

**Regional Haze SIP/TIP Template  
Draft January 2006**

**Central Regional Air Planning  
Association (CENRAP)**

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January 2006

CENRAP wishes to acknowledge the Mid-Atlantic/Northeast Visibility Union (MANE-VU) for providing the draft SIP template that formed the basis for this SIP template. This is a work in progress. This template will continue to evolve while states and other stakeholders make adjustments to the template to fit the overarching needs of jurisdictions fulfilling their haze SIP requirements in the coming years. This template provides guidance to states that choose to utilize it, but states do not have to follow this template in its entirety, or at all. States can opt out and choose to compile their SIPs without the assistance of the template. States are not bound to this template.

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## List of Appendices

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## 1. Background and Overview of the Federal Regional Haze Regulation

### 1.1. General Background / History of Federal Regional Haze Rule

In amendments to the Clean Air Act (CAA) in 1977, Congress added Section 169 (42 U.S.C. 7491) setting forth the following national visibility goal of restoring pristine conditions in national parks and wilderness areas:

“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.”

Over the following years modest steps were taken to address the visibility problems in Class I areas. The control measures taken mainly addressed “Plume Blight” from specific pollution sources, and did little to address regional haze issues in the Eastern United States. Plume blight is the visual impairment of air quality that manifests itself as a coherent plume. This results from specific sources, such as a power plant smoke stack, emitting pollutants into a stable atmosphere. The pollutants are then transported in some direction with little or no vertical mixing.

When the CAA was amended in 1990, Congress added Section 169B (42 U.S.C. 7492), authorizing further research and regular assessments of the progress made so far. In 1993, the National Academy of Sciences concluded that “current scientific knowledge is adequate and control technologies are available for taking regulatory action to improve and protect visibility.”<sup>1</sup>

In addition to authorizing creation of visibility transport commissions and setting forth their duties, Section 169B(f) of the CAA specifically mandated creation of the Grand Canyon Visibility Transport Commission (GCVTC) to make recommendations to the U.S. Environmental Protection Agency (EPA) for the region affecting the visibility of the Grand Canyon National Park. Following four years of research and policy development the Grand Canyon Visibility Transport Commission (Commission) submitted its report to EPA in June 1996. This report, as well as the many research reports prepared by the Commission, contributed invaluable information to EPA in its development of the federal regional haze rule.

EPA’s Regional Haze Rule was adopted July 1, 1999, and went into effect on August 30, 1999. The Regional Haze Rule aimed at achieving national visibility goals by 2064. This rulemaking addressed the combined visibility effects of various pollution sources over a wide geographic region. This wide reaching pollution net meant that many states – even those without Class I Areas – would be required to participate in haze reduction efforts. EPA designated five Regional Planning Organizations (RPO) to assist with the coordination and cooperation needed to address the visibility issue. Those states that make up the midsection of the contiguous United States were designated as Central Regional Air Planning Association (CENRAP).

On May 24, 2002 the US Court of Appeals, DC District Court ruled on the challenge brought by the American Corn Growers Association against EPA’s Regional Haze Rule of 1999. The Court

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<sup>1</sup> *Protecting Visibility in National Parks and Wilderness Areas*. National Research Council. Washington, DC: 1993.

remanded to EPA the Best Available Retrofit Technology (BART) provisions of the rule, and denied industry's challenge to the haze rule goals of natural visibility and no degradation requirements. EPA has proposed revisions to the Regional Haze rule pursuant to the remand. *(States may want to insert language here that pertains to the revisions that have taken place. It is not necessary, merely an option.)* To facilitate the review of this State Implementation Plan/Tribal Implementation Plan (SIP/TIP) by the Environmental Protection Agency (EPA), Federal Land Managers (FLM), stakeholders and the public, a guide is provided in location Section 308 Requirements in this document. (See Appendix 1.1.)

## 1.2 Option A Class I Area States/Tribes

The State/Tribe of <State/Tribe name> has the following Class I areas within its borders: <list Class I areas and provide a description of each with regards to visibility protection>.

In accordance with 40 CFR 51.308 emissions sources within the <insert State/Tribe name> have or may have impacts on the following Class I Areas <insert areas>. [Class I states may have impacts on Class I areas outside their borders as well as inside to address.]

In addition, <State/Tribe name> believes that improved visibility will lead to <provide examples of benefits of reduced regional haze and improved visibility>. <State/Tribe name> expects <insert expectations of improved visibility>.

## 1.2 Option B States and Tribes without Class I Areas

In accordance with 40 CFR 51.308 emissions sources within the <insert State/Tribe name> have or may have impacts on the following Class I Areas <insert areas>. (See Appendix 11.2.)

In addition, <State/Tribe name> believes that improved visibility will lead to <provide examples of benefits of reduced regional haze and improved visibility>. <State/Tribe name> expects <insert expectations of improved visibility>. (See Appendix 1.1).

## List of Chapter 1 Appendices

- 1.1 Guide to Locating Section 308 Requirements
- 1.2 Benefits of Improved Visibility (optional)

## 2. General Planning Provisions

Pursuant to the requirements of 51.308(a) and (b), <state/tribe name> submits this SIP/TIP submission as adopted to meet the requirements of EPA's Regional Haze rules that were adopted to comply with requirements set forth in the Clean Air Act. Elements of this Plan address the Core Requirements pursuant to CFR 40 51.308(d) and the Best Available Retrofit Technology (BART) components of CFR 40.50.308(e). In addition, this SIP/TIP addresses Regional Planning, State/Tribe and Federal Land Manager coordination, and contains a commitment to provide Plan revisions and adequacy determinations.

<State/Tribe name> has adopted this SIP/TIP in accordance with State or Tribal laws and rules. <State/Tribe name> has the authority to adopt the SIP/TIP in accordance with local laws and rules.

<State/Tribe name> provided public notice of the opportunity to comment on the SIP on <dates>. <State/Tribe name> provided notice of public hearing on <dates>. <State/Tribe name> held public hearings regarding the SIP on <dates>. Public comments, inclusive of those made by the Federal Land Manager (FLM) were addressed and are summarized in Appendix 2.1. <Provide a description of the process in place used to compile and address public comments regarding the SIP>.

### **List of Chapter 2 Appendices**

- 2.1 Summary of (a) legal authority; (b) public participation process; and, (c) public comments and responses (inclusive of FLM comments and responses) on SIP draft.

### 3. Regional Planning

In 1999, EPA and affected States/Tribes agreed to create five Regional Planning Organizations (RPOs) to facilitate interstate coordination on Regional Haze SIP/TIPs. The State/Tribe of <insert State/Tribe name> is a member of the Central Regional Air Planning Association (CENRAP) RPO. Members of CENRAP are in the geographical areas listed in Table 3.1. Figure 3.1 shows a map of all five regional planning organizations.

**Table 3.1 CENRAP Geographical Area\***

Arkansas	Iowa
Kansas	Louisiana
Minnesota	Missouri
Nebraska	Oklahoma
Texas	

\*Includes both state and tribal areas

**Figure 3.1 Geographical Areas of Regional Planning Organizations**



The governing body of CENRAP is the Policy Oversight Group (POG). The POG is made up of 18 voting members representing the states and tribes within the CENRAP region and non-voting members representing local agencies, the EPA, the Fish and Wildlife Service, Forest Service and National Park Service. The Policy Oversight Group (POG) facilitates communication with Federal Land Managers, stakeholders, the public, and with CENRAP staff.

Since its inception, CENRAP has established an active committee structure to address both technical and non-technical issues related to regional haze. The work of CENRAP is accomplished through five standing workgroups: Monitoring; Emission Inventory; Modeling; Communications; and Implementation and Control Strategies. Participation in workgroups is open to all interested parties. Ad hoc workgroups may be formed by the POG to address specific issues. Ultimately, policy decisions are made by the CENRAP POG.

CENRAP has adopted the approach that the Regional Haze Rule requires the “States to establish goals and emission reduction strategies for improving visibility in all 156 mandatory Class I parks and wilderness areas.” The rule also encouraged states and tribes to work together in regional partnerships.

This SIP/TIP utilizes data analysis, modeling results and other technical support documents prepared for CENRAP members. By coordinating with CENRAP and other RPOs, the <enter State/Tribe name> has worked to ensure that its long term strategy and BART determinations provide sufficient reductions to mitigate impacts of sources from <enter State/Tribe name> on affected Class I areas. Data analyses, modeling results and other technical support documents are provided to CENRAP members through either CENRAP’s website or through a protocol (ftp) that allows users to copy files between their local system and CENRAP’s system that they can reach on the CENRAP network.

### **List of Chapter 3 Appendices**

There are no Appendices in Chapter 3.

#### 4. State/Tribe and Federal Land Manager Coordination

40 CFR section 51.308(i) requires coordination between States/Tribes and the Federal Land Managers (FLMs). FLMs are an integral part of CENRAP's POG and the membership on standing committees. FLMs have contributed to the development of technical and non technical work as a result of that participation. In addition, opportunities have been provided by CENRAP for FLMs to review and comment on each of the technical documents developed by CENRAP and included in this SIP/TIP. <State/Tribe name> has provided agency contacts to the FLMs as required. In development of this plan, the FLMs were consulted in accordance with the provisions of 51.308(i)(2).

The <State/Tribe name> provided FLMs an opportunity for consultation, in person and at least 60 days prior to holding any public hearing on an implementation plan or plan revision.

