

Introductory Note: In this document each reference to “CAAA” means the Clean Air Act Amendments of 1990, P.L. 101-549.

SECTION III.K AREAWIDE POLLUTANT CONTROL PROGRAM FOR REGIONAL HAZE

III.K.1 PURPOSE AND SCOPE OF THE ALASKA REGIONAL HAZE STATE IMPLEMENTATION PLAN

A. Overview

A State Implementation Plan (SIP) is developed and implemented by states as required by the federal Clean Air Act (CAA), with formal approval and administration by the U.S. Environmental Protection Agency. A SIP consists of narrative overviews, background information, strategy plans, technical data, data analyses, and implementation plans for complying with CAA requirements. In Alaska, the Air Quality Control Plan, which contains the required SIPs for Alaska, is incorporated by reference into state regulations at 18 AAC 50.030.

This chapter of the Alaska Air Quality Control Plan addresses the federal rules for protection of visibility specifically related to regional haze. These federal rules were adopted to fulfill requirements of Section 169B of the Clean Air Act, which has as its purpose to protect and improve visibility at specified federal land units identified as Class I Areas. Class I Areas include national parks greater than 6,000 acres, wilderness areas and national memorial parks greater than 5,000 acres, and international parks that existed as of August 1977.

Despite Alaska’s many national parks, forests, wildlife refuges, and wilderness areas, Alaska has only four such mandatory areas because most of these areas were set aside after the inclusion of the Class I areas in the 1977 Clean Air Act. Table III.K.1-1 lists the four Class I federal areas located within the state; as also shown in the table, no Class I federal areas located outside of the state are affected by emissions produced within Alaska.

Table III.K.1-1 Class I Federal Areas Located Inside and Outside of Alaska Impacted by Emissions Produced Within Alaska		
Class I Federal Area	Located in Alaska	Located Outside of Alaska
Denali National Park	Yes	-
Tuxedni Wilderness Area	Yes	-
Simeonof Wilderness Area	Yes	-
Bering Sea Wilderness Area	Yes	-
None	-	Yes

The United States Environmental Protection Agency (U.S. EPA) adopted the Regional Haze Rule in 1999 to protect visibility in Class I areas. The rule lays out specific requirements to ensure improvements in visibility at 156 of the largest national parks and wilderness areas across

the United States through the mitigation of human-caused air pollution impacts. The Regional Haze Rule sets out a long-term path of visibility improvement towards natural visibility conditions, to be attained by 2064. The Regional Haze Rule requires states to establish interim goals toward the final 2064 visibility goals.

This Regional Haze Plan* describes how the State of Alaska will meet federal requirements to measure and monitor visibility, aerosols, and air pollution at Alaska's four Class I Areas, how Alaska will evaluate the factors reducing visibility at each site, and how Alaska plans to identify and implement air pollution control measures to reach natural visibility conditions by the 2064 Regional Haze Rule target date. This plan includes both the characterizations of the baseline air quality at each of Alaska's Class I Areas and Alaska's strategy toward meeting the interim goals to be attained by 2018. It also presents Alaska's visibility status and goals, and represents Alaska's element of the national effort to assess visibility and visibility improvement through 2018. The SIP demonstrates specifically how 2018 visibility goals will be attained. All pollutants and aerosols affecting visibility are considered by this plan, including those entering Alaska at its borders. Air pollution sources, transport, and atmospheric precursors of aerosols originating within Alaska and entering Alaska from Asia, Europe, and Canada are considered by the SIP.

Each of the 50 states is required to address the Regional Haze Rule, but haze is inherently a regional, and frequently even international, phenomenon. Coordinated technical services, modeling, data management, and consulting have been provided by regional planning organizations. For Alaska, the Western Regional Air Partnership (WRAP) has served this function. Technical tool development, emission inventories, and air quality modeling have been conducted on a regional basis by the WRAP to support the efforts of all of the western states. Alaska has participated actively in WRAP projects, and uses WRAP technical products extensively in this plan.

