

RESPONSE TO COMMENTS
Regional Haze SIP, proposed 12-5-07
REVISED 02-20-09

To assist readers with all the federal agencies that commented, a short acronym list is provided. A more complete list is located at the beginning of the Regional Haze SIP.

EPA	United States Environmental Protection Agency
FLM	Federal Land Managers (includes NPS, FWS, and FS for this document)
FS	United States Forest Service
FWS	United States Fish and Wildlife Service
NPS	National Park Service, United States Department of the Interior

Chapter 1: Background and Overview of the Federal Regional Haze Regulation

The Forest Service (FS) and one individual requested rewording of the sentence in paragraph one defining Class I areas as those “. . . that Congress has recognized at significant sites” to “Class I areas are national parks over 6,000 acres and wilderness areas over 5,000 acres that were in existence before August 7, 1977.” One individual commented that the Texas Commission on Environmental Quality (TCEQ) stated that Guadalupe Mountains contains the only congressionally designated wilderness in Texas; however, there are five congressionally designated wilderness areas in East Texas.

The commission made the changes the FS suggested; this change also corrected the comment of the individual.

The FS commented that Big Bend and Guadalupe Mountains are identified in Chapter 1: *Background and Overview of the Federal Regional Haze Regulation*, but out-of-state Class I areas are not. Including a summary of those other impacted Class I areas would provide balance to this chapter. The FS requested that the TCEQ include the out-of-state Class I areas that Texas impacts in Chapter 1. Additionally, the FS commented that Texas should quantitatively summarize its reasonable progress goals and associated rationale for each Class I area addressed in the Texas Regional Haze State Implementation Plan (SIP) revision.

The commission added revisions in Chapter 1 that direct the reader to Chapter 11: *Long-Term Strategy to Reach Reasonable Progress Goals* for analysis of Texas' impacts on all impacted Class I areas. The commission disagrees with the suggestion that the Texas Regional Haze SIP revision should list the reasonable progress goals established by each state with a Class I area that Texas impacts. Instead, Chapter 11 details both the total and Texas' apportioned 2002 and projected 2018 extinction impacts on each Class I area impacted by Texas' emissions.

One individual commented that Table 1-1: *Visibility-Impairing Pollutants* lists evergreen trees as emitting volatile organic compounds (VOC), but other trees, like oak, also emit VOC.

Evergreen was removed from Table 1-1 in response to this comment.

One individual commented that Table 1-1 does not document that many areas with bare soil or little vegetation are due to human impacts. Example: overgrazing occurred in the area that is now Big Bend before it became a park.

Table 1-1 lists only major sources and not all possible sources. After discussions, the FLMs suggested that the commission could judiciously use 80 percent as the natural source of coarse and fine dust and 20 percent of coarse and fine dust due to human activity. The comparison plots in Chapter 5: *Assessment of Baseline and Current Conditions and Estimate of Natural Conditions in Class I Areas* show little difference in the final calculation whether

natural dust sources are 80 or 100 percent. The commission made no changes in Chapter 1 in response to this comment, but changes were made in Chapter 5 and Appendix 5-2: *Estimate of Natural Visibility Conditions*. (Also see responses on grazing under Chapter 8: *Modeling Assessment*.)

One individual would appreciate a definition of “maintaining adequate visibility.” One individual wants TCEQ to strive for better than adequate air quality in Big Bend and Guadalupe Mountains.

The commission follows the requirements of the Federal Clean Air Act and EPA in regard to visibility. Since there is no health based standard for visibility, there is not an exact number to reach. The commission’s goal is to reduce haze-impairing pollutants in Texas and surrounding states to approximately natural conditions. Texas has calculated natural conditions to be about 11 deciviews at the state’s two Class I areas.

Chapter 2: General Planning Provisions

The United States Environmental Protection Agency (EPA) commented that the TCEQ should ensure it followed the requirements of Part 51, Appendix V. The EPA also suggested that TCEQ edit the paragraph “Public Notice” in Chapter 2: *General Planning Provisions* to include a reference to Part 51, Appendix V. The EPA suggested additional documentation that the state complied with Part 51, Appendix V be included in Appendix 2-1: *Public Participation Process*.

The commission has added the reference to Part 51, Appendix V. When the commission submits any SIP revision to the EPA for approval, it follows the administrative requirements of Appendix V, Section 2.0. This revision will be no exception. The commission’s order, referral letter, public hearing record book, and SIP narrative will address those relevant criteria.

Chapter 4: State, Tribe, and Federal Land Manager Consultation

The EPA, National Park Service (NPS), Fish and Wildlife Service (FWS), Forest Service (FS), and one individual commented that the consultation process appeared incomplete. Circular questions about states that have not completed their BART or Regional Haze SIP process have arisen. All commenters requested: 1) more details on the technical information that was communicated and 2) signed documentation that adjacent states (Louisiana, Arkansas, Missouri, Oklahoma, Colorado, and New Mexico) were satisfied with Texas’ existing regulations for the next revision.

The EPA specifically requested that TCEQ should address the requirements of Section 51.308(d)(1)(iv).

- a) Do these states agree with the TCEQ on the level of their apportionments?
- b) What, if any, reductions in these states’ sources were negotiated through the consultation process as part of the TCEQ’s reasonable progress strategy?
- c) The TCEQ should demonstrate that it has included in its implementation plan all measures necessary to obtain its share of the emission reductions needed to meet the progress goal for those Class I areas for which it causes or contributes to visibility impairment.
- d) In Chapter 4, the TCEQ states that it attended Oklahoma’s three consultation calls held in August and September 2007. The TCEQ should discuss the results of those calls, including whether Oklahoma requested any additi

The commission acknowledges some Regional Haze SIP and Best Available Retrofit Technology (BART) timing issues regarding consultation with neighboring states. To address this issue, the commission sent a formal consultation letter with attached Particulate Matter Source Apportionment Technology (PSAT) results, and where applicable, area of influence maps of Texas sources on Class I areas, and documents containing source-specific data on nitrogen oxides (NO_x) and sulfur dioxide (SO₂)

contributions to neighboring states. The consultation letter discussed expected emissions reductions by 2018 that will improve visibility in the affected Class I areas. The commission also requested recipients of the letters to confirm they are not expecting any additional emission reductions from Texas sources. The letters and replies are in Appendix 4-3: *Additional Consultation Letters to Adjacent States*.

Oklahoma, Missouri, Arkansas and Colorado have replied with letters that those states concur with Texas' current level of controls; full replies are in Appendix 4-3. Colorado agrees that Texas' impact at Great Sand Dunes Wilderness Area was less than 5 percent and was not significant per Colorado's criteria. Louisiana has agreed via e-mail that Texas' existing regulations will suffice for now, and Louisiana does not expect more controls at this time. In the consultation calls with Oklahoma Department of Environmental Quality (ODEQ), Oklahoma did not request any additional emissions reductions from Texas. The commission requested written responses in 30 days so the comments could be added to Appendix 4-3. The commission has made changes to Chapter 4: *State, Tribe, and Federal Land Manager Consultation* and added a new appendix 4-3.

Chapter 5: Estimate of Natural Conditions in Class I Areas

The EPA commented that the TCEQ should provide more detail than is present in Appendix 5-2: *Estimate of Natural Visibility Conditions* on the calculation of the refined estimates of natural visibility for the two Texas Class I areas.

Appendix 5-2b: *Estimating Natural Conditions Based on Revised IMPROVE Algorithm* outlines the method used for the calculation of Texas' estimates of natural visibility at Big Bend and Guadalupe Mountains, including the scaling factors used, which are contained in the second part of Table 5-1: *Regional Annual Mean -Natural Concentrations (RAM-NC) of Trijonis and the EPA*. However, so others may more easily reproduce the calculations and see the details of both how the factors were calculated as well as the resultant calculations of natural visibility, the SAS Program code and input data files are bundled into a ZIP file named TXNC.zip and provided as Appendix 5-2c: *Texas Natural Conditions SAS Program File and Data*. The appendix was expanded to include more details as the EPA requested in their comments.

The NPS and FWS find the basic approach used by Texas in adjusting natural conditions for Big Bend and Guadalupe Mountains reasonable. However, Texas should provide a rationale for what fraction of coarse mass and fine soil is natural and what fraction is from human activity. Since human activity adds uncertainty to the estimate of what fraction of the coarse mass and fine soil is natural, Texas should present an alternative with a different fraction.

In response to this comment, the commission added information to Chapter 5 and Appendix 5-2 to show the comparisons between 80 and 100 percent of the coarse mass and fine soil due to a natural dust source. After discussions on the FLMs comments, the FLMs suggested that the commission could judiciously use 80 percent as the natural source of coarse and fine dust and 20 percent of coarse and fine dust due to human activity. The comparison plots in Chapter 5 and Appendix 5-2 show little difference in the final calculation whether natural dust sources are 80 or 100 percent. Additional supporting research from the Chihuahuan Desert (summarized and referenced in Appendix 5-2 Gill, T. et al. 2005; Kavouras, I. G. et al. 2006 and 2007) suggests that, at least for the estimation of natural visibility values for Texas Class I areas, major dust events are predominantly natural in origin.

The EPA suggested that the TCEQ explain why the baseline average for Big Bend, shown in Table 5-1: *Baseline Haze Indices*, does not include data from 2000.

The fourth quarter data of 2000 for Big Bend was not sufficiently complete. The fourth quarter had only 10 complete days. This information is reflected in the Regional Haze Rule data that can be obtained through the Visibility Information Exchange Web System (VIEWS), such as the summary data through 2004 (at vista.cira.colostate.edu/views/Web/IMPROVE/SummaryData.aspx). The commission made additional explanations in the SIP revision for clarification.

The NPS, FWS, and FS acknowledged Texas' right to develop its own estimates of natural conditions, as established in 40 Code of Federal Regulations (CFR) 51.308; however, the FLMs requested that the EPA default estimates of natural conditions given equal weight in all tables, plots, and predictions that involve or depend upon an estimate of natural conditions.

The comparisons with the EPA default, or more specifically, the Natural Conditions II (NC II) committee's estimates using the New/Revised IMPROVE Algorithm, are available in Appendix 5-2. The commission made some changes in response to this comment, however the NC II estimates will remain in the appendix.

The NPS and FWS suggested that it would help the reader to summarize how the refinement affects the revised natural condition if the state included a chart showing the breakdown of each basic pollutant component. NPS and FWS also suggest that this would give a non-technical reader a simple reference about which components in the haze calculation were changed and by how much.

In response to the comments, a paragraph has been added to Chapter 5, Section 5.3. In addition, a note to this effect has been added to Table 5-1 in Appendix 5-2 to illustrate that the fractions shown for all but coarse mass and fine soil are essentially the same as used by the Natural Conditions II.