During the consultation process, the FLMs were given the opportunity to address their:

- Assessment of the impairment of visibility in any Class I areas
- Recommendations on the development of reasonable progress goals
- Recommendations on the development and implementation of strategies to address visibility impairment.

<State/Tribe name> sent the draft SIP to the FLMs on <dates.> <State/Tribe name> sent the SIP revisions to the FLMs on <dates.> <State/Tribe name> notified the FLMs of public hearings held on <dates.> <State/Tribe name> considered/incorporated the FLMs comments on the SIP draft and/or revisions as follows <describe>.

Comments received from the Federal Land Managers on the plan were addressed. A summary of FLM comments and responses are included in Appendix 2.1 to this plan.

<State/Tribe name> will continue to coordinate and consult with the Federal Land Managers during the development of future progress reports and plan revisions, as well as during the implementation of programs having the potential to contribute to visibility impairment in the mandatory Class I areas. The FLMs must be consulted in the following instances:

- Development and review of implementation plan revisions
- Review of 5-year progress reports
- Development and implementation of other programs that may contribute to impairment of visibility in Class I areas.

<State/Tribe name> has consulted with FLMs on the following <provide examples of plan revisions, progress reports, and other programs>.

*[NOTE: SIPs should go through a notice and consultation process with the FLMs, whether with or without Class I areas. FLMs have had many phone calls within their own agencies' legal counsel to confirm this.]*

**List of Chapter 4 Appendices**

There are no Appendices in Chapter 4.

**5. Assessment of Baseline and Current Conditions and Estimate of Natural Conditions in Class I Areas [NOTE: Please check the CENRAP Website for SIP/TIP updates, as this chapter will continue to change.]**

The goal of the Regional Haze Rule is to restore natural visibility conditions to the 156 Class I areas identified in the 1977 Clean Air Act Amendments. Sec. 51.301(q) defines natural conditions: “Natural conditions includes naturally occurring phenomena that reduce visibility as measured in terms of light extinction, visual range, contrast, or coloration.” The Regional Haze SIPs must contain measures that make “reasonable progress” toward this goal by reducing anthropogenic emissions that cause haze. For each Class I area, there are three metrics of visibility that are part of the determination of reasonable progress:

- 1) baseline conditions,
- 2) natural conditions, and
- 3) current conditions.

Each of the three metrics includes the concentration data of the visibility pollutants as different terms in the light extinction algorithm, with respective extinction coefficients and relative humidity factors. Total light extinction when converted to deciviews (dv) is calculated for the average of the 20 percent best and 20 percent worst visibility days.

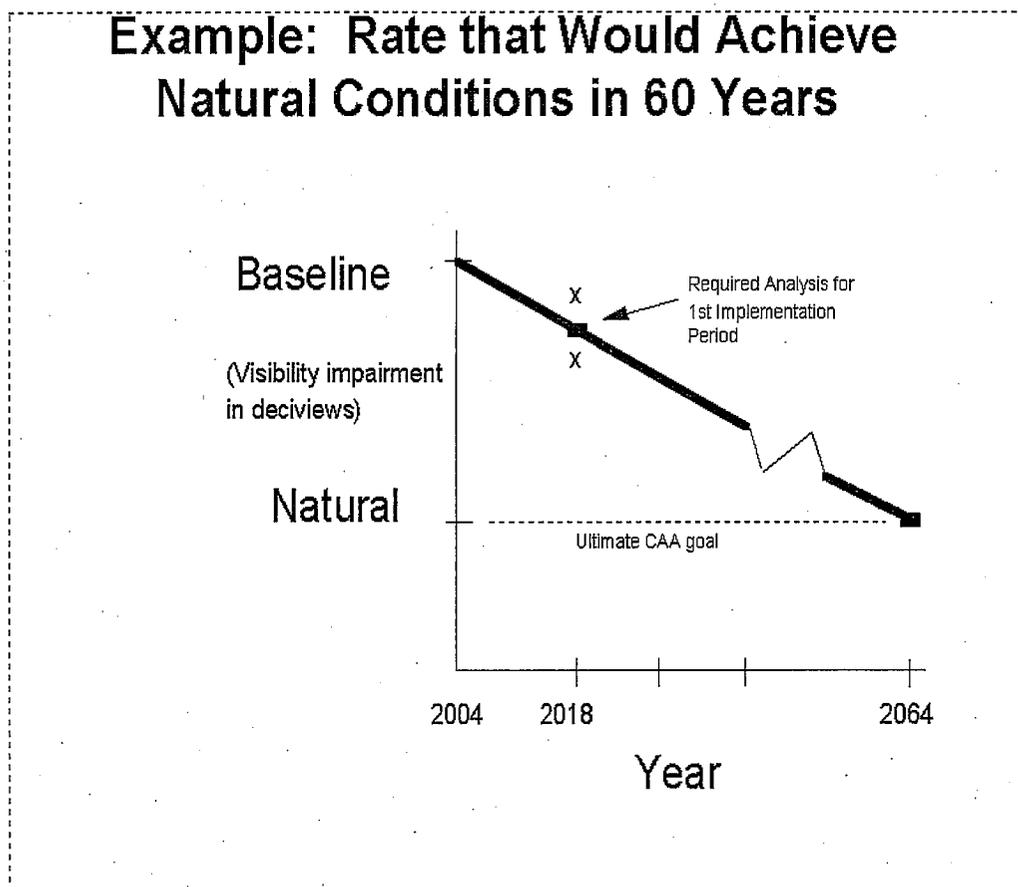
“Baseline” visibility is the starting point for the improvement of visibility conditions. It is the average of the IMPROVE monitoring data for 2000 through 2004 and can be thought of as “current” visibility conditions for this initial period. The comparison of initial baseline conditions to natural visibility conditions indicates the amount of improvement necessary to attain natural visibility by 2064. Natural visibility is determined by estimating the natural concentrations of visibility pollutants and then calculating total light extinction with the light extinction algorithm. (See Figure 5.1 as an example.) Each state must estimate natural visibility levels for Class I areas within its borders in consultation with Federal Land Managers and other states (51.308(d)(2)). “Current conditions” are assessed every five years as part of the SIP review where actual progress in reducing visibility impairment is compared to the reductions committed to in the SIP (see Appendix 5.1).

Default and refined values for natural visibility conditions

EPA’s “Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Program” (Sept 2003) provides states a “default” estimate of natural visibility. The default values of concentrations of visibility pollutants are based on a 1990 National Acid Precipitation Assessment Program report (Trijonis, J.C. (1990) NAPAP State of Science & Technology, vol. III). In the guidance, the United States is divided into “East” and “West” along the western boundary of the states one tier west of the Mississippi River. This division divides the CENRAP states into “East” (MN, IA, MO, AR, LA) with seven Class I areas, and “West” (NE, KS, OK, TX) with three Class I areas. In the two equations, only sulfate and organic carbon have

different values, but the calculated deciview difference is significant. (See Appendix 5.2 for further discussion of the default equation.)

Figure 5.1 Determination of Natural Background



In the guidance, EPA also provides that states may use a “refined approach” to estimate the values that characterize the natural visibility conditions of the Class I areas. The purpose of such a refinement would be to provide more accurate estimates with changes to the extinction algorithm that may include the concentration values, factors to calculate extinction from a measured particular species and particle size, the extinction coefficients for certain compounds, geographical variation (by altitude) of a fixed value, and the addition of visibility pollutants. States can choose between the default and refined equations. One equation is used to calculate baseline and current conditions of visibility due to haze-causing pollutants and, with natural concentrations of the same pollutants; the same equation is used to calculate natural visibility.

The old (default) algorithm:

$$\begin{aligned} b_{ext} \approx & 3 \times f(RH) \times [\text{Sulfate}] \\ & + 3 \times f(RH) \times [\text{Nitrate}] \\ & + 4 \times [\text{Organic Carbon}] \\ & + 10 \times [\text{Elemental Carbon}] \\ & + 1 \times [\text{Fine Soil}] \\ & + 0.6 \times [\text{Coarse Mass}] \\ & + 10 \end{aligned}$$

The new (refined) algorithm:

(differences from the default are in bold)

$$\begin{aligned} b_{ext} \approx & \mathbf{2.2} \times f_s(RH) \times [\mathbf{Small Sulfate}] + \mathbf{4.8} \times f_l(RH) \times [\mathbf{Large Sulfate}] \\ & + \mathbf{2.4} \times f_s(RH) \times [\mathbf{Small Nitrate}] + \mathbf{5.1} \times f_l(RH) \times [\mathbf{Large Nitrate}] \\ & + \mathbf{2.8} \times [\mathbf{Small Organic Carbon}] + \mathbf{6.1} \times [\mathbf{Large Organic Carbon}] \\ & + 10 \times [\text{Elemental Carbon}] \\ & + 1 \times [\text{Fine Soil}] \\ & + \mathbf{1.7} \times f_{ss}(RH) \times [\mathbf{Sea Salt}] \\ & + 0.6 \times [\text{Coarse Mass}] \\ & + \mathbf{Rayleigh Scattering (Site Specific)} \\ & + \mathbf{0.33} \times [\mathbf{NO}_2(\text{ppb})] \end{aligned}$$

The choice between use of the default or the refined equation for calculating the visibility metrics for each Class I area is made by the state in which the Class I area is located. (According to sec. 51.308(d)(2), the state will make the determinations of baseline and natural visibility conditions.) It is with these calculations that the state has developed a “reasonable progress goal” for each Class I area, in consultation with other states whose emissions affect visibility in that park or wilderness area (sec. 51.308(d)(1)(iv)).