The Regional Haze Rule of the Clean Air Act specifically regulates visibility, but the aerosols and pollutants that reduce visibility also impact human health and ecosystems in Alaska. Consequently, the implementation of this plan will impact Alaska's people and ecosystems in a broader manner. Alaska receives air pollutants across all its boundaries, from many international sources subject to different environmental regulations. The analysis of Alaska's air for the development of this plan gives us greater understanding of how our air quality is affected by international sources, and of where Arctic and Sub-arctic Alaska fits in the global picture of air quality.

B. Why Visibility?

Without the effects of air pollution, natural visual range is approximately 140 miles in the western United States and 90 miles in the eastern states. However, over the years, air pollution in many parts of the United States has significantly reduced the range that people can see. In the West, the current range is 35-90 miles, and in the East, only 15-25 miles. In Alaska in 2002, standard visual range at Denali National Park was approximately 133 miles. Reductions in

* The term "Regional Haze Plan" is used to refer specifically to this plan to address the requirements of the Regional Haze Rule; however, the term "Plan" and "SIP" may be used interchangeably.

Denali's visual range from existing and increasing air pollution will be evaluated as part of this SIP.

Visibility is reduced, or impaired, when particles and gases in the atmosphere reflect, scatter or absorb light. The visual range, or distance that we can see, is limited by very small particles in the air. The particles absorb and scatter sunlight, creating haze. Haze affects the color, contrast, and clarity of the vistas, wildlife, forests, seascapes, and ecosystems we can see. Good visibility is important to the enjoyment of national parks and scenic areas.

Many different types of particles and gases are released into the atmosphere through human activities. Not only do the pollutants released directly reduce visibility, but also the pollutants can react chemically with each other to create new types of pollutants which also affect visibility. The individual pollutants that create haze are measurable, for instance as sulfates, nitrates, organic carbon, elemental carbon, soil dust, or sea salt. But while many different types of pollutants contribute to impaired visibility, visibility is a single measure that includes the effects of many pollutants.

C. EPA's Visibility Regulations and the Regional Haze Rule

1. History of the Visibility Program

In 1977, Congress amended the Clean Air Act to include provisions to protect the scenic vistas of the nation's national parks and wilderness areas. In these amendments, Congress declared as a national visibility 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. (Section 169A)

At that time, Congress designated all wilderness areas over 5,000 acres and all national parks over 6,000 acres as "mandatory federal Class I areas" ("Class I areas"). These Class I areas receive special visibility protection under the Clean Air Act. Figure III.K.1-1 shows the 156 national parks and wilderness areas designated as the Class I areas. The four Class I Areas in Alaska are shown in Figure III.K.1-2.

The 1977 Clean Air Act amendments charged Federal Land Managers (FLMs) with direct responsibility to protect the air quality and related values (including visibility) in areas of great scenic importance (that is, Class I areas) and to consider, in consultation with EPA, whether proposed industrial facilities will have an adverse impact on these values. The States were required to determine whether existing industrial sources of air pollution must be retrofitted to reduce impacts on Class I areas to acceptable levels. The EPA was tasked to report to Congress regarding methods for achieving greater visibility and to issue regulations towards that objective.

Part C of the 1977 Clean Air Act amendments stipulated requirements to prevent significant deterioration of air quality and, in particular, to preserve air quality in national parks, national wilderness areas, national monuments and national seashores. The Prevention of Significant Deterioration (PSD) program includes area-specific (Class I, II, and III) increments or limits on the maximum allowable increase in air pollutants (particulate matter or sulfur dioxide) and a preconstruction permit review process for new or modifying major sources that allows for careful consideration of control technology, consultation with FLMs on visibility impacts, and public participation in permitting decisions.

Under Clean Air Act Section 169A(b), Congress established new requirements on major stationary sources in operation within a 15-year period prior to enactment of the 1977 amendments. Such sources to which visibility impairment can be reasonably attributed must install best available retrofit technology (BART) as determined by the State. In determining BART, the State must take into consideration the costs of compliance, the energy and non-air quality 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 to result from the use of such technology.