The EPA asked that the TCEQ provide documentation that supports the estimate that, at least for the estimation of natural visibility values for Texas Class I areas, major dust events can be assumed to be completely natural in origin.

The commission has included additional supporting evidence in additional appendices (and references therein) to Chapter 5. Since there is uncertainty in this estimate, as there is in all the components of natural visibility conditions, the commission has provided plots showing the results for the 20 percent worst natural conditions haze index (in deciviews) if one were to treat only 80 percent of the coarse mass and fine soil to be natural. However, this 80 percent calculation is displayed only as an indication of how little sensitivity this natural visibility estimate has to approximating 100 percent of the coarse mass and fine soil as natural.

The EPA noted that wind blown dust is a more important factor for Guadalupe Mountains than at Big Bend. The TCEQ acknowledges that the number of dust storms at Guadalupe Mountains and Big Bend do not correlate with each other in the SIP and appendixes. Because of these differences, the natural conditions for these two sites should be evaluated individually. The EPA requested that the TCEQ show how this information was considered in the assumptions and show calculations of the natural visibility values for each of Texas' Class I areas.

The commission did calculate separate equations for Big Bend and Guadalupe Mountains; therefore, two different numbers were recommended for natural conditions (see Chapter 5 and Appendix 5-2). Regarding the difference in dust at Big Bend and Guadalupe Mountains, even using 80 percent versus 100 percent of the coarse mass and fine soil as natural made little difference in the final calculation (see Figures 5-1 and 5-3 in Chapter 5

and Figures 5-1 and 5-2 in Appendix 5-2). In response to this comment, the commission added figures to Chapter 5 and Appendix 5-2 to show the comparisons.

The comment in the Stuart Dattner's paper in Appendix 5-2a: *Natural Events: Dust Storms in West Texas* about how the natural conditions for these two sites should be evaluated individually stems from the commission's long-standing assertion that Big Bend and Guadalupe Mountains cannot simply be treated as being essentially the same (Dattner, 2007 at <www.tceq.state.tx.us/assets/public/implementation/air/sip/bart/haze_sip-dust_storms.pdf>). There is ample evidence, in addition to that cited in the dust storm paper, that these parks are in many ways quite different. However, this paper does support the assertion of the Appendix 5-2b: *Estimating Natural Conditions Based on the Revised IMPROVE Algorithm*, (<www.tceq.state.tx.us/assets/public/implementation/air/sip/bart/haze_sip-est.natural_conditions.pdf>), that the observed coarse mass and fine soil components of haze in the western United States, including Big Bend and Guadalupe Mountains, are consistent with Trijonis' estimates of natural conditions (see reference Trijonis 1990), which are used by the EPA and the Natural Conditions II committee in obtaining default estimates of natural conditions. In addition, though the estimate that the 20 percent worst natural visibility conditions can be best approximated by using 100 percent of the coarse mass and fine soil as stemming from natural sources is common to the calculation of natural conditions at both Texas Class I areas, the actual computations are carried out using each area's own data.

Chapter 6: Monitoring Strategy

The NPS, FWS, FS, and one individual commented that the TCEQ stated it will participate in the monitoring network as long as EPA or other states fund these programs. One individual considered the previous statement showed a lack of commitment by the TCEQ to protect Class I areas in and outside Texas. The NPS and FWS commented that the SIP stated the current funding for the Interagency Monitoring of Protected Visual Environments (IMPROVE) network to be primarily EPA with some funding from NPS. However, all the FLM agencies with Class I area management responsibilities (including FWS and FS) contribute to the establishment and operation of the IMPROVE monitoring network. The individual commented that the TCEQ has permitted air emissions in Texas to degrade visibility both inside and outside Texas, but considered it unfair that Texas was not willing to fund a Web site, monitoring, and collaboration with others whose Class I areas are diminished by Texas' air emissions. The commenters suggest Texas have a contingency plan for monitoring and reporting of data in case the IMPROVE program curtails operation of IMPROVE monitors or funding for Visibility Information Exchange Web System (VIEWS).

The commission agrees that the proposed SIP revision did not mention that the financial contributions from the FWS and FS to funding the IMPROVE monitoring at Class I areas. The SIP is revised to acknowledge these contributions. The commission agrees that it plans to consult with the FLM agencies for all the Class I areas that Texas impacts if the current federal funding of any of these IMPROVE monitoring network sites or the VIEWS services is threatened. The commission considers both continued IMPROVE monitoring at current Class I IMPROVE sites and continued VIEWS services to be centrally important to the effort to reduce anthropogenic haze impacts at these sites. The commission plans to work with the FLMs to attempt to find the funding to continue the current Class I IMPROVE monitoring and VIEWS services for these sites. The commission has added these commitments to the SIP in Chapter 6 Section 6.2. Concerning the availability of alternative data sites for the two Class I areas in Texas, the analysis by the IMPROVE Steering Committee has shown definitively that the two sites are each unique in the current IMPROVE Class I site network, so there is no acceptable, reasonably representative alternative that could substitute for either site.

In response to the question about the TCEQ's monitoring and monitoring plans at Big Bend and at Guadalupe Mountains, the commission notes that it currently operates a PM_{2.5} TEOM, which is a Tapered Element Oscillating Microbalance that measures particulate matter with aerodynamic diameters less than 2.5 microns, an every-sixth-day PM_{2.5} chemical speciation monitoring site, and a set of meteorological instruments at the Big Bend IMPROVE site. Additionally, the TCEQ hosts the NPS ozone data from Big Bend on the TCEQ Web site. In fact, the NPS ozone data appear on the TCEQ Web site.

The commission currently plans to continue this monitoring but is unable to make a binding commitment about future operation of these instruments. Operation is dependent on future funding of TCEQ monitoring and on potentially competing priorities for resources. As long as the TCEQ is able to continue its monitoring at Big Bend, it will make all the data available to the FLMs, the EPA, and the public.

Chapter 7: Emissions Inventory

The EPA requested an explanation of how the TCEQ resolved any significant differences between the actual locations of stationary sources in 2002 and the Integrated Planning Model (IPM)-generated 2018 locations.

As part of the review of the IPM Version 2.19 projections of emissions to the 2018 planning year for regional haze, the commission obtained from the EPA's Clean Air Markets Division an explanation of the procedure the IPM uses for predicting locations of new electric generating units (EGUs). As would be expected based on economic and logistic considerations, the procedure places a high priority on locating new units at existing plants. In consideration of current air quality, the model also projects locations of new units based on a hierarchy of county attainment status, such that the units are located in pollutant attainment counties, particulate matter nonattainment counties, and eight-hour ozone nonattainment counties, in that order. The commission acknowledges the uncertainties that any projection tool would have in predicting the location of new electric generating units, but considers the procedure used by the IPM is reasonable. Appendix 7-2: *Integrated Planning Model Projections of Electric Generating Unit Emissions for the Regional Haze State Implementation Plan* has been revised to discuss the EPA's procedure used by the IPM to locate projected EGUs.

The EPA asked how the TCEQ resolved any significant differences between the 2002 magnitudes of stationary sources and the IPM-generated 2018 magnitudes.

Central Regional Air Planning Association (CENRAP) used the IPM Version 2.19 to project emissions of EGUs from the base year of 2002 to the future planning year of 2018. CENRAP then used the projected EGU emissions in its photochemical modeling of visibility impacts in Class I areas. Inputs developed for IPM runs are based on assumptions applicable at the time the model is constructed, including fuel prices, fuel availability, regulatory policies, and a multitude of related factors. Emissions projected by the IPM for Texas EGUs are summarized in Appendix 7-2.

Table 2: *Texas Emissions of SO₂ and NO_x from EGUs - IPM 2.19 Versus IPM 3.0* in Appendix 7-2 shows that for the period 2002 to 2018, the IPM Version 2.19 predicted an approximately 35 percent decrease in Texas EGU emissions of sulfur dioxide, the pollutant most important for regional haze formation in Class I areas of interest downwind from Texas. Based on regulatory programs intended to result in overall decreases of sulfur dioxide in Texas, this result appears to be reasonable. The commission acknowledges the uncertainty in the emissions projections, as the 2018 planning horizon for regional haze is particularly long and model assumptions are thus quite uncertain. However, the

commission still regards the IPM as a viable EGU emissions planning tool for Regional Haze SIP development and is not aware of a better tool. The commission has made no changes in this SIP revision.

The EPA asked whether the IPM-predicted total electrical generating capacity for 2018 appears to be reasonable when compared with that in 2002.

Appendix 7-2 focuses on electric generating capacity in Texas mainly for coal/lignite- and gas-fired electric generating capacity since emissions from the combustion of these fuels are of most concern relative to visibility impacts. The appendix provides a comparison of total capacity for these fuels for 2005 based on data from the National Electric Energy Database System, and for 2018 as projected by the IPM. As shown in Table 1: *Electric Generating Capacity in Texas - IPM 2.19 Versus IPM 3.0* of Appendix 7-2, the IPM Version 2.19 used by CENRAP projected an approximately 28 percent increase in total generating capacity in Texas for these fuels (combined) during the planning period. The commission believes this projected increase is reasonable based in part on population projections from the Office of the Texas Comptroller, which show about a 20 percent increase in population from 2005 to 2018. Also, generating capacity projections from the Electric Reliability Council of Texas (ERCOT) show continued growth of coal/lignite- and gas-fired capacity for the ERCOT region at least through 2013, the furthest projection year available from ERCOT. The commission acknowledges that the future growth of generating capacity for these fuel types will be related to more than population growth (e.g., fuel prices, fuel availability, environmental policies, growth in renewable energy resources, and other related factors), and that both the population projections and ERCOT-generating capacity projections are subject to uncertainties as are the projections. Appendix 7-2 has been revised to clarify the discussion of the IPM-projected total generating capacity.

The FS questioned why the 2018 modeling over-predicts point source emissions, considering point source emissions have declined in every year since 2001.

From 2002 to 2018, CENRAP projected emission increases in the organic compounds, carbon monoxide, and particulate categories. For non-EGU sources CENRAP predicted increases in all contaminant categories (ranging from slight in nitrogen oxide and sulfur dioxide categories to significant increases in carbon monoxide and organic compounds). The increases predicted by CENRAP's modeling are in contrast to actual decreases in these emissions in the actual annual inventory data collected between 2002 and 2005. Between 2002 and 2005, the historical data indicate actual industrial source emissions have decreased or held approximately constant for the point sources in all categories except carbon monoxide from electric generating units. Based on a historical decrease in emissions, CENRAP's predicted increase is considered conservative.