The State/Tribe of <insert name of state/tribe> has used the <insert default or refined equation> to calculate visibility metrics for the purpose of developing its reasonable progress goal (see Appendix 5.1).

Using the <insert default or refined equation,> the state/tribe of <insert name of state/tribe> have determined that natural visibility conditions for the <insert name of Class I area> Class I area is best represented by <insert number of deciviews> deciviews (see Appendix 5.2).

*There is a national consensus workgroup addressing changes to the light extinction equation. The final recommendations of that work will be reviewed and voted on by the IMPROVE Steering Committee in Dec 2005.*

*A WRAP contractor is also refining the 1990 natural conditions equation with a review of IMPROVE and other data and proposes a number of changes that include many more regions (than East and West) that group Class I areas with similar natural emissions and natural sources of haze. His final report is due the end of Dec 2005. When this revision work is completed a second set of "refined" numbers will be added to the IMPROVE and VIEWS websites for baseline and current conditions values for each Class I area. States that choose the "corrected" algorithm that incorporate recent visibility research and analysis can also adopt new natural conditions values and document the reasonableness of these changes to EPA.*

#### Consultation regarding the visibility metrics

Consultation among states is a requirement that is repeated in the regional haze rule. As part of a "long-term strategy" for regional haze, a state whose emissions are "reasonably anticipated" to contribute to impairment in other states' Class I area(s) must consult with those states and also consult with any states whose emissions affect its own Class I area(s) (sec. 51.308(d)(3)).

A chief purpose of the RPO is to provide a means for states to confer on all aspects of the regional haze issue, including consultation on reasonable progress goals and long-term strategies which are based on the current (baseline) and natural visibility determinations. (This process is described in Chapter 3 "Regional Planning", above.) CENRAP has provided a forum for the member States and Tribes to consult on the determination of baseline and natural visibility conditions in each of the Class I areas.

In addition, states in CENRAP have conferred with neighboring Class I area states outside CENRAP, both individually and by way of the states' RPO.

*Each state/tribe provides description of that consultation process here.*

Sec. 51.308(i) requires Class I area states' coordination with FLMs that includes consultation on implementation, including the assessment of visibility impairment and recommendations regarding the reasonable progress goal and strategies for improvement. This consultation requirement is treated in Chapter 4.

#### OPTION A: states/tribes with Class I Areas

Through participation in CENRAP and as a state/tribe, <insert name of state/tribe> has completed this regulatory requirement. Chapter 4 provides details of actions taken to meet this requirement.

## OPTION B: states/tribes without Class I Areas

The <State or Tribe > does not contain any Class I areas. As described in Chapter 3 Regional Planning, the <name of jurisdiction> coordinated with States/Tribes containing Class I areas which are affected by emissions from sources located in <States/Tribes of jurisdiction> as those States/Tribes assessed baseline, natural and current visibility conditions in their respective Class I areas. Chapter 4 provides details of actions taken to meet this requirement.

### 5.1 Baseline Visibility Conditions

#### OPTION A: states/tribes with Class I Areas

The <name of Class I area> Class I area has an established baseline visibility of <number> deciviews for the cleanest 20 percent of the sample days and <number> deciviews for the 20 percent worst visibility days. This is based on sampling data collected at the <monitoring location> IMPROVE monitoring site. A five year average (2000 to 2004) was calculated for each value (both best and worst) in accordance with 40 CFR 51.308(d)(2). The light extinction and deciview visibility values for these worst and best days are based on data and calculations included in Appendix 5.1 of this [SIP/TIP]. The summary data with the concentration values, light extinction calculations, and deciview values are presented in tables in Appendix 5.1

*If your state's/tribe's air monitors lack the required 5 years of data, you will want to make a similar or the same following statement: "Air monitoring that would represent the visibility at <name of Class I area> Class I area does not meet EPA completeness criteria for the five year averaging period (i.e. less than 75% valid data collection in a calendar year)."*

The baseline visibility determination is based on a five year average (2000 to 2004) calculated in accordance with published EPA guidance documents using data from the <monitoring location> IMPROVE [or IMPROVE protocol] monitoring site. The <name of Class I area or IMPROVE protocol site> surrogate site has an established baseline visibility of <number> deciviews for the cleanest 20 percent of the sample days and <number> deciviews for the 20 percent worst visibility days. A demonstration that this site is representative of the <Class I area name> Class I area is contained in Appendix 6.1 and was prepared in accordance with established EPA guidance. The light extinction and deciview visibility values for these worst and best days are based on data and calculations also included in Appendix 6.1 of this <SIP/TIP>. The summary data with the concentration values, light extinction calculations, and deciview values are presented in the tables in Appendix 6.1.

OPTION B: states/tribes without Class I Areas will not need to address this chapter.

As described in Chapter 3 Regional Planning, <state/tribe> coordinated with States containing Class I areas (in and out of the CENRAP area) which are affected by emissions from sources

located in <state/tribe> as those States assessed baseline and natural visibility conditions in their respective Class I areas.

## 5.2 Natural Visibility Conditions

OPTION A: states/tribes with Class I Areas

The <name of Class I area> Class I area has an estimated natural background visibility of < deciviews> on the 20 percent best days and < deciviews> on the worst 20 percent of days. Appendix 5.1 provides calculations and methodologies. Appendix 5.2 includes a demonstration of the appropriateness of these values for <name of Class I area> as well as a discussion of the reasons for the selection of the methodology.

OPTION B: states/tribes without Class I Areas will not need to address this chapter.

### 5.1 Visibility Metrics for the Class 1 Areas in <State>

<b>Natural Background Conditions</b>				
<b>Class 1 area</b>	<b>Average for 20% Worst Days (deciviews)</b>	<b>Average for 20% Best Days (deciviews)</b>	<b>Average for 20% Worst Days Bext (Mm-1)</b>	<b>Average for 20% Best Days Bext (Mm-1)</b>
<b>Baseline Visibility Conditions 2000-2004</b>				
<b>Class 1 area</b>	<b>Average for 20% Worst Days (deciviews)</b>	<b>Average for 20% Best Days (deciviews)</b>	<b>Bext (Mm-1) Average for 20% Worst Days</b>	<b>Bext (Mm-1) Average for 20% Best Days</b>

### List of Chapter 5 Appendices

- 5.1 Determination of Baseline Visibility Conditions
- 5.2 Estimate of Natural Visibility Conditions

## 6. Monitoring Strategy

Section 51.308(d)(4) of the federal regional haze rule requires a monitoring strategy for measuring, characterizing, and reporting regional haze visibility impairment that is representative of all mandatory Class I areas within the State/Tribe of <State/Tribe name>. The monitoring strategy relies upon participation in the Interagency Monitoring of Protected Visual Environments (IMPROVE) network.

### Current Monitoring Strategy

#### OPTION A: states/tribes with Class I Areas

Upon the creation of CENRAP, the newly formed Monitoring Workgroup identified that there were large visibility data voids in Southern Arkansas, Iowa, Kansas, Southern Minnesota, Nebraska, and Oklahoma. Only five (5) Interagency Monitoring of Protective Visual Environments (IMPROVE) sites were located in the CENRAP region. Between 2000 and 2003, five (5) more IMPROVE sites and 15 IMPROVE Protocol Sites were installed. In <state/tribe> IMPROVE or IMPROVE Protocol Sites are located <insert information on monitors.> <State/Tribe name> commits to meet the requirements under 40 CFR 51.308(d)(4)(iv) to report to EPA visibility data for each of the <insert State/Tribe name>'s Class I area(s) annually.

The filter samples from the IMPROVE modules are sent for analysis to the Crocker Nuclear Laboratory of the University of California in Davis and the data is posted to the IMPROVE website [<http://vista.cira.colostate.edu/improve/>] and the Visibility Information Exchange Websystem (VIEWS) website [<http://vista.cira.colostate.edu/views/>]. [Further the data is available through EPA's Air Quality System (AQS) database.](to be confirmed) This fulfills <state name> reporting requirement of visibility data (electronic) under subsection (iv). Details regarding the monitors (location, date of installation etc., and monitoring data are found in Appendix 6.1.

<insert picture of monitoring sites>

### Future Monitoring Strategy

In order to assess progress in reducing visibility impairment in Class I areas, the existing IMPROVE and IMPROVE Protocol sites will be maintained contingent upon continued national funding to measure, characterize and report regional haze visibility impairment to satisfy requirements of subsection (i). The State/Tribe will evaluate the monitoring network periodically including evaluation technology changes and the need for new monitors. Where economically feasible or with national funds, <state/tribe> anticipates making those changes needed to be able to assess whether reasonable progress goals are being achieved in each of <State/Tribe name>'s mandatory Class I areas.

### Special Monitoring Studies

As funding permits, CENRAP, in cooperation with states and tribes, intends to study impacts of ammonia and carbon on visibility impairment in the CENRAP region. Preliminary monitoring studies and monitoring data analysis suggests that these two air constituents contribute to a large portion of visibility impairment in the CENRAP geographical area.