On December 2, 1980, the EPA outlined a phased visibility program to ensure progress in achieving the national goal set forth by Congress. Regulations promulgated for Phase I of the program (under 40 CFR §51.300 through 307) required Alaska, 34 other states and 1 territory with mandatory Class I areas to revise their State Implementation Plans (SIPs) to include visibility protection.

Research conducted by EPA identified two general types of visibility impairment in Class I areas:

- Impairment due to smoke, dust, colored gas plumes, or layered haze emitted from stacks which obscure the sky or horizon and are relatable to a single stationary source or a small group of stationary sources.
- Impairment due to widespread, regionally homogeneous haze from a multitude for sources which impairs visibility in every direction over a large area, commonly referred to as regional haze.

EPA adopted a phased approach because it concluded that monitoring and regional scale modeling techniques, as well as knowledge concerning effectiveness of controls, were not fully developed for use in a regional haze regulatory program. EPA indicated regulations concerning more complex problems such as regional haze and urban plumes would be addressed in later phases.

Phase I of the visibility regulations focused on “reasonably attributable visibility impairment” (RAVI) and required states to:

- Coordinate SIP development with the appropriate FLMs.
- Develop programs to assess and remedy Phase I visibility impairment from existing major sources and to prevent visibility impairment from new sources.
- Develop a long-term strategy to address reasonable progress toward the national visibility goal.
- Develop a visibility monitoring strategy to collect information on visibility conditions.
- Consider in all aspects of visibility protection any “integral vistas” (important views of landmarks or panoramas that extend outside of the boundaries of the Class I area) identified by the FLMs or states as critical to the visitors’ enjoyment of the Class I areas. (An integral vista that is adopted into regulation can be afforded the same level of protection from visibility impairment as the Class I area itself or any lesser level of protection, as determined by a state on a case-by-case basis.)

The EPA required affected states to submit revised SIPs satisfying these provisions by September 2, 1981.

In response to EPA’s Phase I visibility rules, the Alaska Department of Environmental Conservation (ADEC) adopted regulations and State Implementation Plan revisions in 1982 that identified visibility special protection areas including the mandatory Class I areas and two integral vistas within Denali National Park and a visibility protection program for mandatory Class I areas through ADEC’s PSD permitting program. This SIP was approved by EPA in the Federal Register on July 5, 1983.

2. Summary of the 1999 Federal Regional Haze Rule

The 1990 amendments to the Clean Air Act established a new Section 169(B) to address regional haze. Since regional haze and visibility problems do not respect state and tribal boundaries, the amendments also authorized EPA to establish visibility transport regions as a way to combat regional haze. The 1990 amendments also established a visibility transport commission to investigate and report on regional haze visibility impairment in the Grand Canyon National Park and nearby Class I areas. To address the 1990 Clean Air Act amendments, the problem of long-range transport of pollutants causing regional haze, and to meet the national goal of reducing man-made visibility impairment in Class I areas, EPA adopted “Phase II” visibility rules in 1999, the Regional Haze Rule. These rules can be found at 40 CFR 51.300-309 and were published in the Federal Register, Volume 64, July 1, 1999, pages 35714-35774. This regional haze SIP meets the “Section 308” requirements in 40 CFR 51.308. (The “Section 309” (40 CFR 51.309) option is available only for nine western states [Arizona, California, Colorado, Idaho, Nevada, New Mexico, Oregon, Utah, and Wyoming].)

The Regional Haze Rule requires states to adopt regional haze SIPs that focus on improving the haziest days (the worst 20%) and protecting the clearest days (the best 20%). The Rule lays out

the mechanisms by which states define long-term paths to improve visibility, with the goal of achieving visibility that reflects natural conditions by 2064. Unlike criteria pollutant SIPs, which require specific targets and attainment dates, the Regional Haze Rule requires states to establish a series of interim goals to ensure continued progress. The first planning period specifies setting reasonable progress goals for improving visibility in Class I Areas by the year 2018.