The EPA commented that Section 51.308(d)(4)(v) requires the TCEQ to submit an emissions inventory that includes emissions for a baseline year, emissions for the most recent year that data are available, and estimates of future projected emissions. The EPA requested that the TCEQ contrast its 2005 emission inventory with that from its baseline year of 2002, and 2018, in order to check the accuracy of the EI projection methodology.

A summary of the 2005 emissions inventory data was included in Appendix 7-1: *Texas Emissions Inventory Development: Base Year 2002 and Projected Year 2018*, Section 7.5 of this SIP revision. Summary data from 2002, 2005, and projected 2018 inventories are all included in the SIP revision. The commission made no changes in response to this comment.

The EPA, NPS, FWS, and FS commented that it was unclear which category the over reported tons per year (tpy) of sulfur dioxide were in and requested clarification on why Texas believes the CENRAP-generated sulfur dioxide inventory is incorrect.

The 111,853 tpy of area source sulfur dioxide emissions modeled by the CENRAP are significantly higher than the 15,633 tpy of area source sulfur dioxide emissions reported by the TCEQ in 2002. The difference is attributed to industrial and residential coal combustion, which was erroneously included in the CENRAP modeling. In other areas of the country, coal burning is used as fuel for small industrial sources and also to warm residential homes. Because of the abundance of natural gas, coal is not a preferred fuel type for these sources in Texas, therefore the use assumptions in the CENRAP model are not valid. The Texas area source 2002 annual inventory, developed with knowledge of fuel usage in Texas and submitted to EPA, is a more accurate reflection of the SO₂ emissions from these types of sources.

The EPA, NPS, and FWS questioned that CENRAP's modeled emissions estimate was not expected to significantly impact visibility estimates for 2018 because of the relatively small contribution from these Texas sources on Class I areas. The EPA, NPS and FWS commented that data presented in the SIP narrative suggested that Texas sources' emissions constitute the majority of visibility impact at the Wichita Mountains Salt Creek, and Caney Creek; and indicated that Texas sources' emissions have a great impact at White Mountain. The EPA, NPS and FWS asked that the TCEQ explain the specific difference between the reported TCEQ sulfur dioxide inventory and the CENRAP modeled inventory as well as the rationale for why TCEQ considers Texas' contribution to visibility impairment in neighboring states' Class I areas to not be significant.

The SIP statement that “the SO₂ emissions modeled by the CENRAP are significantly higher than the 15,633 tpy reported by the TCEQ” was intended to refer specifically to the area sources of industrial and residential coal combustion that were over-represented in the CENRAP modeling inventory, not all SO₂ emissions. The commission did not intend to imply that emissions or emissions contributions to visibility from its sources were insignificant. The erroneously modeled industrial and residential coal combustion sources are typically individually smaller and distant from Class I areas. As a result, their representation in the model does not significantly detrimentally affect visibility estimates or model conclusions. In response to this comment, additions were made to Chapter 7: *Emissions Inventory* and Appendix 7-1 of the SIP revision for clarity.

The NPS and FWS referenced the SIP Table 7-3: *CENRAP's 2018 Emissions Inventory Summary for Texas* showing that emission estimates of organics, primary particulates and ammonia are predicted to increase during the planning period (years 2002 to 2018). The NPS and FWS suggested that the TCEQ include a summary within the SIP revision of why estimates predict increases in organics, primary particulates, ammonia, and area source sulfur dioxide, together with a discussion of how much these increases are expected to affect visibility impairment at both Texas' and neighboring states' Class I areas rather than relying on the referenced CENRAP Technical Summary Document (TSD). This discussion should also consider the effects of emission decreases projected for sulfur and nitrogen products.

Appendix 7-1 discusses the use of EPA's Economic Growth Analysis System Version 5.0 (EGAS5) methodology to predict 2018 emissions. The EGAS 5.0 factors were based on the most recently available (at the time of inventory projection) set of economic and demographic projections developed by Regional Economic Model, Incorporated (REMI) and the most current energy forecasts prepared by Department of Energy's Annual Energy Outlook (AEO). Data such as statistics from the Bureau of Labor, population growth, and projected energy use from the Department of Energy are input into the model. These

anticipated increases in emissions are off-set in each category and region of the state by the appropriate on-the-books controls. The EGAS5 was used to predict future emissions for area sources except for wind blown dust from non-agricultural land use categories, emissions from wildfires, and emissions from Mexico. These categories were held constant.

The specific levels of area source emissions for the NO_x, SO₂, VOC, carbon monoxide (CO), ammonia, PM_{2.5}, and particulate matter with aerodynamic diameters less than 10 microns (PM₁₀) are listed in both Table 7-1: *CENRAP's 2002 Base Year Emissions Inventory Summary for Texas* and Table 7-3. The emissions inventory predictions made for the CENRAP modeling indicate, for the area source category, sulfur dioxide emissions increase by approximately 2 percent. Statewide emissions of organics are predicted to increase by 6 percent, the PM₁₀ by 2 percent and the PM_{2.5} by approximately 7 percent.

Ammonia is predicted to increase by 33 percent. The largest portion of ammonia emissions are associated with the area source agricultural-based sources. The Carnegie Mellon University model was used to estimate these emissions. Ammonia is not a limiting pollutant for visibility for Texas' and neighboring Class 1 areas. The area source sulfur dioxide emissions were from industrial and residential fuel combustion categories, heavily influenced by population growth, which are erroneously included in the CENRAP inventory. These coal-burning industrial and residential sources are not applicable to Texas and were not part of Texas' area source 2002 annual emissions inventory submission to EPA. Changes were not made in response to comments because the chapter summarizes the modeled values.

The NPS, FWS, and FS agreed that Mexico emissions contained within the boundaries of the CENRAP modeling domain are important contributors to visibility impairment at Big Bend and Guadalupe. The NPS, FWS, and FS requested that Texas acknowledge the work contained in the final Big Bend Regional Aerosol and Visibility Observational (BRAVO) study. The BRAVO study indicated sources in Mexico, Texas, and the eastern United States all play a role in sulfate conditions at Big Bend. The NPS, FWS, and FS look forward to working with Texas to solicit EPA action with its sister agencies to address the Mexico portion of sulfate impairment at Big Bend. The NPS, FWS, and FS also requested that the SIP speak to the Texas contribution to sulfate found in the BRAVO field study in the long-term strategy and reasonable progress sections.

City League for Environmental Action Now (CLEAN) also agreed with the BRAVO study 2004, an interagency report, which CLEAN interpreted found sulfur emissions from coal-fired power plants contributed to a larger proportion of haze in Big Bend than previously suspected.

The commission used the emissions inventory for the modeling from the BRAVO study as updated by Mexico. The commission used the latest available acceptable data for modeling for long term strategy and reasonable progress modeling. The BRAVO study collected data in 1999, then analyzed and produced the BRAVO Report in 2004, indicating that approximately one-third of the sulfate at Big Bend comes from outside the United States, one-third from Texas, and one-third from areas of the United States upwind of Texas. The commission revised Chapter 11 Section 11.3 to include reference to the BRAVO report.

The modeling for the SIP revision uses the latest available emissions estimates, including BRAVO study emissions estimates. The commission agrees that sulfur emissions are the most significant contributor to haze in the Big Bend Class I area. The commission disagrees that the importance of sulfur dioxide emissions in contributing to visibility impairment at Big Bend is a new finding. The NPS monitoring at Big Bend was showing this fact in the 1990s. Coal fired power plants are the major source of sulfur dioxide emissions. In the 2002 base period for the Regional Haze SIP revision, sulfate pollution contributed 55

percent of the visibility impairment from pollution. Texas' sulfur dioxide emissions contributed 21 percent of this 55 percent of the visibility impairment from pollution at Big Bend on the 20 percent worst visibility days in 2002.

One individual was concerned that commission does not know the extent of emissions from upstream oil and gas production. This information should have been gathered by 1999 for the Houston-Galveston-Brazoria (HGB) Ozone One-Hour Nonattainment Area SIP revision. The individual commented that numerous small to medium size point sources should be controlled to reduce regional haze, hazardous air pollutants, and transported ozone and precursors. This individual suggested improving the emissions inventory and expanding its categories.

The commission acknowledges the need to improve the upstream oil and gas production emissions inventory. Current effort is underway by the TCEQ and CENRAP to improve this estimate and any improved estimates will be included in the five year SIP review. No changes were made to the SIP.

The EPA asked whether the mix of electrical generating capacity (gas versus coal plus renewables) as projected in 2018 by the IPM appears reasonable when compared to that in 2002.

As shown in Table 1 of Appendix 7-2, the IPM Version 2.19, used by CENRAP, projected an approximately 14 percent increase in coal/lignite-fired generating capacity in Texas from 2005 to 2018, and about a 32 percent increase in gas-fired capacity. The ERCOT projections, which are available to 2013, show a greater percentage growth in coal/lignite-fired than natural gas-fired capacity based on utility planning that is publicly available. Both the IPM and ERCOT projections show a greater amount of gas-fired capacity in the latest available projection year than coal/lignite-fired capacity. Although IPM projections of generating capacity from renewable resources such as wind power are not summarized in Appendix 7-2 (since sources such as wind power do not create visibility impairing pollutants), other data obtained from the EPA indicate that IPM projections of generating capacity from such renewable sources are much lower than those from ERCOT. As is the case for total projected generating capacities, the commission acknowledges that the projected mix of fuels for generating capacity is subject to uncertainties. Appendix 7-2 has been revised to clarify the discussion of the IPM-projected generating capacities for coal/lignite and natural gas.

The FS commented that the Midwest Regional Planning Organization used the IPM Version 3.0 rather than Version 2.19. The FS requested that the TCEQ justify the use of IPM Version 2.19 in light of the EPA's recent indication that IPM Version 3.0 provides a significantly more accurate prediction of future EGU operating scenarios and emissions.

The commission is not aware of a specific indication from the EPA that the IPM Version 3.0 provides a significantly more accurate prediction of future EGU operating scenarios and emissions than IPM version 2.19. The commission acknowledges that Version 3.0 was based on more recent assumptions relating to fuel prices, fuel availability, regulatory policies, and a multitude of other factors. Thus, the commission conducted an analysis comparing the potential visibility impacts on Class I areas from Texas EGU emissions, based on projections of emissions from each version of the model. This analysis is documented in Appendix 7-2. The analysis provided evidence that visibility impacts of EGU emissions from each IPM version would be similar. Thus, the commission concluded that the IPM version 2.19 would be a viable planning tool for Texas to use for regional haze. Due to the particularly long planning horizon to 2018 for regional haze and the uncertainty in the assumptions upon which the IPM is based, the commission does not conclude that either version of IPM is necessarily better than the other. The commission is also not aware of a

better EGU emissions planning tool than the IPM for regional haze SIP development. The commission made no changes in response to this comment.