#### OPTION B: states/tribes without Class I Areas

Upon the creation of CENRAP, the newly formed Monitoring Workgroup identified that there were large visibility data voids in Southern Arkansas, Iowa, Kansas, Southern Minnesota, Nebraska, and Oklahoma. Only five (5) Interagency Monitoring of Protective Visual Environments (IMPROVE) sites were located in the CENRAP region. Between 2000 and 2003, five (5) more IMPROVE sites and 15 IMPROVE Protocol Sites were installed. In <state/tribe> IMPROVE or IMPROVE Protocol Sites are located <insert information on monitors.> <State/Tribe name> commits to meet the requirements under 40 CFR 51.308(d)(4)(iv) to report to EPA visibility data for each of the <insert State/Tribe name>'s Class I area(s) annually.

The filter samples from the IMPROVE modules are sent for analysis to the Crocker Nuclear Laboratory of the University of California in Davis and the data is posted to the IMPROVE website [<http://vista.cira.colostate.edu/improve/>] and the Visibility Information Exchange Websystem (VIEWS) website [<http://vista.cira.colostate.edu/views/>]. [Further the data is available through EPA's Air Quality System (AQS) database.](to be confirmed) This fulfills <state name> reporting requirement of visibility data (electronic) under subsection (iv). Details regarding the monitors (location, date of installation etc., and monitoring data are found in Appendix 6.1.

<insert picture of monitoring sites>

### List of Chapter 6 Appendices

#### 6.1 Monitoring and Data Analysis to Support the Regional Haze Rule

## 7.0 Emission Inventory

40 CFR section 51.308(d) (4) (v) requires a statewide emission inventory of pollutants that are reasonably anticipated to cause or contribute to visibility impairment in any mandatory Class I area. As specified in the applicable EPA guidance, the pollutants inventoried by <State/Tribe name> include volatile organic compounds, nitrogen oxides, fine particulate (PM2.5), coarse particulate (PM-10), ammonia and sulfur dioxide. An inventory was developed for the baseline year 2002. A summary of those inventory results follows; the complete 2002 emission inventory has been submitted as Appendix 7.1.

**Table 7.1 2002 Emissions Inventory Summary**

	VOC	NOx	PM2.5	PM10	NH3	SO2
Point						
Area						
Mobile						
Off-Road						
Mobile						
Non-Road						
Mobile						
Biogenics						
TOTAL						

Methodologies for the 2002 emissions inventory are documented in Appendix 7.2. Large technical support documents are noted, but not included in Appendix 7.2 and can be downloaded by going to [www.cenrap.org](http://www.cenrap.org) [add specific location].

These 2002 emissions were grown to 2018 primarily using EGAS6, MOBILE6, and IPM for electric generating units (EGUs). A summary of those inventory results follows; the complete 2018 emission inventory has been submitted as Appendix 7.3.

**Table 7.2 2018 Emissions Inventory Summary**

	VOC	NOx	PM2.5	PM10	NH3	SO2
Point						
Area						
Mobile						
Off-Road						
Mobile						
Non-Road						
Mobile						
Biogenics						
TOTAL						

Methodologies for the 2018 emissions inventory are documented in Appendix 7.4. Large technical support documents are noted, but not included in Appendix 7.4 and can be downloaded by going to [www.cenrap.org](http://www.cenrap.org) [add specific location].

**List of Chapter 7 Appendices**

- 7.1 Statewide/Tribal 2002 Emissions Inventory
- 7.2 2002 Emissions Inventory Technical Support Document (includes all CENRAP contractor work)
- 7.3 Statewide/Tribal 2018 Emissions Inventory
- 7.4 2018 Emissions Inventory Technical Support Document

## 8. Modeling Assessment

40 CFR part 51, appendix W provides modeling guidelines for conducting regional-scale modeling for particulate matter and visibility. The U.S. EPA recommends the use of one of the three following models to simulate pollutants impairing visibility: CMAQ, CAMx, and REMSAD. CENRAP contractors performed regional modeling using CMAQ and CAMx.

Community Multiscale Air Quality (CMAQ) Model is a Eulerian model that simulates the atmospheric and surface processes affecting the transport, transformation and deposition of air pollutants and their precursors. A Eulerian model computes the numerical solution of partial differential equations of plumes on a fixed grid, while other models may lose accuracy or need regridding as the plumes expand.

The Comprehensive Air quality Model with extensions (CAMx) is a computer modeling system for the integrated assessment of photochemical and particulate air pollution. CAMx incorporates all of the technical attributes demanded of state-of-the-art photochemical grid models, including two-way grid nesting, a subgrid-scale Plume-in-Grid module to treat the early dispersion and chemistry of point source NO<sub>x</sub> plumes, and a fast chemistry solver.

Particulate Matter (PM) Modeling: CAMx Mechanism 4 (M4) provides "1-atmosphere" modeling for fine and coarse PM and ozone. Aqueous phase chemistry is modeled using the RADM mechanism. Inorganic sulfate/nitrate/ammonium chemistry is modeled with ISORROPIA. Secondary organic aerosols are modeled using a semi-volatile scheme called SOAP. Wet and dry deposition processes are included for gasses and particles. Gridded deposition information is output along with the concentrations.

In the July 1, 1999 publication of the Regional Haze Rule in the Federal Register, EPA defined the uses of regional modeling as follows:

- Analyses and determination of the extent of emissions reductions needed from individual States
- Analyses and determination of emissions needed to meet the progress goal for the Class I area
- Analyses to support conclusion that the Long-Term Strategy provides for reasonable progress
- Analyses to calculate the resulting degree of visibility improvement that would be achieved at each Class I area
- Analyses to compare visibility improvement between proposed control strategies

### 8.1 Model Inputs

#### 8.1.1. Selection of Episodes

- <Describe how episodes were selected.> The Technical Support Document provides the methodologies for this process and is found at Appendix 8.1.
- 8.1.2. Selection of Modeling Domain  
<Describe how modeling domain was selected.> The Technical Support Document provides the methodologies for this process and is found at Appendix 8.1.
- 8.1.3. Emission Inventories - Generating the source inventory for modeling is intertwined with the creation of the pollutant inventory. Each emission source and the type of pollutants it emits must be specifically identified. For dispersion modeling, each source must be classified as a point source, area source, mobile source (on-road and off-road), and biogenic sources. The Technical Support Document provides the methodologies for this process and is found at Appendix 8.1. Emission inventory information can be found in Chapter 7.
- 8.1.4. Meteorology - The Fifth-Generation NCAR / Penn State Mesoscale Model (MM5) is the latest in a series that developed from a mesoscale model used by Anthes at Penn State in the early 70's that was later documented by Anthes and Warner (1978). Since that time, it has undergone many changes designed to broaden its usage. These include (i) a multiple-nest capability, (ii) nonhydrostatic dynamics, which allows the model to be used at a few-kilometer scale, (iii) multitasking capability on shared- and distributed-memory machines, (iv) a four-dimensional data-assimilation capability, and (v) more physics options. The model (known as MM5) is supported by several auxiliary programs, which are referred to collectively as the MM5 modeling system. Since MM5 is a regional model, it requires an initial condition as well as a lateral boundary condition to run. To produce a lateral boundary condition for a model run, one needs gridded data to cover the entire time period that the model is integrated. The Technical Support Document provides the methodologies for this process and is found at Appendix 8.1.

## 8.2 Model Performance Evaluation

Model evaluations compared concentrations of various pollutants simulated by CMAQ and CAMx with observations from:

- Interagency Monitoring of PROtected Visual Environments (IMPROVE)
- Clean Air Status and Trends Network (CASTNet)
- Speciated Trends Network (STN)
- Aerometric Information Retrieval Systems (AIRS)
- South Eastern Aerosol Research and Characterization (SEARCH)

Model performance evaluation summaries follow. Detailed model performance evaluations are found in Appendix 8.2

## 8.3 Base A Model Simulations

<Summarize inputs, model performance and decisions resulting from Base A Model Simulations. *To be done.*> Detailed information on Base A Model Simulations is found in Appendix 8.3.

#### **8.4 Base B Model Simulations**

<Summarize inputs, model performance and decisions resulting from Base B Model Simulations. *To be done.*> Detailed information on Base B Model Simulations is found in Appendix 8.4.

#### **8.5 Information from Modeling Performed by Other RPOs**

<Summarize modeling results with implications for CENRAP. *To be done.*> Detailed information is found in Appendix 8.5.

#### **8.6 Control Strategy Simulations**

8.6.1 Control Strategy 1

8.6.2 Control Strategy 2

8.6.3 Control Strategy 3

<For each control strategy simulation, summarize modeling results. Provide analyses between various modeled control strategies. *To be done.*> Detailed information is found in Appendix 8.6.

#### **8.7 Emission Reduction Estimates Final Control Strategies**

<Summarize key points. *To be done.* May need appendix 8.7, “Emission Reduction Recommendations”, if more details are required.>

#### **List of Chapter 8 Appendices**

- 8.1 Modeling Technical Support Document
- 8.2 Model Performance Evaluation
- 8.3 Base A Model Simulations
- 8.4 Base B Model Simulations
- 8.5 Information from Modeling Performed by Other RPOs
- 8.6 Control Strategy Simulations
- 8.7 Emission Reduction Recommendations

## 9. Best Available Retrofit Technology

The U.S. EPA’s 1999 Regional Haze Rule singles out certain older emission sources that have not been regulated under other provisions of the Clean Air Act for additional controls. The State/Tribe of <State/Tribe name> is required those older sources that contribute to visibility impairment in Class I to install Best Available Retrofit Technology (BART) or implement an emissions trading or other alternative program that will achieve greater reasonable progress than would be achieved through the installation and operation of BART. On July 6, 2005, U.S. EPA published a revised final rule, including Appendix Y to 40 CFR part 51 “Guidelines for BART Determinations Under the Regional Haze Rule” that provides direction to states on determining which of these older sources may need to install BART and how to determine BART.