Each regional haze SIP must provide a comprehensive analysis of natural and human-caused sources of haze for each Class I area, and must contain strategies to control the sources and reduce the emissions that contribute to haze. The intent is to focus on reducing anthropogenic emissions, while achieving a better understanding and quantification of the natural causes of haze.

The Regional Haze Rule lays out specific requirements to ensure improvements in the anthropogenic components of visibility:

- The Best Available Retrofit Technology (BART) requirements address certain larger industrial sources that began operation before the adoption of the 1977 PSD Rules. Section III.K.6 of this Plan describes the BART review and evaluation in detail.
- The reasonable progress demonstration requires setting goals for the 20% worst and best days in each Class I area, based on an evaluation of how BART and other regional haze strategies will reduce emissions and improve or protect visibility. Section III.K.9 of this Plan describes the reasonable progress demonstration in detail.

3. Elements of the Regional Haze Plan

The Regional Haze Rule sets forth the goal of achieving natural visibility conditions by 2064 in all Class I Areas. Along that path, states must establish a series of interim goals to ensure continued progress. The first planning period specifies setting reasonable progress goals for improving visibility in Class I Areas by the year 2018. Specifically, the interim goals must provide for improved visibility on the 20 percent of days with the worst visibility, and ensure that there is no further degradation on the 20 percent of days with the best visibility.

A Regional Haze State Implementation Plan must contain many technical elements and analyses, as well as background information. The required elements of the plan are explained briefly in this section, and then detailed in the sections outlined below.

- Determining baseline and natural visibility conditions – Section III.K.4
- Presenting base year and future year emission inventories – Section III.K.5
- Setting reasonable progress goals for 2018 – Section III.K.9
- Documenting the strategy to attain these goals – Section III.K.8
- Determining best available retrofit technologies – Section III.K.6
- Consultation with states, tribes, and federal land managers – Section III.K.11
- Committing to a monitoring strategy – Section III.K.3
- Specifying a timeline for future Plan revisions – Section III.K.10

a. Determining Baseline and Natural Visibility Conditions

For each Class I Area in Alaska and for the baseline years of 2000-2004, the State must describe existing (current) visibility conditions on the suite of days with the best and worst visibility. The state must also establish what the best and the worst visibility would be like on days when only natural sources affect visibility, without any human-caused impairment. Achieving natural conditions for visibility on the worst days by the year 2064 is the overall goal of the Regional Haze Program.

Baseline or current visibility includes haze pollutant contributions from anthropogenic sources as well as those from natural sources, using the actual pollutant concentrations measured at IMPROVE (Interagency Monitoring of Protected Visual Environments) monitors every three days during the period of 2000-2004. The 20 percent highest days (roughly corresponding to the 24 days having the worst visibility) are averaged each year. These five yearly values are then averaged to determine the worst day visibility for the 2000-2004 baseline period. The same process is used to establish the best day baseline visibility value from the annual 20 percent best days over the baseline years.

Natural visibility conditions represent the long-term degree of visibility estimated to exist in the absence of anthropogenic impairment. Natural events such as wind storms, wildfires, volcanic activity, biogenic emissions, and even sea salt from sea breezes introduce particles from natural sources that contribute to haze in the atmosphere. Individual natural events can lead to high short-term concentrations of visibility-impairing pollutants.

Establishing the link between haze species (chemical form) and visibility impairment is the key to understanding regional haze. The haze species reflect (scatter) and absorb light in the atmosphere, thereby extinguishing light. The amount of light extinction affects visibility or the clarity of objects viewed at a distance by the human eye. The amount and type of haze species in the air can be measured, and the amount of light extinction caused by each one can be calculated, for any location or day, as visibility conditions change from good to poor throughout the year. The specific visibility measurement unit, the deciview (dv), is the natural logarithm of light extinction. The deciview is used in the Regional Haze Rule to track visibility conditions. While the deciview value describes overall visibility levels, light extinction describes the contribution of particular haze species to measured visibility. The haze species concentrations are measured as part of the IMPROVE monitoring network deployed throughout the United States.