The FS referred to a discussion in Appendix 7-1 regarding IPM 2.19 versus IPM 3.0. The FS commented that “since they state that IPM 2.1.9 was constructed when natural gas was prevalent, it is likely that projections for Texas under IPM 3.0 would have higher emissions due to more use of coal.” The FS also commented that Texas said that statewide the emissions projected in both versions were very similar.

The discussion in the proposed SIP referred to by the FS is actually found in Section 7.3.2 of Appendix 7-1 instead of Section 7.2.2.4. As noted in Table 1 of Appendix 7-2, total sulfur dioxide emissions projected to 2018 for Texas EGUs by the IPM Version 3.0 were approximately the same as those projected by Version 2.19, even though the IPM Version 3.0 projected about a 14 percent greater coal-fired capacity in 2018 than did Version 2.19. The commission does not conclude that emissions of sulfur dioxide projected by the IPM Version 3.0 would necessarily be greater than those projected by Version 2.19. The projected emissions are a function not only of capacities for the fuel types but also of the assumptions upon which each IPM version is based, including the extent to which sources implement emission controls for projected units or purchase credits in response to the Clean Air Interstate Rule (CAIR) or successor cap and trade program. The IPM Version 3.0 projected about a 10 percent decrease in nitrogen oxides from Version 2.19. The commission believes that the projected decrease was primarily due to the fact that Version 3.0 retired a large number of nitrogen oxide-emitting gas-fired generating units. In response to this comment, the commission made revisions to Appendix 7-2 to clarify the discussion of IPM-projected emissions.

The FS commented that it would be helpful for a more detailed discussion of the IPM results and the analysis of EGU impacts on visibility in the listed Class I areas. The FS said that a map showing the groupings of EGUs would add to the discussion.

The commission notes that Section 7.3.2 of SIP Appendix 7-1, to which the commenter referred, contains only a brief summary of the IPM analysis. A detailed discussion comparing results from the analysis of the two IPM versions is provided in SIP Appendix 7-2. This appendix presents a map of Texas EGUs emitting sulfur dioxide, the pollutant of primary concern for downwind visibility impacts, and presents tables showing the upwind Texas EGU groupings upon which the analysis is based. The commission considers that the map and the tables of EGU groupings provide sufficient information for the discussion provided in the appendix. No change was made to the SIP.

One individual questioned why the TCEQ did not state how accurately the emissions inventory was for regional haze and questioned if this emissions inventory was any better than past inventories. The individual referenced several reports discussing the inaccuracy of the emissions inventory in past ozone SIPs and other reports. One individual believed TCEQ was doing nothing in this SIP, other than to reflect emission reduction programs already in place and additional sulfur dioxide reductions from refineries as a result of EPA refinery consent decrees. The commenter considered these reductions inadequate and insufficient for ozone attainment since the emissions inventories were deficient.

The commission acknowledges the uncertainties of emissions inventory estimation techniques. Significant effort was made to provide the CENRAP modeling with the best available emissions estimates. Additional effort was made in categories considered more critical to accurate modeling, such as mobile sources. The commission continues to be committed to improving the quality of emissions inventories. The reports referenced by the individual mostly addressed industrial source VOC emissions. The nitrogen oxide and

sulfur dioxide emissions were determined by the TCEQ to have the most significant impact on visibility impairment. For example, at Big Bend National Park annual average sulfate and nitrate observed concentrations account for greater than 50 percent of the visibility impairment in 2002 as shown in Figure 8-2 of the Regional Haze SIP revision. The sulfur dioxide and nitrogen oxide inventories are not predisposed to the same level of uncertainty associated with parts of the volatile organic compounds inventory because emissions of these pollutants generally result from combustion sources that can be measured directly and often have continuous measuring or monitoring devices that record those emissions. In addition, ozone model understanding is more than a decade ahead of regional haze modeling, while this Regional Haze SIP is the first for most states. Predicting regional haze can be more complex than ozone photochemical modeling because while the same complex atmospheric chemistry is involved, there are also more pollutants to model. Haze does not have to meet a health based standard, but is measured in deciviews (dv) and meant to improve visibility. The Region Haze Rule requires using all existing rules and regulations, state and federal, to determine a uniform rate of progress to improve visibility. All nitrogen oxide reductions made in support of achieving the ozone standard throughout the state are beneficial also to reducing regional haze. The commission made no changes in response to these comments.

Chapter 8: Modeling Assessment

The NPS and FWS commented that both Figure 8-4: *Observed and Base Case Modeled Concentrations at Big Bend* and Figure 8-5: *Observed and Base Case Modeled Concentrations at Guadalupe Mountains* are intended to support the discussion of the model performance evaluation. The commenters asked that the commission explain why the figures are referencing the Typical 2002G base year inventory instead of the actual 2002 performance inventory.

The CENRAP modeling team evaluated the differences in model performance evaluation (MPE) results between a version of the 2002F base case and 2002F typical case and found the differences in the statistics to be negligible. A minor correction was made in the 2002F typical case inventory, and at that point, in an effort to conserve resources, the modeling team decided not to rerun the base case, but to rerun the typical case and perform an MPE on the 2002 typical case. The MPE results for the 2002F typical case are the most recent available. The commission made no change in response to this comment.

The FS commented that in Chapter 8 while high contributions from international transport and natural sources certainly affect progress for Class I areas such as Big Bend, these sources do not apply to the northern Class I areas. The FS stated that transport from Canada is often associated with the cleanest days at these northern Class I areas.

The sentence referred to above was meant to apply to the Texas Class I areas. The commission made minor changes to clarify the text.

One individual commented that the commission did not acknowledge Harris County source impacts in other states. The commenter questioned if the commission investigated the cumulative affect of sources along the Houston Ship Channel that can affect regional haze.

The commission disagrees with the commenter. The commission specifically requested that the Particulate Matter Source Apportionment Technology (PSAT) modeling analyses examine the impact of three Texas source regions. The results of the PSAT analyses conducted by CENRAP and the commission are presented in Appendix 8-1: *Technical Support Document for CENRAP Emissions and Air Quality Modeling to Support Regional Haze SIP*, see Chapter 5: *Additional Supporting Analysis*. As shown in Figure 5-8: *30 Source Regions used in the CENRAP 2002 and 2018 CAMx PSAT PM Source Apportionment Modeling*, Texas is broken up into three regions, one of these being the Gulf Coast which

includes Harris County and the Houston Ship Channel. The source impacts from this area can be found in the PSAT results. An example of the results for Caney Creek can be found in Figure 5-10: *PSAT Source Region by Source Category Contributions to the Average 2000-2004 Baseline and 2018 Projected Extinction for the Worst 20 Percent Visibility Days at Caney Creek, Arkansas of the TSD*. The commission made no changes in response to this comment.

One individual was concerned about the modeling results. The individual stated that the commission admitted that visibility falls 5 percent short at Breton and 40 percent short at Wichita Mountains. In addition, the commenter asserted that the high contributions of ... natural sources (e.g., windblown dust) are likely human caused because grazing and farming and can cause long-term changes to surface area exposure which creates more potential dust generating surfaces. The individual asked what the commission will do to reduce Texas's agricultural emissions so that Class I areas outside of Texas will reach acceptable visibility levels as soon as possible. The individual advocated for quantification of agricultural impacts and destruction of natural plant coverage. This individual recommended rules to require best management practices for grazing, farming, and agricultural practices that expose soil and an implementation plan with enforcement to ensure that the plan and goals are achieved.

The federal Regional Haze Rule suggests states should not try to attribute ancient human land disturbances as anthropogenic. Specifically, the *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Program* (EPA 2003) states that “estimates of natural visibility conditions should reflect contemporary conditions and land use patterns,” rather than “historic conditions.”

While some dust (coarse mass and fine soil) at both of Texas' Class I areas must be from some human activity, analysis of the dust storms that dominate high dust events at Guadalupe Mountains, and significantly impact Big Bend suggests that the dust originates from dry desert and dry lake bed areas with little or no human activity, almost all of which are situated in the Chihuahuan Desert. For instance, in the 2005 report *Investigation of Dust Emission Hotspots in Chihuahuan Desert Playa Basins*, Gill et al. state the conclusion that “Field campaigns revealed that ... the vast majority of source points were natural desert landscapes” (Gill et al. 2005). In addition, the Gill et al. work found that:

Particle size analysis of surface sediment samples revealed that many of the dust source points have surface granulometries which create a “perfect storm” for aerosol emission. They include two or three distinct grain size populations: very fine clays in the PM_{2.5} range (including particles as small as 0.2 micron in clay playa sites) and fine sands (50- 200 μm), and in some sites silts (10- 50 μm particle size). This is consistent with current state-of-the-science knowledge of the desert wind erosion process. Sand grains saltate (bounce) across the land surface in wind storms, breaking apart and “sandblasting” silt and clay aggregates and releasing their individual constituent grains into the atmosphere as dust.

The commission has included additional supporting evidence in Appendix 5 for the estimate that, at least for the estimation of natural visibility values for Texas Class I areas, that major dust events can be approximated to be completely natural in origin. Additionally, since there is uncertainty in this estimate, as there is in all the components of natural visibility conditions, the commission has provided plots showing the results for the 20 percent worst natural conditions Haze Index (in deciviews) if one were to treat only 80 percent of the coarse mass and fine soil to be natural. However, this 80 percent calculation is displayed only as an indication of how little sensitivity this natural visibility estimate has to approximating 100 percent of the coarse mass and fine soil as natural.

At this time the commission has no plans to add additional control measures for grazing and farming dust emissions. This issue may be reviewed in future Regional Haze SIP revisions.

One individual commented that the modeling may be inaccurate for the following reasons:

- the modeling area is larger than used for other nonattainment demonstrations;
- the poor quality of emissions inventory in Texas and other states; and
- the lack of credibility of the CAMx model being used since it has failed to model Houston and Dallas successfully towards ozone attainment using real monitoring data.

Due to these issues, the commenter suggested severe credibility problems for the Texas regional haze modeling. In Chapter 8, the commission did not provide any information about the accuracy of the modeling done by the TCEQ, CENRAP, or EPA. For previous ozone attainment SIP revisions, the commission stated that the modeling conducted was sufficient, adequate, and documented attainment; yet, the goals were not met.

This modeling analysis is currently the most credible analysis available for regional haze. Texas and other states are continuing to improve their emission inventories and their modeling platforms. The regional haze modeling domain encompasses such a large area because pollutants that contribute to haze can travel great distances. The commission made no changes in response to this comment.

