plan for measuring, characterizing and reporting regional haze visibility impairment that is representative of all mandatory Class I federal areas area within the State. Also to be included in the plan is a statewide emissions inventory of pollutants that are reasonably anticipated to cause or contribute to visibility impairment in any Class I area. The inventory must include emissions for a baseline year, emissions for the most recent year for which data are available, and estimates of future projected emissions. A commitment must be included to update the inventory periodically.

- **Best Available Retrofit Technology:** The SIP is to contain emission limitations representing “BART” and schedules for compliance with BART for each BART-eligible source that may reasonably be anticipated to cause or contribute to any impairment of visibility in any mandatory Class I Federal area, unless the State demonstrates that an emissions trading program or other alternative measures will achieve greater reasonable progress toward natural visibility conditions. Each source subject to BART install and operate BART as expeditiously as practicable, but in no event later than five years after approval of the implementation plan revision or no later than 2013 to 2014. Five basic elements related to BART, a principle element for the Clean Air Act addressing the installation of emission controls for existing major facilities, placed into operation between 1962 and 1977, that have the potential to emit more than 250 tons of visibility-reducing pollution a year, are:
 - The cost of the controls;
 - The energy and non-air environmental impacts of compliance;
 - Any existing pollution control technology in use at the source;
 - The remaining useful life of the source; and
 - The degree of improvement in visibility which may reasonably be anticipated from the use of such technology.

States may adopt alternative measures, such as a regional emissions trading program, in lieu of BART so long as the alternative measures achieve greater reasonable progress than would the application of source specific BART. An emissions trading program or other alternate measures should provide flexibility to achieve greater reasonable progress than source specific BART at a lower cost. An emission trading program or alternative measure program adopted in lieu of BART must be fully implemented within the period of the first long-term strategy or by 2018.

- **Comprehensive Periodic Implementation Plan Revisions:** Colorado must submit a progress report to EPA five years after the submittal of the initial Regional Haze SIP and every five years thereafter. Colorado must also submit a regional haze implementation plan revision to EPA by July 31, 2018 and every ten years thereafter.
- **Assessment of Baseline, Natural and Current Conditions:** The baseline, the natural and the current visibility conditions need to be established for each Class I area to track progress. The baseline condition is the visibility for the 20 percent haziest and 20 percent clearest days at the time the regional haze program is established using year 2000 through 2004 data. The natural condition is the visibility experienced in the absence of human-caused impairment. The current condition is the best and worst days calculated from a multiyear average periodically revised to illustrate progress from baseline and toward natural conditions. This value is revised for each SIP update.
- **Determination of the Adequacy of the Existing Plan:** When Colorado submits any five-year progress report to EPA, the State must also take one of the following actions based upon the information presented in the progress report.
 - If Colorado determines that no revision is needed at the time of periodic revision, it must provide to the EPA a negative declaration that further revision of the existing implementation plan is not needed at this time.
 - If Colorado determines that the implementation plan is or may be inadequate due to emissions from sources in another State(s) which participated in a regional planning process, Colorado must provide notification to the EPA and to the other state(s) which participated in the regional planning process with the States. Colorado must also collaborate with the other state(s) through the regional planning process for the purpose of developing additional strategies to address the plan’s deficiencies.

- Where Colorado determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources in another country, Colorado shall provide notification, along with available information, to EPA.
- Where Colorado determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources within the State, Colorado shall revise its implementation plan to address the plan's deficiencies within one year.
- **State and Federal Land Manager Coordination:** Colorado must provide FLMs with an opportunity for consultation at least 60 days prior to holding any public hearing on an implementation plan (or plan revision) for regional haze. This consultation must include the opportunity for the affected Federal Land Managers to discuss their assessment of impairment of visibility in any mandatory Class I Federal area and recommendations on the development of the reasonable progress goal and on the development and implementation of strategies to address visibility impairment.