The U.S EPA initially calculated default natural visibility conditions for all Class I areas but allowed states to develop more refined calculations. The Regional Planning Organizations nationwide funded research to refine the methods used to calculate visibility, the results of which were used to calculate the deciview values presented in this Plan. Additional research is ongoing to continue to better define natural visibility conditions in the western United States. New research is examining the increasing prevalence of wildfires in the western United States. The frequency of dust storms and their impact on areas disturbed by human vs. wildlife activities are

being investigated, as well as global transport of dust from natural desert storms in Africa and Asia. There is also increased awareness of the biogenic contributions to haze.

Section III.K.4 describes current visibility conditions in each Class I area as well as the nature of the pollutant species that contribute to the observed levels. Section III.K.9 provides further information on the role of natural versus anthropogenic contributions and how that affects the progress that can be expected by 2018.

b. Statewide Emissions Inventory of Haze-Causing Pollutants

As with any air quality analysis, a good understanding of the sources of haze pollutants is critical. The Plan includes emissions for the base year 2002, which represents the midpoint of the 2000-2004 baseline planning period, as well as future projected emissions to the year 2018. This emissions inventory was developed by the WRAP and ADEC. Alaska has developed inventories specific to Alaska conditions for urban, rural, aviation, rail, and marine sectors. Section III.K.5 provides information on emissions within Alaska, including both natural and anthropogenic source categories.

c. Reasonable Progress Goals for 2018

Reasonable progress goals are established by each state for each Class I Area as a deciview level to be achieved by 2018, the end of the first planning period. The reasonable progress goals must assure that the worst haze days get less hazy and that visibility does not deteriorate on the best days, when compared with the baseline period. WRAP and ADEC have prepared technical analyses to assess future visibility and provide the context to establish reasonable progress goals for the Class I Areas.

States must also compare their reasonable progress goals to the level of visibility improvement that would be achieved if perfectly linear progress between the current period and expected natural conditions in 2064 were to occur. This linear rate of progress is known as the uniform glide path. The uniform glide path is not a fixed standard that must be met; instead it simply provides a basis for evaluating the selected 2018 goals. Many factors come into play in determining whether the uniform glide path can be achieved in the initial progress period, including the cost and feasibility of controls as well as the appropriateness of the level set for natural conditions in 2064. The analysis of control measures leading to Alaska's selection of the reasonable progress goals is described in Section III.K.8. Section III.K.9 provides information on the WRAP and Alaska technical analyses used to establish the goals and discussion of natural versus human-caused source contributions.

d. 2018 Progress Strategy

The Plan also describes the long-term strategy that provides the necessary emission reductions to achieve the reasonable progress goals established for each Class I Area within Alaska. The Long-Term Strategy (LTS) is that portion of the Visibility SIP containing the state's 10-15 year strategy for making reasonable progress toward remedying existing and preventing future

visibility impairment. Federal law mandates a periodic review and, if necessary, revision of the Long-Term Strategy section of the plan at least every five years.

The EPA regulations require the State to (1) develop a long-term strategy; (2) coordinate its LTS with existing plans and goals, including those of federal land managers, that may affect impairment in any Class I area; (3) demonstrate why the LTS is adequate for making reasonable progress toward the national goal and state why the minimum factors were or were not addressed in developing the LTS; (4) consider the time necessary for compliance as well as the economic, energy and non-air quality environmental impacts of compliance, the remaining useful life of any affected existing source, as well as the effect of new sources; (5) review its strategy no less frequently than every 5 years and consult with federal land managers during this process; and (6) report to EPA and the public on the progress in achieving the national visibility goal.

During development of the LTS the State must consider, at a minimum, the six factors listed below.