The NPS and FWS commented that there is a considerable amount of discussion in the SIP revision that emissions used by CENRAP and others for modeling were greater than the inventory reported by the commission. However, Figures 8-4 and 8-5 use the CENRAP typical base year inventory of 2002 and consistently show significant under prediction of all visibility impact parameters when compared to observed values. Although the model is later used in a relative sense (employing relative reduction factors (RRFs)), Texas should address this apparent discontinuity between text describing a significant over estimate of SO₂ emissions and model performance metrics that indicate a significant under estimate. One individual advocated for more control measures since the modeling under estimates many haze-forming pollutants.

The commission has analyzed the model performance and learned that the modeling under predicts the sulfate impacts from outside the United States, Texas, and states upwind of Texas. The commission has requested further analysis of the model performance. The initial results suggest that the model may be producing the correct sulfate concentrations but not transporting them all the way to these West Texas Class I areas. The first report of this work has been added as Appendix 8-2: *Big Bend Model Performance Analysis*. The commission has further model performance analysis work under way to support improved model performance in future Regional Haze SIP revisions. The commission is also working with its modeling contractor to correct the over estimation in the area source emissions inventories. No changes have been made in response to this comment. (For more details on controls, see the response under general comments with the current list of control measures, pages 44-45.)

Emission Categories Held Constant

The NPS, FWS, and one individual commented that the Gulf of Mexico has significant contributions in 2018 for the worst 20 percent of visibility days. Offshore emissions should not be held constant through the planning period. The commenters suggested that a better estimate of the future case emissions should be made.

The commission spoke with Minerals Management Service (MMS) personnel in spring 2008 who stated that MMS has no issues holding offshore emissions constant for the following reasons:

- **MMS currently has no data to justify growth in emissions and agrees that a projection to the future with no change is a reasonable one.**
- **Current closer-in leases are being exhausted and shutdown; new leases are for deeper water offshore and further out into the gulf. Application of newer technology will reduce emissions per unit of production.**
- **MMS personnel indicate that these further out sources are likely to have less impact onshore.**

MMS is currently preparing a 2008 emission inventory, which will be completed in 2010. Emission trends will be reviewed by the commission when that data is publicly available. No changes have been made based on these comments.

One individual questioned why so many inventory categories between 2002 and 2018 were held constant.

- Global transport of air pollution from China would vary.
- Mexico and Central America emissions vary due to changes in economic activity.
- The Sam Houston National Forest and three other national forests in Texas are conducting more prescribed burning than in the past to provide better habitat for the federally endangered Red-cockaded Woodpecker. So within Texas, there may be more burning of vegetation.
- Emissions from wildfires between 2002 and 2018 can vary greatly depending on droughts, winds, and other factors.

GEOS-Chem was used to model boundary conditions for the CENRAP modeling domain, including those for China. The commission cannot reasonably predict future emissions from China. Holding these inventories constant while growing Texas and the United States emissions puts more emphasis on the potential future impact from Texas and United States sources on Class I visibility impairment. Depending upon resources and quality of future global emission inventory data, the commission may consider future case model runs of GEOS-Chem or other global models to use for future case boundary conditions. In addition, regional haze from China appears not to be a significant factor in the worst 20 percent of days at Class I areas that Texas impacts, so the assumptions about this source of regional haze are likely to be insignificant in affecting future projections for these Class I areas.

For the Mexican and Central American emissions, the direction of emission changes is uncertain. Improving economic status often results in more investment in pollution controls. The improvement in pollution reduction may or may not offset the increasing economic activity and energy usage in these countries. The commission understands that Mexico is currently working on the development of a 2005 emissions inventory and future emissions projections and will review this information when it becomes publicly available.

In regards to prescribed burning and wildfires, the commission acknowledges that there can be great variability from year to year. However, in current analyses, smoke emissions from fires are not an important contributor to regional haze at Class I areas in Texas. No changes were made in response to these comments.

One individual considered it a faulty assumption to use the same biogenic emission inventory between the base case and the future case for modeling. The commenter asserted that biogenic VOC was not constant due to urban deforestation caused by sprawl.

Predicting future biogenic inventories is projected to cost approximately \$5 million and not necessarily more accurate than the base case inventory. Urban sprawl along with its vegetative changes is difficult to quantitatively estimate, so any predictions are also likely to be uncertain. If sufficient resources were available to project a future inventory, the commission could use the results for modeling; however, the new inventory would likely be consistent with the current biogenics assumption. No changes were made in response to this comment.

Chapter 9: Best Available Retrofit Technology (BART)

The EPA and one individual noted concern that Texas had no BART sources that had to install control equipment of the approximately 250 potentially BART-eligible sources in the state. The EPA commented that Texas sources significantly contribute to visibility degradation to a number of Class I areas in other states, in some cases more than the host state. The EPA commented that it is unclear how this decision is “reasonable” under Section 51.308(e), which requires that, “The state must submit an implementation plan containing emission limitations representing BART and schedules for compliance with BART for each BART-eligible source that may reasonably be anticipated to cause or contribute to any impairment of visibility in any mandatory Class I Federal area.” The individual considered that Texas having no sources subject to BART showed that the commission has no desire to attain regional haze standards by the 2064 compliance date.

BART applies to sources completed between August 7, 1962, and August 7, 1977. Many of these sources have already been subject to controls, which lowered the emissions to levels that screened potentially BART-eligible sources from visibility impairment in Class I areas. Some of these sources were constructed under Texas new source review (NSR) permitting requirements, which included best available control technology (BACT) requirements. These requirements were initially implemented between 1971 and 1972. Sources constructed under these rules were required to use effective engineering controls to minimize or eliminate emissions of all air pollutants. Additionally, Senate Bill 7, passed in the 76th session of the Texas Legislature in 1999, required all electric generating units (EGUs) to reduce sulfur dioxide and nitrogen oxide emissions under permits by no later than May 2005. Moreover, House Bill 2912, passed in the 77th session of the Texas Legislature in 2001, required all previously grandfathered sources (i.e. constructed prior to August 30, 1971) to obtain standard permits, permits by rule, or an individual permit. House Bill 2912 specified the performance required for upstream natural gas field compressors powered by internal combustion engines. For all other individual permits, the engineering standard required the sources to apply ten-year old BACT to obtain a permit. The compliance date required by these permits for sources in eastern Texas (except for small business owners) was March 1, 2007. The compliance date required by these permits for sources in western Texas and for small business owners was March 1, 2008.

BART was designed to bring major sources that had been grandfathered under federal new source review rules under effective control, but all Texas sources have already been brought under effective emission control requirements by Texas permitting requirements, and to some extent, recent EPA refinery consent decrees. Thus, since Texas has already addressed the control technology of its sources by requiring permits even when federal new source review was not in place or through its subsequent permit requirements under state law, it is not surprising that BART, designed to add controls to unregulated industry, did not require additional reductions.

Title 40 CFR 51.308(e)(4) says, "A state that chooses to meet the emission reduction requirements of the CAIR by participating in one or more of the EPA-administered CAIR trading programs for sulfur dioxide and nitrogen oxide need not require BART-eligible EGUs subject to such trading programs in the state to install, operate, and maintain BART for the pollutants covered by such trading programs in the state." Texas has adopted the CAIR rule as well as other SIP revisions that reduce emissions. These actions removed the large majority of the Texas sources from further BART consideration for sulfur dioxide and nitrogen oxide controls. The decision to treat CAIR as equivalent to BART will be revisited if CAIR is replaced with a trading program or rule that the EPA considers to be equivalent to BART, and that addresses the federal appellate court's ruling. The TCEQ will provide a SIP revision to address this issue, once the federal government has finalized its decision with respect to CAIR or a replacement trading program for sulfur dioxide and nitrogen oxide.

A large percentage of major non-EGU sulfur dioxide and nitrogen oxide sources in Texas are hundreds of kilometers from the nearest Class I area, so their contributions to visibility impairment at Class I areas are small. The emission reduction requirements under EPA's refinery consent decrees resulted in dramatic reductions in sulfur dioxide emissions from refinery and sulfuric acid plant emissions of sulfur dioxide. Without these consent decree reductions, BART requirements may have applied in some cases. Because emissions from these facilities have already been controlled by Texas' permitting requirements, these sources were not subject to additional controls as a result of the BART requirements, which have been incorporated into the TCEQ's BART rule adopted on January 10, 2007.

In accordance with the EPA guidance, the commission implemented the BART rule and followed procedures laid out in the rule. The commission modeled sources in a conservative manner to screen out sources that had less than a 0.5 deciview impact on Class I areas as provided in the EPA's BART rule. Some sources that did not screen out of the initial modeling chose to shut down facilities or to apply controls which reduced their impact on Class I areas. Other sources already had extensive controls in place due to other emission control programs for ozone SIP revisions, and the refinery consent decrees. The BART process is fully explained in Chapter 9: *Best Available Retrofit Technology* of the SIP revision. All BART-eligible sources are listed. In addition, there is a list of sources that reduced their potential to emit through permit amendments, and/or by shutting down units in order to avoid being subject to BART controls. At this time, all BART-eligible sources have modeled emission impacts below the BART determination threshold due to emission reductions required by existing regulations or consent decrees. No changes were made in response to these comments.

The EPA, NPS, FWS, and FS commented that the federal Regional Haze Rule established BART criteria for exempting sources that are determined to be non-significant, and that the EPA offered an upper bound of that single source significance level at 0.5 deciview. The EPA and FS asked that Texas provide a discussion of how it arrived at its selected 0.5 deciview threshold value.

The 0.5 deciview threshold was adopted by the commission on January 10, 2007, as part of the Texas BART rule. The response to comments in that rule adoption stated: "The commission will not lower the 0.5 deciview threshold. The commission has received no evidence that a lower threshold is appropriate in Texas. By using only a single threshold, the TCEQ does not intend to imply that the threshold for causing visibility impairment is the same as for contributing to. Since TCEQ expects all Class I areas have more than one source impacting visibility, any source that causes visibility-impairment (such as, using for example, based on the EPA's threshold of a humanly perceptible visibility impact of 1.0 deciview or greater) also contributes to the same. So 'the contributes to' threshold is the one relevant to this rule. ...The commission is following EPA guidance, Part 51, Appendix

Y, Section III.A.1, and has made no changes in §116.1520 and §116.1530 in response to the comments.”

Additionally, as discussed previously, almost all Texas sources that might have been subject to BART technical analysis requirements under the BART rule are hundreds of kilometers from the nearest Class I area and their emissions are already controlled under appropriate permitted emission limits. Since Texas has neither grandfathered sources nor a large number of sources near Class I areas and potentially subject to BART technical analysis and control requirements under BART, the commission does not consider it appropriate to use a threshold other than the 0.5 deciview threshold that EPA set. No changes were made in response to this comment.