The State/Tribe of < State/Tribe name> is <not> requiring sources subject to BART to install, operate, and maintain BART rather than implement an emissions trading program or other alternative measure in place of BART.

### 9.1 BART – Eligible Sources in State/Tribe of <State/Tribe name.>

The facilities with BART-eligible units in the State/Tribe of <State/Tribe name> are shown in Table 9.1. A detailed description of each BART-eligible emission unit is included in Appendix 9.1.

**Table 9.1 Facilities with BART-eligible Units in the State/Tribe of <State/Tribe>**

BART Source Category Name	SIC Code	Facility ID	Facility Name	BART-Eligible Emission Units

The BART-eligible sources were identified using the methodology in the Guidelines for BART Determinations under the Regional Haze Rules or “Guidelines”. [ 40 CFR Part 51, Appendix Y.] For an emission unit source to be identified as BART-eligible, the State/Tribe of <State/Tribe name> used these criteria from the Guidelines:

- One or more emissions units at the facility fit within one of the 26 categories listed in the Guidelines;
- The emission unit(s) were in existence on August 7, 1977 and began operation at some point on or after August 7, 1962; and

- The limited potential emissions from all emission units identified in the previous two bullets emission units were greater than 250 tons or more per year of any of these visibility-impairing pollutants: SO<sub>2</sub>, NO<sub>x</sub>, and PM<sub>10</sub>.

The Guidelines recommend addressing these visibility-impairing pollutants: sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), and Particulate Matter. The State/Tribe of <State/Tribe name> addressed these three pollutants and used particulate matter less than 10 microns in diameter (PM<sub>10</sub>) as an indicator for particulate matter to identify BART-eligible units, as the Guidelines suggests. Consistent with the Guidelines, the State/Tribe of <State/Tribe name> did <not> evaluate emissions of Volatile Organic Compounds (VOCs) and ammonia in BART determinations for these reasons:

<insert reasons for evaluating or not evaluating VOC/ammonia emissions in BART determinations>

The State/Tribe of <State/Tribe name> <briefly describe the process used by the State/Tribe to identify the BART-eligible sources, e.g. facility survey, review of data bases, etc. Refer to detailed description of identification process in Appendix 9.1.

## 9.2 Determination of Sources Subject to BART

Under the Guidelines, the State/Tribe has these options regarding its BART-eligible sources:

a) make BART determinations for all sources or b) consider exempting some sources from BART because they do not cause or contribute to visibility impairment in a Class I area. The State/Tribe of <State/Tribe name> has chosen option <a or b>. If a State/Tribe chooses option b, then the Guidelines suggest three sub-options for determining that certain sources need not be subject to BART:

- (1) Individual source attribution approach (dispersion modeling).
- (2) Use of model plants to exempt sources with common characteristics.
- (3) Cumulative modeling to show that no sources in a state are subject to BART.

The State/Tribe of <State/Tribe name> has chosen suboption <insert #> above to determine which sources are subject to BART. <Language that follows is for suboption 1: The State/Tribe of < State/Tribe name > performed a source-specific analysis to determine which sources cause or contribute to visibility impairment using the CALPUFF model <if state has used an approved alternative model to CALPUFF, then substitute that here instead an alter the remaining text in this paragraph>. The CALPUFF modeling protocol used for determining which facilities are subject to BART is included in Appendix 9.2. In accordance with the Guidelines, a contribution threshold of <0.5> deciview was used for determining which sources were subject to BART. The Guidelines provide States the discretion to set a lower deciview threshold than 0.5 deciviews if “the location of a large number of BART-eligible sources within the State and in proximity to a Class I area justifies this approach.” The <0.5> deciview threshold was selected because <list reasons>.

The facilities with BART-eligible units found to be subject to BART by the State/Tribe of <State/Tribe name> are shown in Table 9.2. Appendix 9.3 contains more detailed results of the modeling analyses for each BART-eligible source. Facilities found to be subject to BART must complete a BART analysis.

**Table 9.2 Facilities with Units Subject to BART in the State/Tribe of <State/Tribe>**

<b>BART Source Category Name</b>	<b>Facility ID</b>	<b>Facility Name</b>	<b>Emission Units Subject to BART</b>	<b>Pollutants Evaluated in BART Determination</b>	<b>Contribution to Visibility Impairment (delta deciview)</b>

U.S. EPA has found that, as a whole, the Clean Air Interstate Rule (CAIR) cap-and-trade program improves visibility more than implementing BART in states affected by CAIR. A State that opts to participate in the CAIR program under part 96 AAA-EEE need not require affected BART-eligible EGU to install, operate, and maintain BART. NOTE: CAIR regulates both NOx and SO2. A state must opt into both the NOx and SO2 model cap and trade programs to be able to exempt EGUs from BART. A state must opt to participate in 40 CFR 96 AA to II. Since CAIR allows states to modify NOx allowance allocations, 40 CFR 96 EE need not be included.

The State of <State name> is <not> participating in CAIR. BART-eligible EGU in both CAIR States and non-CAIR States must submit a BART determination if the State finds they are subject to BART. If a State accepts EPA’s overall finding that CAIR “substitutes” for BART, then the BART determination need only be done for PM emissions. NOx and SO2 emissions do not need to be included in the BART determination as they are addressed in CAIR. The State of <State name> did <not> perform a BART determination for subject-to-BART EGUs to evaluate NOx and SO2 for these reasons:

<list reason(s)>

**9.3 Determination of BART Requirements for Subject-to-BART Sources**

BART for the BART-eligible sources in <State/Tribe name> are shown in Tables 9.4 through 9.x. for each visibility impairing pollutant. BART is the emission limit for each pollutant based on the degree of reduction achievable through the application of the best system of continuous emission reduction, taking into consideration the technology available, the costs of compliance, CENRAP SIP template (for possible use by CENRAP states)

the energy and the non-air quality environmental impacts of compliance, any pollution control equipment in use or in existence 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. However, a State is not required to make a determination of BART for SO<sub>2</sub> or NO<sub>x</sub> if a BART-eligible source has the potential to emit less than 40 tons per year of such pollutant(s), or less than 15 tons per year for PM<sub>10</sub>.

**Table 9.3 List of Sources with Design, Equipment, Work Practice or Operational Standard as BART**

Facility Name	Emission Unit	Need for Alternative Standard	Description of Alternative Standard (BART)

The BART analysis conducted by the facility for each subject-to-BART source is included in Appendix 9.4. BART for each subject-to-BART source was determined by the State using the methodology in the Guidelines. These BART emission standards are summarized in Table 9.4 and will be included in the Title V operating permit for each source after this implementation plan is approved by EPA. Draft Title V operating permits, including the technical support document providing the rationale for the BART emission limit, are in Appendix 9.5.

<State/Tribe name> has determined in establishing BART that technological or economic limitations on the applicability of measurement methodology to the sources listed in Table 9.3 would make the imposition of an emission standard infeasible. A design, equipment, work practice, or other operational standard, or combination thereof has been prescribed to require the application of BART for each source. These standards, to the degree possible, set forth the emission reduction to be achieved by implementation of such design, equipment, work practice or operation, and provide for compliance by means which achieve equivalent results. These standards are summarized in Table 9.3 and will be included in the Title V operating permit for each source after this implementation plan is approved by EPA. Draft Title V operating permits, including the technical support document providing the rationale for BART at each source, are in Appendix 9.5

The application of BART to all BART-eligible sources provides an estimated emission reduction from the baseline year, 2002, of <number> tons per year of sulfur dioxide, <number> tons per year of nitrogen oxides, <number> tons per year of PM<sub>2.5</sub>, and <number> tons per year of PM<sub>10</sub>. [Optional, report: <number> tons per year of volatile organic compounds, and <number> tons per year of ammonia.] These reductions are shown in Tables 9.4 through <9.6> for each source and in total.

*[Optional, depending on the results of the BART analysis:]* <State/Tribe name> in weighing the five factors has determined that BART does not result in the installation of any new controls or other work practice standards for < the following> sources subject to BART in the State/Tribe of < name of state or tribe>. <list sources if less than all>. List reasons. Reference the BART visibility analysis).

The <State/Tribe name> is requiring that each source subject to BART shall install and operate BART as expeditiously as practicable but in no event later than five years after approval of the SIP/TIP or plan revision by EPA.

This requirement will be included in the Title V operating permit for each source subject to BART after this SIP/TIP is approved by EPA. The Title V operating permits also include a requirement that each source maintain the control equipment and establish procedures to ensure such equipment is properly operated and maintained. Copies of the draft Title V operating permits include the BART installation schedule for each source may be found in Appendix 9.5.

#### **9.4 Emissions Trading Program or Other Alternative Measures in Lieu of BART (optional)**

<State/Tribe name> (alone or in cooperation with the <States/Tribes> has developed and will implement an emissions trading program (or other alternative measure) rather than require sources subject to BART to install, operate, and maintain BART. This program will achieve greater reasonable progress than would be achieved through the installation and operation of BART.

The emissions trading program (or other alternative measure) consists of:

(Note: Describe the program and provide a summary of all the plan elements and documentation of all analyses required in 51.308(e)(2) and (3)).