- *Emission reductions due to ongoing air pollution control programs.* For example, the attainment and maintenance of National Ambient Air Quality Standards in the Anchorage and Fairbanks areas may reduce visibility impairment in a number of Class I areas in the state. If this is the case, the state should explain how this would contribute to reasonable progress.
- *Additional emission limitations and schedules for compliance.* States may have to control minor sources causing impairment not covered by BART to make reasonable progress toward the national goal.
- *Measures to mitigate the impacts of construction activities.* This recognizes that nearby construction activities can contribute to impairment in Class I areas. If this appears to be a problem in Alaska, the State should explain in its LTS what measures it will take to mitigate these impacts.
- *Source retirement and replacement schedules.* The construction of new sources, which will ensure the early or scheduled retirement of older, less well-controlled sources, can greatly aid progress toward the national visibility goal over the long term.
- *Smoke management techniques for agricultural and forestry management purposes including such plans as currently exist within the State for this purpose.* While EPA does not believe this is a significant cause of impairment in most states, the LTS should discuss measures that would constitute reasonable progress in relation to this issue.
- *Enforceability of emission limitations and control measures.* It is recognized that in some situations the enforceability of proposed or actual emission limitations and control measures on sources causing existing impairment may be an issue.

Section III.K.8 describes the measures included in Alaska's 2018 Long Term Progress Strategy.

e. Best Available Retrofit Technology (BART) Requirement

The BART requirement implements a federal mandate to retrofit certain very old sources that pre-date the 1977 amendments to the Clean Air Act by up to 15 years. The Plan must identify facilities that fall into any one of 26 specific source categories and contain emission units from the 1962-1977 time period having the potential to emit more than 250 tons per year of any haze pollutant. These emission units are known as BART-eligible sources. If it is demonstrated that the emissions from these sources cause or contribute to visibility impairment in any Class I Area, then the best available retrofit technology must be installed.

The determination of BART must take into consideration the costs of compliance, the energy and non-air quality 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 to result from the use of such technology. In Alaska, there were seven facilities that fit the initial BART-eligible criteria. The systematic BART analysis carried out by ADEC is detailed in Section III.K.6.

f. Required Consultation

Preparation of the Plan and selection of reasonable progress goals requires consultation between states, FLMs, and affected tribes since haze pollutants can be transported across state lines, as well as international and tribal borders. In Alaska, Class I Areas are managed by the National Park Service (NPS) and the U.S. Fish and Wildlife Service (USFWS.) The draft Plan must be available to the FLMs at least 60 days before the public hearing on the final Plan. This allows time to identify and address any comments from the FLMs in the final Plan in advance of the public hearing.

Participation in the WRAP has helped to foster a regionally consistent approach to haze planning in the western states and provided a sound mechanism for consultation. The consultation process is explained in detail in Section III.K.11.

g. Monitoring Strategy

The Regional Haze SIP includes a monitoring plan for measuring, estimating and characterizing air quality and visibility impairment at Alaska's four Class I areas. The haze species concentrations are measured as part of the IMPROVE monitoring network deployed throughout the United States. Alaska uses four IMPROVE monitoring stations representing three of the four Class I Areas. Three of these stations were initiated specifically in response to Regional Haze rule requirements. There is no air monitoring being conducted for the Bering Sea Wilderness Area due to its remote location. Monitoring and additional research addressing transboundary sources of pollution in Denali Park are described in Section III.K.3 and Appendix III.K.3.

h. Mid-Course Review of Progress, Revisions, and Timelines

Following submittal of the initial Plan, and every ten years after that, a revised plan must be submitted for the following ten-year period. In the interim, each state is required to submit a five-year progress report to the EPA. Inventory and monitoring data updates, as well as a progress report on emission reductions, are prepared for the mid-course review. As in this initial plan, at the mid-course review Alaska will work and consult with other states through a regional planning process, as funding allows.

The mid-course review also allows each state to assess progress towards its reasonable progress goals. As explained in Section III.K.8, Alaska's strategy for improving visibility is related to ongoing activities to reduce emissions of criteria pollutants. The current control measures and incentive programs for stationary, area, and mobile sources contribute measurably to reductions in haze. The first mid-course review, anticipated to occur in 2013, will provide an opportunity to reassess progress in light of these and future programs. Section III.K.10 describes Alaska's commitment to periodic review.