The EPA, NPS, and FWS commented that several tables in Chapter 9 were difficult to understand. The EPA asks for further documentation and building of a cross-walk to help demonstrate what modeling was used to screen-out each source. The NPS, FWS, and one individual questioned why Table 9-6: *Post-BART Emissions Reductions at Texas Sources* in Chapter 9 and Appendix 9-12: *BART-Eligible List* are not the same. The NPS, FWS, and one individual asked the commission to clarify the differences between the two tables and provide more definite information regarding the ExxonMobil facility.

The commission acknowledges that the BART-eligible tables may be difficult to understand due to the complexity of the BART process.

The table in Appendix 9-12 is the BART-eligible list that has been on the Web site since April 2006 when the BART survey results were posted; this same source list has been updated with details of each exemption, modeling completion, usage of the model plant, and whether the source passed or failed the modeling threshold. To simplify this potentially six page BART-eligible list, this larger list was broken into smaller and simpler tables with an explanation of the differences. Therefore, combining all the tables in Chapter 9 are approximately equivalent to the larger, more detailed table in Appendix 9-12. The exception is the greater detail in Table 9-6 of Chapter 9, which documents the estimated post-BART reductions of approximately 9,000 tpy and that is found only in Chapter 9.

Not all of the sources shown in the table in Appendix 9-12 referred to in the comment will reduce NO_x, SO₂, or particulate matter emissions. Table 9-6 in Chapter 9 has been updated to clarify this, and to show the most current information available. The detailed documentation of the emission reductions shown in Appendix 9-10 has also been updated with the most current information available. Reduction estimates are conservative because they are from the 2002 actual emissions level to a potential to emit level. Should any of the reductions noted in the tables need to be further updated, they will be incorporated into the SIP revision at the next review in 2013. In response to these comments, the commission simplified the tables in Chapter 9 and updated the information on ExxonMobil.

The EPA commented that in Chapter 9 of the SIP revision the TCEQ should address the following:

- a) The TCEQ should present additional detail on the methodology used to identify the initial list of potentially BART-eligible sources that received surveys. For instance, was a permit review part of this strategy? How did the TCEQ determine if particular sources were in one of the 26 BART categories; had a potential to emit of 250 tpy or more of any visibility-impairing pollutant; and were not operating prior to August 7, 1962, and were in existence on August 7, 1977? This should include a discussion of the sources discussed in Section 9.5, which were exempted from BART-eligibility through the TCEQ BART Rule.
- b) The TCEQ should present additional information that demonstrates this strategy effectively captured all potentially BART-eligible sources within the state.

This Regional Haze SIP revision provides additional information on the survey methodology used by Texas. A copy of the survey is included as Appendix 9-3: *Texas Survey for BART Eligibility*. The updated information summarizes Texas' method to capture sources meeting the BART-eligibility requirements outlined in the EPA's Regional Haze Rule. Standard Industrial Codes and Source Classifications Codes were associated with the 26 source categories identified in the EPA BART Rule. The TCEQ surveyed all Texas sources with applicable codes and emissions thresholds, including fossil-fuel steam generating plants with potentially BART-eligible quantities of particulate, for additional information regarding build and reconstruct dates and potential to emit level for emissions. The information obtained in this survey helped identify the sources that were BART-eligible. Sources requested exemptions based on the 2007 Texas BART Rule, modeling for visibility impacts, or other updated information at the site. The exemption process is also discussed in Chapter 9 Section 9.2 through 9.5 of the Regional Haze SIP revision. The BART-eligible sources were adequately captured in this process. The companies surveyed represented over 97 percent of the sulfur dioxide and 77 percent of the nitrogen oxide emissions from 2002.

The NPS and FWS commented that the two tables in Chapter 9 identify BART-eligible sources that were exempted after performing source-specific BART engineering determinations through either CALPUFF modeling (Table 9-3: *BART-Eligible Sources Exempted Based on CALPUFF Modeling Results*) or CAMx modeling (Table 9-4: *BART-Eligible Sources Exempted Using Single Source CAMx Modeling*). The commenters suggested that it would be helpful to list the modeled visibility impact results for each of these facilities in these tables (i.e., Class I area, deciview impact, and distance/direction information for each Class I area evaluated in the individual source modeling analyses). The commenters suggest that this information would provide the reader with a quick reference of the relative importance of each listed facility that was exempted through individual source attribution modeling.

The commission provided the information requested in Chapter 9. Table 9-3 now presents the source, the Class I area modeled with the greatest impact, distance to the Class I areas, and the modeled visibility impact at each Class I area.

One individual commented that the distances used for BART-eligible sources are too short (50 kilometers or 31 miles and 100 kilometers or 62 miles) since TCEQ and other agencies have shown that emissions can travel hundreds of miles away and affect Big Bend and Guadalupe Mountains. This individual suggests expanding distances up to 400 kilometers or 250 miles, since it has been documented by studies that ozone can be transported into the Dallas area from the Houston area. In the case referenced by the individual, ozone air pollution traveled over 400 kilometers or 250 miles.

The commission did not limit the distance from a Class I area for potential BART-eligibility to 50 or 100 kilometers. All sources regardless of distance, with the appropriate category of sources as defined by the BART rule, within the state were considered. Based on analysis of visibility impacts, the EPA allowed the use of the model plant analysis by which a state could choose to exempt sources that emit smaller amounts of nitrogen oxide and or sulfur dioxide, as long as they were more distant from a Class I area, per Option 2: *Use of Model Plants to Exempt Individual Sources with Common Characteristics* under Appendix Y to Part 51-Guidelines for BART Determinations Under the Regional Haze Rule (page 39162). Texas concurred with this use for the lesser significant emitting sources for the purposes of BART analysis. All applicable sources within the 50 kilometer range were considered for BART. Additionally, all sources, regardless of their distance from the Class I areas or quantity of emissions, were included in regional haze modeling and consideration for additional potential controls, even if initially removed from BART consideration. The commission

looked at a range of distances from approximately 90 to 600 km (see Appendix 9-6, Table B-1). No changes were made in response to this comment.

One individual suggested the TCEQ establish areas of influence (AOI) to capture sources farther away than 50 to 100 kilometers away from Class I areas. This individual suggest the TCEQ use these areas of influence subdivided geographic areas and emphasize sources that have the highest possibility of providing reductions that will benefit visibility and thus reduce regional haze impairment.

As part of the area of influence analysis, the TCEQ identified any source within an area of influence with potential add-on controls and its costs were included. The analysis included sources greater than 50 to 100 kilometers from any of the ten Class I areas. Sources with potential controls were identified from the CENRAP list which was developed using EPA's AirControlNET. The visibility impact from these potential controls was evaluated and this SIP revision is updated to reflect this analysis in Chapter 9. Control strategies were limited to costs similar to those of other air control programs such as EPA's estimate of the Clean Air Interstate Rule's cost of \$2,700 per ton. Changes were made to Chapter 10 to more thoroughly explain the AOI-based analysis.

Chapter 10: Reasonable Progress Goals (RPGs)

The FS commented that Texas correctly used the modeled value for the 20 percent best days as its reasonable progress goals (RPGs). As part of the consultation process, the FS has indicated to several other states their incorrect interpretation. The FS commends Texas for setting this reasonable progress goal correctly.

The commission appreciates the comment and looks forward to a continued and collaborative relationship with the FS and other FLMs.

The EPA requested that the TCEQ discuss the emissions reductions resulting from its BART rule. In Chapter 10, the TCEQ stated its reasonable progress goals, "These RPGs do not include additional emissions reductions from implementing the Texas BART rule"

The reductions associated with the BART rule are discussed in the Chapter 9 and summarized in Table 9-5: *Post-BART Emissions Reductions at Texas Sources*. Although Chapter 9 estimates potential reductions, the commission chose not to include these reductions in the long term strategy in Chapter 10 at this time. Texas may examine these reductions again at the next revision, if needed. The commission made no changes in response to this comment.

The EPA commented that there is no provision in the federal Regional Haze Rule for delaying potentially cost effective controls due to modeling uncertainty. The EPA noted that the TCEQ's proposed SIP stated a potential over prediction of electric generating units emissions on Class I areas by the IPM model analysis. Also, the EPA commented that the uncertainty in the impact of the CAIR program is one reason why the TCEQ has elected not to pursue additional controls at this time.

Due to the uncertainty in the impact of CAIR or its eventual replacement (whether over predicting or under predicting emissions), the commission's approach at this time is to track CAIR or replacement program over the five-year and ten-year intervals, and determine if additional controls are needed in Texas.

The EPA commented that under Section 51.308(d)(3)(ii), the TCEQ must demonstrate it has included all measures necessary to obtain its share of the emission reductions needed to meet the progress goal of Class I areas in other states as well. The EPA requested that the TCEQ

investigate reductions at Wichita Mountains in Oklahoma, Caney Creek in Arkansas, and Salt Creek in New Mexico, as well as other Class I areas Texas has shown to impact.

The commission has updated Chapter 10 of the SIP revision and Appendix 10-1: *Analysis of Control Strategies RPG* with a summary of Texas' proposed control strategies for ten Class I areas. This includes the Big Bend and Guadalupe Mountains National Parks and eight others outside the state. The summary includes impacts of visibility impairment from proposed controls for those Class I areas.

The EPA, FS, and one individual noted that the TCEQ took the position that even if over \$300 million dollars was spent on sulfur dioxide and nitrogen oxide controls at the 24 sources (Table 10-4: *The TCEQ's Point Source Control Strategy Summary*), only 0.05 deciview improvement would be seen at Big Bend and Guadalupe Mountains (Table 10-5: *Estimated Visibility Improvement*). The EPA and FS noted this assessment did not consider that the average cost of sulfur dioxide control was approximately \$1,850 per ton. Considering that sulfate (SO₄) was the dominant controllable pollutant the TCEQ indicated causes or contributes to visibility impairment (Figures 8-4 and 8-5), the TCEQ should reconsider this assessment. One individual considered the value of people's lives and the pristine wilderness worth the cost of controls.

The commission did consider source controls that were not already on the books. The on-the-books controls, including CAIR, were included in the CENRAP Base G modeling run. A CENRAP-directed effort used EPA's AirControlNet program to determine additional controls for various source categories beyond the Base G. These potential controls, associated costs, and benefits were considered in the four factor analysis which is revised in the SIP. The incremental cost was not reduced in this study. The commission's proposed control strategy for additional controls results in a negligible projected improvement in visibility. The commission's analysis concludes that additional controls for regional haze are not reasonable at this time. However, this will be reviewed in future SIP revisions.

The FS referred to paragraph in Chapter 10 indicating that no electric generating unit was able to make an enforceable commitment to any particular pollution control strategy. The FS commented that Texas has no basis to state that the IPM projections were an over prediction. The FS commented that the IPM projections could also be an under prediction, which would not add to the justification for not pursuing any additional controls.