The emissions trading program should include requirements for: emission allowances for the pollutants included in the program, tracking permits, emissions monitoring and reporting, audits and reports, set-asides for new sources, transfers of allowances, banking provisions, the tracking system for allowances, and penalties to be assessed if allowances are not achieved.

A detailed description of the emissions trading or alternative measures program is included in Appendix 9.6 and the cumulative air quality analysis for the emissions trading or alternate measures program is included in Appendix 9.7.



## 10. Reasonable Progress Goals

40 CFR section 51.308(d)(1) requires <States/Tribes name> to establish reasonable progress goals (RPG) for each Class I area within the state (in deciviews) that provide for reasonable progress towards achieving natural visibility. In addition, EPA released guidance on <date> to use in setting reasonable progress goals <reference>. The goals must provide improvement in visibility for the most impaired days, and ensure no degradation in visibility for the least impaired days over the SIP/TIP period. The state must also provide an assessment of the number of years it would take to attain natural visibility conditions if improvement continues at the rate represented by the RPG.

The EPA guidance referenced above describes the RPG development process as follows:

RPGs should be initially developed considering available control measures as evaluated using the statutory factors. Based on emission reductions anticipated from the resulting control strategy for all visibility impairing pollutants, the State should ensure that the RPGs define visibility conditions at, or better than, conditions based on the uniform rate of progress. If a State finds that its initial RPG will not result in visibility improvement equal to or better than the uniform rate of progress, then the State should reconsider available control measures, and additional measures should be evaluated as appropriate. The RPGs should then be revised based upon a more stringent suite of controls.

The “statutory factors” that the state must consider are identified in 40 CFR 51.308(d)(i)(A) as:

- a) The costs of compliance,
- b) The time necessary for compliance,
- c) The energy and non-air quality environmental impacts of compliance, and
- d) The remaining useful life of existing sources that contribute to visibility impairment.

The state must demonstrate how these factors were taken into consideration in selecting the goal for its mandatory Class I areas.

The “Uniform Rate of Progress” (URP) named in the EPA guidance (described as uniform rate of improvement in 40 CFR 51.308(d)(1)(i)(B)) and is essentially a line between current or baseline conditions on the worst days and natural background in 2064. *<Possible summary table of the URP for each Class I area in CENRAP included in this chapter>*

Table 10.1 provides a Uniform Rate of Progress for Class I Areas in <S/T> .

**Table 10.1. Uniform Rate of Progress for Class I areas in <S/T>**

<b>Class I Area</b>	<b>Deciview Improvement Needed by 2018 assuming URP</b>	<b>Progress Annually to 2018 assuming URP</b>	<b>Deciview Improvement Needed by 2064</b>

(Repeat as necessary for each Class I area.)

**10.2 Option A: State with Class I area(s)**

<S/T> has determined that the rate of visibility improvement by 2018 shown in Table 10.2 is reasonable and hereby adopts it as the reasonable progress goal for the listed Class I areas. An analysis showing that this goal is reasonable is provided at Appendix 10.1, "Analysis of Control Strategies and Determination of Reasonable Progress Goals". The analysis considers the cost of compliance, the time for compliance, the energy and non-air quality impacts of compliance and the remaining useful life of existing sources.

In determining a reasonable progress goal for each Class I area, <S/T> has consulted with the other States/Tribes, which are reasonably anticipated to cause or contribute to visibility impairment in each of these Class I areas. A description of the interstate consultation process is provided in Appendix 10.2.

**Table 10.2 Reasonable Progress Goals for Class I Areas**

<b>Class I Area</b>	<b>Deciview Improvement Projected by 2018 using RPG</b>	<b>Deciview Improvement by 2018 at URP</b>	<b>Projected Annual Rate of Improvement 2008-2018</b>	<b>Projected Deciview Improvement by 2064</b>

**10.2 Option B: States/Tribes Without Class I Areas**

<S/T> does not contain any Class I Areas. However <S/T> is "anticipated to cause or contribute to visibility impairment" (40 CFR 51.308(1)(iv)) to these Class I areas: <list Class I areas impacted by state/tribe>. <S/T> has therefore participated in the consultation process outlined in CENRAP SIP template (for possible use by CENRAP states) Jan 2006 version 31

Appendix 10.2. <S/T> agrees with the reasonable progress goals adopted by the state of <State(s) name> and agrees to implement the Long Term Strategy identified in Chapter 11. An analysis showing that this goal is reasonable is provided at <appendix 10.1, “Analysis of Control Strategies and Determination of Reasonable Progress Goals”>.

### **10.3 Consultation**

In determining a reasonable progress rate for each Class I area discussed above, <State/Tribe name> has consulted with the other States/Tribes, which (are) reasonably anticipated to cause or contribute to visibility impairment in each of these Class I areas. A description of the consultation process is provided at Appendix 10.2.

### **10.4 Reporting**

Progress will be reported to the EPA every five years in accordance with 51.308 (g).

### **List of Chapter 10 Appendices**

10.1 Analysis of Control Strategies and Determination of Reasonable Progress Goals

10.2 Description of Interstate Consultation Process in Establishing Reasonable Progress Goals

## **11. Long Term Strategy to Reach Reasonable Progress Goals**

40 CFR section 51.308(d)(3) requires the <State/Tribe name> to submit a long-term strategy that addresses regional haze visibility impairment for each mandatory Class I Federal area within and outside the State/Tribe which may be affected by emissions from within the State/Tribe. The long-term strategy must include enforceable emissions limitations, compliance schedules and other measures necessary to achieve the reasonable progress goals established by States/Tribes where the Class I areas are located. This chapter describes how <State/Tribe name> meets the long-term strategy requirements.

### **11.1 Consultation**

40 CFR section 51.308(d)(3)(i) requires <State/Tribe> to consult with other States/Tribes to develop coordinated emission strategies. This requirement applies both where emissions from the State/Tribe are reasonably anticipated to contribute to visibility impairment in Class I areas outside the State/Tribe and when emissions from other States/Tribes are reasonably anticipated to contribute to visibility impairment in Class I areas within the State/Tribe.

<State/Tribe> consulted with other States/Tribes and tribes by participation in the CENRAP and <list other RPO> processes that developed technical information necessary for development of coordinated strategies. In addition, < State/Tribe > participated in discussions focused on Class I areas in the <identify Class I area group> which involved the following states and tribes <list states and tribes>. < State/Tribe > also coordinated with CENRAP and other RPOs to develop a weight of evidence analysis that was used to develop the States/Tribe's long-term strategy (see Appendix 11.1, Contribution Assessment, and Appendix 11.2 ,Weight of Evidence) Strategy development considered the impacts of the State/Tribe's emissions on Class I areas within and outside the State/Tribe. <Edit, revise or elaborate as necessary to describe the State/Tribe's consultation.>

<State/Tribe name> is reasonably anticipated to contribute to the following Class I areas:  
<Provide list or table. Also include % contribution from anthropogenic sources in each state that contributes significantly using data in appendices 11.1 and 11.2>

The State/Tribe's coordination with FLMs on long-term strategy development is described in Chapter 4.

### **11.2 Share of Emission Reductions**

40 CFR section 51.308(d)(3)(ii) requires < State/Tribe > to demonstrate that its implementation plan includes all measures necessary to obtain its fair share of emission reductions needed to meet reasonable progress goals.

The weight of evidence analysis referenced in section 11.3 demonstrated that the State/Tribe's long-term strategy when coordinated with other State/Tribes' strategies is sufficient to meet reasonable further progress goals. All applicable measures reflected in the weight of evidence analysis have been incorporated in the State/Tribe's long-term strategy. Section 11.4 below provides information on these measures.

Table <#> below outlines < State/Tribe > contributions to the Class I areas.  
<create table summarizing State/Tribe contributions to Class I areas>

### 11.3 Weight of Evidence Technical documentation

A full discussion of weight of evidence is found in Appendix 11.2.

#### 11.3.1 Basis for emission reduction obligations

40 CFR section 51.308(d)(3)(iii) requires < State/Tribe > to document the technical basis for the State/Tribe's apportionment of emission reductions necessary to meet reasonable progress goals in each Class I area affected by the State/Tribe's emissions.

< State/Tribe > relied on technical analyses developed by CENRAP and <name other RPO> to demonstrate that the State/Tribe's emission reductions, when coordinated with those of other States/Tribes are sufficient to achieve reasonable progress goals in Class I areas affected by the States/Tribes. The CENRAP analysis is outlined below and is described in more detail in the referenced appendices:

1. Identify states expected to contribute significantly <what is the threshold?> to visibility degradation in each Class I area. <Appendix 11.1 – Contribution Assessment and Appendix 8.1 – Modeling TSD>
2. Identify pollutants (predicted in 2018) that contribute to visibility degradation in each Class I area. <Appendix 32, 17, and 16 – Emission inventory TSD>
3. Identify major sources of the pollutants likely to contribute to visibility degradation in each Class I area in 2018. <Appendix 11.1 and Appendix 8.1>
4. Identify control strategies that might result in significant reductions of pollutants. Strategies may be CENRAP-wide for pollutants and sources that are likely to impact most Class I areas or smaller scale for pollutants or sources found in more restricted areas. The four statutory factors were considered in choosing possible controls. <Alternatively, should a % reduction or weighted (by distance) % reduction be considered?>
5. Model the effect of these strategies <Appendix 8.6>.
6. For those Class I areas that then meet the uniform rate of progress (URP), the states that contribute significantly shall implement these strategies or obtain equivalent emission reductions from other sources.