The commission's wording in the proposed Regional Haze SIP referred to a potential over prediction of emissions by the IPM. However, the commission agrees with the commenter that the IPM could also be under predicting. The paragraph has been revised.

The EPA commented that an evaluation on emissions over distance analysis (Q/5d) can be conducted but emissions over distance analysis are sensitive to the meteorology that impacts the transport and may not yield a conservative analysis. For example, if the source modeled is not upwind (and the source does not transport directly to the Class I area frequently), the analysis would not be conservative to evaluate another source that is upwind of the Class I area more frequently. The EPA requested an expanded discussion of this issue so the analysis for all sources is a conservative assessment.

The commission agrees emissions over distance analyses can be sensitive to weather and transport and may not yield a conservative analysis so it used areas of influence for the top priority anthropogenic pollutant emissions from Texas for each Class I area affected by emissions from Texas. Development of these areas of influence integrated considerations of wind flow, frequency of pollutant impacts, residence time, and concentration of sources as well as distance from the individual sources to the Class I receptor and the emission rate of each source. Chapter 10 and its appendices provide further information on the use of areas

of influence and the four factor analysis in determining whether all reasonable controls have been applied in this round of emission reductions to proceed toward the national goal of natural conditions at all Class I areas. Changes were made in response to this comment.

The NPS, FWS, and one individual commented that the text associated with Table 10-7: *Contributions to Visibility in the Texas Class I Areas* implies that the boundary conditions contribution to impairment is primarily from Central America. The CENRAP modeling assessment did not differentiate among five large-scale model boundaries when compiling data for sulfates and nitrates. The commenters requested Texas clarify whether Table 10-7 is referring to total contribution to extinction or contributions to sulfate and nitrate impairment based on the CENRAP tracking model. The TCEQ needs to acknowledge that a portion of boundary conditions may be a result of recirculation of Texas and other United States-generated emissions. The SIP revision should note that boundary conditions are highly uncertain and that contributions from within the model boundaries may be significantly higher.

Because the CENRAP modeling does not identify the source area of pollutants transported into the CENRAP modeling domain from the boundary, the information about source areas beyond the CENRAP modeling domain comes in part from available information about the location, density, and nature of anthropogenic and natural sources. The information also comes from back trajectory analysis conducted by the NPS in the 1990s and back trajectory analysis for the 20 percent worst of days in 2002 at Big Bend.

The commission interprets these data to be generally consistent with the CENRAP particulate matter source apportionment (PSAT) modeling, which shows in Figure 11-2: *Areas and Pollutants Causing Regional Haze at Big Bend* that the extinction contribution from Mexico and from the boundary conditions are roughly equal, but that nearly all the international transport of organic carbon and black carbon comes from the boundary condition area. This result is consistent with satellite imagery and other information pointing to southern Mexico plus the southern Yucatan as being the major source areas for the smoke at Big Bend. The large amount of oil and gas production activity in the Bay of Campeche plus the urban and industrial activity in Mexico from the southern part of Mexico, which includes Mexico City and all but the northern tip of the Yucatan, are in the boundary conditions domain. The commission concludes that these facts are generally consistent with the international sulfate impact at Big Bend, which the PSAT analysis attributes mainly to the northern portion of Mexico, which is in the CENRAP modeling domain.

The commission agrees that occasionally some United States continental haze does migrate far enough south into the Gulf of Mexico that the GEOS-Chem model used to produce the boundary condition estimates could have included it in the regional haze transported from the boundary conditions domain into the CENRAP modeling domain. The commission disagrees with the suggestion that a significant amount of regional haze attributed to the boundary conditions comes from the United States. When air masses penetrate that far south into the Gulf of Mexico, they are often following strong cool or cold fronts moving rapidly enough that they do not accumulate large amounts of regional haze. Slow moving summertime high pressure areas that accumulate large amounts of regional haze are much more often associated with recirculation into the United States from the central and northern Gulf of Mexico, where the CENRAP PSAT modeling analysis would identify the correct source area and attribute the pollution to that area.

The commission agrees that there is significant uncertainty about emissions in the boundary conditions area and from Mexico, but the commission concludes that the representations in the CENRAP PSAT analysis appear generally reasonable. The commission notes that the analysis in the BRAVO study concluded in the late 1990s and analyzed early in this decade

indicates that approximately one-third of the sulfate at Big Bend comes from outside the United States, one-third from Texas, and one-third from areas of the United States upwind of Texas. The commission has revised its SIP revision to include these important perspectives. If this attribution of more of the sulfate to the midwestern and southeastern United States turns out to be more accurate than the CENRAP PSAT modeling, then the reductions from CAIR or its replacement program could be more effective in reducing regional haze at Big Bend and Guadalupe Mountains than the commission has projected using CENRAP PSAT modeling.

The FS commented that the uniform rate of progress shown in Chapter 10 is not the EPA default rate and should be indicated as such.

The commission disagrees that the EPA default should be in the SIP narrative as it might add to reader confusion; however, the text in Chapter 10 has been revised and refers the reader directly to the EPA default rate in Appendix 10-3: *Uniform Rate of Progress Curves Using Default Natural Conditions Estimates*. In addition, the appendices to Chapter 10 are located directly after Chapter 10 in the SIP submission so that the relevant information that the FS requested is more convenient for review.

The NPS and FWS requested the additional references cited in the reasonable progress discussion, including the Alpine Geophysics, CENRAP, and EPA works, be included in the appendices.

These documents were written by parties outside the agency and are cited as references in support of Texas' work. Except for the EPA documents, appropriate references have been added to the TCEQ's regional haze Web site in response to comments.

One individual commented that it takes time to clean up present polluters. This individual proposed that Texas should not continue to grant exceptions to grandfathered emitters, and the TCEQ should not consider permitting additional uncontrolled sources.

The commission does not agree that grandfathered sources are granted exceptions from permitting. There are no longer grandfathered facilities in Texas. The Texas Clean Air Act requires that all sources previously grandfathered submit a permit, qualify for an applicable permit-by-rule, or shut down by 2004. During the permit review process, the emissions from previously grandfathered sources are reviewed to ensure that the permit protects human health and the environment. The appropriate and feasible emission control requirements vary depending on the size and nature of the source are determined on a case-by-case basis. New and modified sources are required to meet current Best Available Control Technology (BACT), including these previously grandfathered sources. Any source that is modified must meet current technology requirements through additional permit review or by meeting the conditions of a permit-by-rule. Insignificant sources may be authorized under an applicable permit-by-rule, which may allow a lesser degree of control due to the small size of the source.

Four Factor Analysis

The FS commented that given the uncertainty of the modeling and the implementation of CAIR, the SIP appeared to disregard Texas impacts to Class I areas in Arkansas and Missouri. PSAT results indicated that Texas sources were the largest contributor to visibility impacts at these wilderness areas, particularly at Caney Creek Wilderness in Arkansas. The FS requested that Texas analyze and fully disclose Texas impacts to these Class I areas. The long term strategy and four factor analysis for reasonable progress should address these Class I areas at Caney Creek and Upper Buffalo.

The commission agrees that the SIP revision must show the full impact Texas has on each Class I area it impacts as well as the amount of reduction in that impact that modeling indicated the long-term strategy will produce by 2018. The commission has revised this SIP to show those full impacts and impact reductions for all Class I areas affected by Texas' emissions. The commission agrees that it is necessary to identify specific areas of influence for each Class I area impacted by Texas' emissions, including Arkansas and Missouri. Further, a four factor analysis is necessary for the set of sources in the respective areas of influence that impact each of the Class I areas that Texas' emissions impact. Chapter 10 presents these areas of influence, the sources within these areas that were considered for additional control, and the results of the four factor analysis for each set of sources. (The four factor analysis considers the cost of reducing air pollution emissions, the time necessary for compliance, the energy and non-air quality environmental impacts of reducing emissions, and the remaining useful life of existing sources that contribute to visibility impairment.) Changes were made to Chapter 10 Section 10.4 in response to this comment.

One individual disagreed with TCEQ's approach of not adding more controls since 25 percent of regional haze emissions are due to international sources. The individual questioned if TCEQ had double counted emissions in Table 10-7 since boundary conditions and Mexico can have overlap. The individual questioned the accuracy of visibility impairment from international sources.

The commission disagrees with these comments. The commission's decisions about the amount of control that is reasonable are independent of the impact of international transport. The boundary condition area and the areas of Mexico that are inside the CENRAP emission inventory and modeling domain are distinct. The modeling procedures were set up to separate the emission points into either the CENRAP modeling domain or the domain for GEOS-Chem, which was used to model the boundary condition domain. The dividing line is the southern boundary of the CENRAP modeling domain, shown in Figure 8-2: *National Inter-Regional Planning Organizations Modeling Domain*. The emission points in Mexico are in the CENRAP modeling domain if they are north of the CENRAP domain boundary. The Mexican emissions south of the CENRAP domain and the emissions from Central America are in the boundary conditions. The inventoried emissions from Mexico are assigned to only one of these two areas. Chapter 11 discusses the uncertainty in assignment of regional haze at Big Bend to international transport, to Texas, and to the rest of the United States. The commission's decisions about the amount of control that is reasonable in this Regional Haze SIP revision is based on the four factor analysis, as the EPA's Regional Haze Rule specifies. (The four factor analysis considers the cost of reducing air pollution emissions, the time necessary for compliance, the energy and non-air quality environmental impacts of reducing emissions, and the remaining useful life of existing sources that contribute to visibility impairment.)

One individual was concerned that what makes emissions reductions from programs like CAIR unlikely is that many sources want to purchase emission credits and do not want to add on air pollution controls to reduce regional haze. These actions undermine TCEQ's statement that existing program reductions are sufficient so nothing more needs to be done for the next five years.

The commission disagrees with these comments. The federal Regional Haze Rule requires that all reasonable reductions occur. Regarding CAIR or its eventual replacement, as a program that covers the entire Eastern United States, reductions occurring in surrounding states will positively impact visibility in Class I areas in Texas. The TCEQ has used the four factor analysis, as required, for the set of Texas sources impacting Class I areas, to determine whether all reasonable reductions have been required. The four factor analysis considers the cost of reducing air pollution emissions, the time necessary for compliance, the

energy and non-air quality environmental impacts of reducing emissions, and the remaining useful life of existing sources that contribute to visibility impairment.