7. For those Class I areas that remain above the URP, the states that contribute significantly shall determine whether there are other sources within their jurisdiction that can implement controls that meet the four statutory factors.

The demonstration of attainment of reasonable progress goals relies on the analysis of monitored and modeled data in a weight of evidence analysis to determine whether visibility is improved on days when it is usually poor and does not deteriorate on days when it is usually good. Current visibility is estimated from monitored components of PM<sub>2.5</sub> and coarse mass. Models are used in a relative sense to estimate how current concentrations respond to emission reduction measures. Data analysis is used to identify source categories and regions. Current concentrations of particulate matter components are adjusted by the relative modeled response to estimate concentrations at the end the first implementation period in 2018. Future visibility is estimated from estimated component concentrations of PM<sub>2.5</sub> and coarse particulate matter at the end of the first implementation period. The difference between present visibility and future estimated visibility is compared with the reasonable progress goal to determine if the goal is met.

The CENRAP technical report on current visibility conditions is found in Appendix 5.1, Determination of Baseline Visibility Conditions. CENRAP technical reports on current and projected inventories and on regional modeling are found in Chapters 7 and 8. Chapter 8 includes the technical report on long-term strategy modeling performed by <States/Tribes name> to demonstrate meeting reasonable progress goals.

Appendix 11.2 is CENRAP's contribution assessment. Appendix <optional, insert # if used> is MidWest RPO's contribution assessment. <Insert other references as appropriate>

### **11.3.2 Baseline inventory**

40 CFR section 51.308(d)(3)(iii) requires <State/Tribe name> to identify the baseline inventory on which the long-term strategy is based.

<State/Tribe name> used the 2002 CENRAP Inventory Version <insert version> as its baseline inventory. (See Table 7.1, Chapter 7.)

## **11.4 Anthropogenic sources of visibility impairment**

40 CFR section 51.308(d)(3)(iv) requires <State/Tribe name> to identify all anthropogenic sources of visibility impairment considered by the State/Tribe in developing its long-term strategy.

Appendix 7.2 provides the basis of the 2002 emissions inventory used in developing this SIP/TIP.

## **11.5 Factors the State/Tribe Must Consider**

40 CFR section 51.308(d)(3)(v) requires <State/Tribe name> to consider several factors in developing its long-term strategy. These are discussed below.

### **11.5.1 Emission reductions due to ongoing air pollution programs.**

40 CFR section 51.308(d)(3)(v)(A) requires <State/Tribe name> to consider emission reductions from ongoing pollution control programs.

<State/Tribe name> considered the following ongoing programs in developing its long-term strategy: <list of programs with whatever elaboration is deemed appropriate>

### **11.5.2 Measures to mitigate the impacts of construction activities.**

40 CFR section 51.308(d)(3)(v)(B) requires < State/Tribe name > to consider measures to mitigate the impacts of construction activities. <Appendix 11.3 *Clarity is needed on what, if anything, should go in the SIP*>

*[Note: Under the ozone NAAQS, states in nonattainment of the ozone standard are required to consider construction emissions as part of the general conformity rule (only VOC and NOx emissions are reviewed). Mitigation under general conformity should be considered as a supplement to any mitigation activities performed under the regional haze rule.]*

### **11.5.3 Emission limitations and schedules of compliance.**

40 CFR section 51.308(d)(3)(v)(C) requires <State/Tribe name> to identify additional measures to meet reasonable progress goals when ongoing programs alone are not sufficient to meet the goals.

<State/Tribe name> found that ongoing air pollution control programs <were or were not> sufficient to meet reasonable progress goals through 2018. <<As a result, <State/Tribe name> adopted the following measures: <list of measures>. Rules, administrative orders and schedules of compliance addressing these measures are found in Appendix 11.4 unless they involve implementation of BART. The enforceable mechanisms for BART compliance, e.g.

Administrative orders, rules, title V operating permits, or schedules of compliance, for facilities required to implement BART are found in Appendix 9.5.

#### **11.5.4 Source retirement and replacement schedules**

40 CFR section 51.308(d)(3)(v)(D) requires <State/Tribe name> to consider source retirement and replacement schedules in developing reasonable progress goals.

*Option A:*

<State/Tribe name> considered the following source retirement and replacement schedules in developing its long-term strategy: <list of source retirement and replacement schedules followed by appropriate discussion on what this means for the long-term strategy> These schedules are described in more detail in Appendix 11.5.

**OR**

*Option B:*

Retirement and replacement will be managed in conformance with existing SIP/TIP requirements pertaining to PSD and New Source Review.

#### **11.5.5 Agricultural and forestry smoke management**

40 CFR section 51.308(d)(3)(v)(E) requires <State/Tribe name> to consider smoke management techniques for the purposes of agricultural and forestry management in developing reasonable progress goals. <Describe how the State/Tribe addressed smoke management in developing its long-term strategy.>

CENRAP states/tribes may wish to consider three approaches.

APPROACH 1: <State/Tribe name> has adopted a basic Smoke Management Program (SMP).

<State/Tribe name> evaluated/compiled a smoke management plan that includes the following requirements as laid out in *EPA's Interim Air Quality Policy on Wildland and Prescribed Fires*:

- Authorization to burn
- Minimizing air pollutant emissions
- Smoke management components of burn plans
  - 1) Actions to minimize emissions
  - 2) Evaluation of smoke dispersion
  - 3) Public notification and exposure reduction procedures
  - 4) Air quality monitoring
- Public education and awareness

- Surveillance and enforcement
- Program evaluation

<State/Tribe name\*\* *could be another entity other than environmental agency, such as the Dept of Ag, etc.*> has a process for authorizing or granting approval to manage fires. <State/Tribe name> identified <a central authority> that is responsible for implementing the program.

<State/Tribe name> has encouraged wildland owners/managers to consider alternatives to burning. <State/Tribe name> has taken the following steps <insert steps> to remove administrative barriers to implementing alternatives to burning.

<State/Tribe name> has an SMP that includes measures that will be taken to reduce residual smoke from burning activities. <Stat/Tribe name> has documented the steps taken prior to the burn and actions taken during and after the burn to reduce air pollutant emissions. <Insert documentation>.

In addition, <State/Tribe name> has a process to evaluate potential smoke impacts at sensitive receptors and schedule fires to minimize exposure of sensitive populations and avoid visibility impacts in Class I areas. <Insert text about steps taken to minimize exposure of sensitive populations and visibility impacts in Class I areas>.

<State/Tribe name> has a public notification process and exposure reduction process in place to reduce the impacts of burning. <Insert text about public notification process and exposure reduction process>.

<State/Tribe name> has a monitoring process in place to determine how fires affect visibility in Class I areas. <Insert text about monitoring process>.

<State/Tribe name> has established a policy to issue health advisories when necessary. <Insert text about notifying potentially affected populations includes those in adjacent jurisdictions of planned fires>.

<State/Tribe name> has provided for periodic review (every 3-5 years) of the SMP by all stakeholders involved. <Insert text about the periodic review process, including stakeholders involved, their comments, response to comments, etc.>

Pursuant to the EPA's Interim guidance (cited above), <State/Tribe name> has adopted a program that they believe will prevent any NAAQS violations and addresses visibility impairment due to fires. This program established basic parameters: wind speed, direction, location, and distance to sensitive receptors. <Describe basic parameters>.

APPROACH 1-A: <State/Tribe name> has a program in which owners/managers voluntarily notify state/tribal officials of fire plans. Documentation of this program is in Appendix 11.6.

**OR**

APPROACH 1-B: <State/Tribe name> has a program in which owners/managers must get prior authorization prior to implementing fire plans. Documentation explaining this process is in <Appendix 11.6>.

In addition, <State/Tribe name> exempts de minimis fires from meeting the regulations. <State/Tribe name> exempts fires that cover fewer than <X> acres or consume less than <Y> tons of fuel.

In developing and implementing this SMP, <State/Tribe name> worked with public wildland managers, private and Indian wildland owners/managers, and the general public. Documentation of outreach is in Appendix 11.6.

APPROACH 2: <State/Tribe name> certified that a program has been adopted and implemented.

<State/Tribe name> certified in a letter to the Administrator of EPA, that a basic program (described above under Option A, taken from section VI of the Interim Air Quality Policy on Wildland and Prescribed Fires) has been adopted and implemented. (Special consideration will be given to air quality data resulting from fires managed for resource benefits if a letter was submitted.) (See section VII.A of the Interim Policy.)

<State/Tribe name> sent the letter to the Administrator of EPA on <date(s)>.

EPA's reply is included in <Appendix 11.6>.

APPROACH 3: <State/Tribe name> did not adopt a smoke management program.

Fires in <State/Tribe name> do not significantly contribute to visibility impairment in mandatory Class I Federal areas. Therefore, there is no need for a SMP in this SIP.

**11.5.6 Enforceability of emission limitations and control measures**

40 CFR section 51.308(d)(3)(v)(F) requires <State/Tribe name> to ensure that emission limitations and control measures used to meet reasonable progress goals are enforceable.

<State/Tribe name> has ensured that all emission limitations and control measures used to meet reasonable progress goals are enforceable by embodying these in the administrative orders and the State/Tribe-adopted rules found in Appendix 11.4 and the appendix addressing BART enforceability, appendix 9.5. <State/Tribe name> requests EPA approval of these measures.

**11.5.7 Anticipated net effect on visibility resulting from projected changes to emissions**

40 CFR section 51.308(d)(3)(v)(G) requires <State/Tribe name> to address the net effect on visibility resulting from changes projected in point, area and mobile source emissions by 2018.

The emission inventory for <State/Tribe name> projects changes to point, area and mobile source inventories by the end of the first implementation period resulting from population growth; industrial, energy and natural resources development; land management; and air pollution control. A summary of these changes is given in Table 11.1 for each of the pollutants addressed in the regional haze inventory. More detail is provided in Appendix 10.1.

**Table 11.1 Emission from Point, Area and Mobile Sources in < State/Tribe name>**

	2000	2018 Basecase	2018 with Additional Measures for RFP
Total Point Sources – NOx			
Total Point Sources – SO2			
Total Point Sources - PM			
Total Areas Sources – NOx			
Total Area Sources – SO2			
Total Area Sources – PM			
Total Mobile Sources – NOx			
Total Mobile Sources – SO2			
Total Mobile Sources - PM			

The net effect of these emission differences on visibility in Class I areas was discussed in the weight of evidence demonstration provided in Appendix 11.2.

## **List of Chapter 11 Appendices**

- 11.1 Contribution Assessment Analysis
- 11.2 Weight of Evidence
- 11.3 Construction Mitigation Measures
- 11.4 Control Measures Adopted by State: rules, Administrative Orders, Schedules of Compliance (not BART)
- 11.5 Source Retirement/Replacement Schedules
- 11.6 Agricultural and Forestry Smoke Management

## **12. Comprehensive Periodic Implementation Plan Revisions**

40 CFR section 51.308(f) requires a State/Tribe to revise its regional haze implementation plan and submit a plan revision to EPA by July 31, 2018 and every ten years thereafter. In accordance with the requirements listed in Section 51.308(f) of the federal rule for regional haze, <State/Tribe name> commits to revising and submitting this regional haze implementation plan by July 31, 2018 and every ten years thereafter.

In addition, Section 51.308(g) requires periodic reports evaluating progress towards the reasonable progress goals established for each mandatory Class I area. In accordance with the requirements listed in Section 51.308(g) of the federal rule for regional haze, <State/Tribe name> commits to submitting a report on reasonable progress to EPA every five years following the initial submittal of the SIP/TIP. The report will be in the form of a SIP/TIP revision. The reasonable progress report will evaluate the progress made towards the reasonable progress goal for each mandatory Class I area located within <State/Tribe name> and in each mandatory Class I area located outside <State/Tribe name>, which may be affected by emissions from within <State/Tribe name>. All requirements listed in 51.308(g) shall be addressed in the SIP/TIP revision for reasonable progress.

### **List of Chapter 12 Appendices**

There are no Appendices in Chapter 12.

### **13. Determination of the Adequacy of the Existing Plan**

Depending on the findings of the five-year progress report, <State/Tribe name> commits to taking one of the actions listed in 40 CFR section 51.308(h) {list out for clarity}. The findings of the five-year progress report will determine which action is appropriate and necessary.

#### List of Possible Actions – 40 CFR section 51.308(h)

- 1) <State/Tribe name> determined that the existing SIP required no further substantive revision in order to achieve established goals. <State/Tribe name> provided to the Administrator a negative declaration that further revision of the SIP is not needed at this time>
- 2) <State/Tribe name> determined that the existing SIP may be inadequate to ensure reasonable progress due to emissions from other states which participated in the regional planning process. <State/Tribe name> provided notification to the Administrator and the states that participated in regional planning. <State/Tribe name> collaborated with states through the regional planning process to address the SIP's deficiencies.
- 3) <State/Tribe name> determined that the current SIP may be inadequate to ensure reasonable progress due to emissions from another country. <State/Tribe name> provided notification, along with available information, to the Administrator.
- 4) <State/Tribe name> determined that the existing SIP is inadequate to ensure reasonable progress due to emissions within the <State/Tribe name>. <State/Tribe name> will revise/has revised its SIP to address the plan's deficiencies. {State/Tribe must address the deficiencies within one year.}

#### **List of Chapter 13 Appendices**

There are no Appendices in Chapter 13.

## Guidance Documents

### **Assessment of Baseline, Natural and Current Conditions**

EPA is to develop guidance on calculating *baseline and current* visibility. EPA is to develop guidance on calculating baseline in the absence of on-site data. EPA is to develop technical guidance on estimating *natural* visibility conditions. EPA to revise the Interim Air Quality Policy on Wildland and Prescribed Fires which includes guidance on determining the contribution of fire to natural visibility conditions. States should include in the SIP "appropriate methods for estimating natural conditions. It is assumed that the States procedures will use these guidance documents to establish the *Baseline, Background* and *Current* conditions in each Class I Area.

### **Best Available Retrofit Technology**

Controlling SO<sub>2</sub> Emissions: A Review of Technologies, EPA Office of Research and Development, EPA-600/R-00-093

Guidelines for Determining Best Available Retrofit Technology for Coal-fired Power Plants and Other Existing Stationary Facilities. EPA-450/3-80-009b. November 1980. This document addresses reasonably attributable BART not regional haze BART. However, it will be the basis for regional haze BART guidance being developed by EPA. The RH BART engineering analysis will be similar to the RA BART guidance of 1980.

*40 CFR part 51 Regional Haze Regulations; Final Rule. EPA. Federal Register Vol. 64, No 126/ Thursday, July 1, 1999. The preamble discusses RH BART in detail.*

Guidance for Demonstrating Attainment of Air Quality Goals for PM<sub>2.5</sub> and Regional Haze. EPA. Draft 2.1, January 2, 2001.

This document, when finalized in 2001, will provide guidance on how to use modeled and monitored data to estimate if visibility goals for regional haze will be met by a proposed control strategy.

Voluntary Emissions Reduction Program for Major Industrial Sources of Sulfur Dioxide in Nine Western States and a Backstop Market Trading Program. An Annex to the Report of the Grand Canyon Visibility Transport Commission. Western Regional Air Partnership. October 1, 2000.

This document describes an emissions trading program and provides a model rule and draft memorandum of understanding between states and tribes for implementing an interstate emissions trading program.

Proposed Guidelines for Best Available Retrofit Technology (BART) Determinations Under the Regional Haze Regulations. EPA. Draft January 12, 2001. This document, when finalized in 2001, will provide the guidance on RH BART. It was recently proposed in the Federal Register.

The final document will be Appendix Y of Part 51. It will address the RH BART engineering analysis, cumulative visibility assessment, and emission trading alternatives.

Improving Air Quality with Economic Incentive Programs. EPA - 452/R-01-001. January 2001. This document provides guidance for economic incentive programs including emission trading programs that states may incorporate in their strategies for meeting air quality standards and addressing visibility impairment in national parks and wilderness areas.

### **Long Term Strategy**

*Guidance for Demonstrating Attainment of Air Quality Goals for PM<sub>2.5</sub> and Regional Haze* (EPA, OAQPS, draft 2.1, January 2, 2001)

*Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations* (EPA-454/R-99-006, April 1999)

*Proposed Guidelines for Best Available Retrofit Technology (BART) Determinations Under the Regional Haze Regulations.* This proposal will be published in the *Federal Register* soon.

### **Monitoring Strategy and Emissions Inventory**

Visibility Monitoring Guidance document, (EPA-454/R-99-003, June 1999)  
<http://www.epa.gov/ttn/amtic/files/ambient/visible/r-99-003.pdf>

IMPROVE Particulate Monitoring Network - Procedures for Site Selection, (Crocker Nuclear Laboratory, University of California, February 24, 1999)  
<http://www.epa.gov/ttn/amtic/files/ambient/visible/select22.pdf>

IMPROVE Particulate Monitoring Network – Standard Operating Procedures Air Quality, (Crocker Nuclear Laboratory, University of California, October 15, 1998)  
<http://www2.nature.nps.gov/ard/vis/sop/index.html>

National Park Service Visibility Monitoring internet site,  
<http://www2.nature.nps.gov/ard/vis/vishp.html>

EPA Consolidated Emission Reporting Rule, (Federal Register: May 23, 2000, Volume 65, Number 100, Proposed Rules, Page 33268-33280.)  
[http://www.epa.gov/ttn/chief/cerr/CERR\\_FR.pdf](http://www.epa.gov/ttn/chief/cerr/CERR_FR.pdf)

Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations (EPA-454/R-99-006, April 1999). <http://www.epa.gov/ttn/chief/eidocs/eidocfnl.pdf>

### **Reasonable Progress Goals**

Controlling SO<sub>2</sub> Emissions: A Review of Technologies, EPA Office of Research and Development, EPA-600/R-00-093

EPA Clean Air Technology Center - Control Cost Manual (5th edition) -  
<http://www.epa.gov/ttn/catc/products.html>

EPA BART guidelines (soon to be proposed) -  
<http://www.epa.gov/ttn/oarpg/t1pfpr.html>

EPA Guidelines for Preparing Economic Analyses -  
<http://www.epa.gov/economics/>

Guidelines for Determining Natural Background, to be developed by EPA.

Guidelines for interpreting statutory factors, to be developed by EPA.

Regional Haze Regulations, Final Rule, 40 CFR, Part 51, July 1, 1999.

**Weight of Evidence**

*Guidance for Improving Weight of Evidence Through Identification of Additional Emission Reductions, Not Modeled.* <http://www.epa.gov/scram001/guidance/guide/addwoe1h.wpd>