The NPS, FWS, and FS commented that in establishing the reasonable progress goals (RPG), the TCEQ failed to establish a sufficient relationship between the most attributable sources for visibility impacts and the affected Class I areas. The NPS and FWS found it difficult to ascertain what geographical source region and which sources contained within that region TCEQ considered when establishing the total costs for visibility improvement at the two Class I area within Texas. The NPS and FWS commented that the TCEQ provided insufficient information on the four factor analysis to show that controls at specific sources on a cost per ton basis were unreasonable. The NPS and FWS requested that the TCEQ identify specific geographic regions, based upon area of influence studies, that encompass the most important visibility-affecting emission sources for Big Bend and the Guadalupe Mountains and focus its reasonable progress analyses for these two Class I areas. The NPS and FWS asked that the TCEQ identify significant point sources in those areas of influence and conduct a thorough reasonable progress analysis with more specific four factor responses for that source region.

In response to these comments, the commission revised the Regional Haze plan with a summary of the area of influence analysis for ten Class I areas, including eight outside the state. Impacts of emissions on those Class I areas are included. Texas has listed emissions from significant sources in a Class I's area of influence. A list of these sources is included in an adopted version of the SIP.

Costs of controls for sources that impact any of these ten Class I areas were considered in the four factor analysis. A more detailed four factor analysis is summarized in Chapter 10. The commission's analysis indicates that additional controls beyond those already existing on the books are not considered cost effective at this time. This issue will be readdressed in future Regional Haze SIP revisions. The federal Regional Haze rule requires states to submit five-year progress reports that include an assessment of whether the current plan strategies are sufficient for the state to meet the reasonable progress goals. If it is found that strategies are not sufficient, 40 CFR § 51.308(h)(4) requires that a revision to the SIP be submitted within one year, rather than waiting for the next 10-year comprehensive review. Changes were made in response to these comments.

The NPS, FWS, and FS commented that in large geographic states such as Texas or Alaska, establishing these areas of influence are important for describing appropriate cost benefit arguments, since evaluations applied on a state-wide basis are often not relevant for any specific Class I area. The NPS, FWS, and FS asked that such areas be clearly identified by some geographic means, and to encompass sources that have the most visibility impairing significance for a given Class I area. In the case of Texas, CENRAP has already generated area of influence information. The commenters suggested including geographic extent and significant source information.

The commission used the area of influence generated under CENRAP's direction to generate lists of major sources within the area of influence for ten Class I areas, including eight areas in adjoining states. Cost of controls for each of these Class I areas is addressed and is now included in an update of the SIP. The commission made changes to Chapter 10 and Appendix 10-1 in response to these comments.

The NPS and FWS stated no narrative information was provided regarding cost benefit of controlling sources that may impair Class I areas outside Texas. The NPS and FWS asked that the TCEQ present information on how the controls were analyzed and provide tables specific to each Class I area. The NPS, FWS and FS asked that the TCEQ include analysis for all Class I areas to which Texas contributes.

This SIP revision has been updated in Chapter 10 and Appendix 10-1, Table 6-10 to present a list of sources and potential controls for each Class I area of influence, including eight outside Texas. The commission reviewed all the proposed controls on all sources provided by the CENRAP cost control study. Only the controls with costs per ton within the price range of strategies currently promulgated by the state were reviewed. These are \$2,700 per ton (similar to levels for CAIR). These potential control strategies were further screened for potential effectiveness of the strategy by applying a cost over distance analysis for all units. Distance was defined as the closest Class I, regardless whether it was in- or out-of-state. Additionally, the units without a proposed strategy in the CENRAP study were reviewed to determine if any source categories were represented that the TCEQ believed a control strategy could be applied. For example, flue gas desulfurization for carbon black plants was added to the proposed list in this final step.

The EPA, NPS, FWS, FS, and Sierra Club requested that the four factor analysis in Appendix 10-1, which is a required element in the federal Regional Haze Rule Section 51.308(d)(1)(i)(A), be included in the SIP narrative. The EPA, NPS, FWS, and FS commented that in Section 10.2 of the proposed SIP stated that Appendix 10-1 provided an analysis of the four factors identified by statute as required for setting reasonable progress goals and concluded that based upon these factors the goals are reasonable. The NPS, FWS, and FS recommend information in that appendix should be summarized in the SIP narrative and should clearly state the decision of the state on a Class I basis.

This SIP has been revised with a more detailed four factor analysis in Chapter 10. Costs for controls for sources that impact any of these ten Class I areas were considered in the four factor analysis. The control list originally in Appendix 10 has been relocated to Chapter 10, not detached, to allow easier access by the public.

The Sierra Club requested more evaluation of controls be located in the text of Chapter 10 instead of Appendix 10. The commenter does not have confidence in the existing TCEQ control strategies to meet the long time frames to address the proposed SIP revision.

In response to this comment, the commission has updated the SIP narrative in Chapter 10 with more detail on the four factor analysis for controls. The list of specific list of controls, due to its length, remains in the appendix. In various parts of Texas, additional emission controls will be required due to the Dallas-Fort Worth and Houston-Galveston-Brazoria SIPs, other early action plans, and various near nonattainment agreements. The commission expects these adopted control strategies as part of SIPs for ozone nonattainment areas to also be pertinent for haze reduction as some of the precursor emissions are identical. The recent EPA refinery consent decrees are also subject to sulfur dioxide reduction as part of the EPA negotiated agreements. Reductions in both nitrogen oxide and sulfur dioxide emissions are planned. As a part of these ozone strategies and the Regional Haze SIP, periodic modeling and emissions inventories are required. The adequacy of Texas' control strategies and rules will be evaluated every five years as required by the federal Regional Haze Rule. The Regional Haze rule requires states to submit five-year progress reports that include an assessment of whether the current plan strategies are sufficient for the state to meet the reasonable progress goals. If it is found that strategies are not sufficient, 40 CFR § 51.308(h)(4) requires that a revision to the SIP be submitted within one year, rather than waiting for the next ten-year comprehensive review.

Area of Influence (AOI)

The NPS, FWS, FS, and one individual commented that the TCEQ has set a 20 percent cut off for emission impacts, which is an unacceptably high level of impact to allow. The commenters were concerned the data did not show Texas' visibility impacts on other states.

The commission did not use a 20 percent impact level in its analysis in this SIP revision. However, in Appendix 10-1, the commission did include both Table 1: *Pollutant Impacts on Visibility at the Class I Areas from Texas Emissions* and Table 3: *Source Category Contributions to SO₄ and NO₃ at the Five Class I Areas Texas Affects the Most*, which showed Texas' impact on only the top five Class I areas in terms of the percentage of impact that came from Texas. This level was shown in the SIP for sake of summarizing results for the areas with the most impact from Texas. To prevent readers of the SIP from getting the incorrect impression that Texas used a 20 percent cut off, the SIP revision has been updated with a summary of impacts for ten Class I areas, including eight outside the state. Impacts of emissions from Texas sources on those Class I areas are included. Significant sources within each Class I area of influence (AOI) were identified, using an emissions over distance value (Q/d) of 5 to limit the list to those most likely to have a impact on a Class I area based on the magnitude of emissions and distance from the Class I area. The cost of potential controls on significant sources within an area of influence was analyzed. The commission revised Chapter 10 in response to these comments.

The NPS, FWS, and FS requested that the TCEQ develop and adopt an area of influence approach to best define cost benefit information when concluding reasonable progress factors. Class I sites that should be included are: Big Bend (NPS managed in Texas), Guadalupe Mountains (NPS managed in Texas), Wichita Mountains (FWS managed in Oklahoma), Caney Creek (FS managed in Arkansas), Salt Creek (FWS managed in New Mexico), and White Mountains (FS managed in New Mexico). The NPS and FWS suggested that the reasonable progress analyses are missing specific information about Texas' contributions to visibility impairment at the Wichita Mountains in Oklahoma and other out-of-state Class I areas.

The commission revised Chapters 4 and 10, and Appendices 4-3 and 10-1 in response to these comments as follows. The area of influence analysis for ten Class I areas were summarized. These areas include Big Bend, Breton Isle, Caney Creek, Carlsbad Caverns, Guadalupe Mountains, Salt Creek, Upper Buffalo, White Mountain, Wichita Mountains, and Wheeler Peak. The first two orders of magnitude (areas of influence) for each pollutant and each Class I area were identified. Then significant sources within this circle or area of influence were identified. The sources were screened using an emissions over distance value (Q/d) of five to limit the list to those sources most likely to have a impact on visibility at a Class I area based on the magnitude of emissions and distance from the Class I areas. Visibility impacts on those Class I areas are included.

Any source with identified potential add-on controls and its costs were included. These were identified from the CENRAP-directed list, which was developed using EPA's program, AirControlNET. The visibility impact from these potential controls was evaluated and the SIP is revised to reflect this analysis.

The FS commented that if the averaged control costs in Chapter 10 are for the entire CENRAP region from Minnesota to Texas, this does not give an accurate description of costs sources would incur in Texas. The TCEQ should determine and use costs more representative of the southern tier of CENRAP states.

The commission's use of the EPA's AirControlNET data to determine cost of controls for this SIP revision is consistent with other Texas SIPs. The commission typically relies on data supplied by EPA through resources such as AirControlNET. The commission takes

into consideration any known differences in cost. The commission added an estimated cost for the flue gas desulfurization proposed set of controls for Texas carbon black sources. These controls were not proposed in the AirControlNET data used by CENRAP. In regards to Texas specific controls, the commission did consider some source controls beyond the EPA's AirControlNET in the proposed SIP revision. No changes were made to the SIP.

The NPS and FWS commented that the uncertainty of CAIR controls is clear in Texas with regard to purchased emission credits and source unwillingness to make control commitments. The NPS and FWS commented that this level of uncertainty can have a heavy influence on the ability of the state to predict or meet visibility goals into the future. The NPS and FWS commented that TCEQ should identify areas of influence for each Class I area and develop a list of the significant point sources within that area to form the primary basis to better evaluate the progress of those sources within the CAIR framework.

As part of the Regional Haze SIP development process, the commission considered control options beyond CAIR and BART, which are discussed in the four factor analysis summarized in Chapter 10. The commission's analysis indicates that additional controls beyond those already implemented are not considered cost effective at this time. The commission will address the need for addition requirements as part of the five-year review process, which starts in 2013. Due to the uncertainty of the impact of CAIR or its eventual replacement, whether over predicting or under predicting emissions, the commission's approach at this time is to track CAIR or its replacement over the five-year and ten-year intervals, and determine if additional controls are needed. The progress of impacted sources will be evaluated in future SIP revisions and review of annual emissions inventories, required by Federal Clean Air Act (FCAA) and the state.

Appendix 10-1: Analysis of Control Strategies

The FS stated it is also entirely possible that the control costs were over estimated.

The commission agrees there are variations and uncertainties associated with the control cost estimates that could result in lower estimates as well as higher ones. However, given the increase in costs of controls being installed in current systems, the commission considers higher costs are more likely. The United States Department of Energy stated in October 2007 that "the latest benchmarking study by the EUCG, formerly known as the Electric Utility Cost Group, examines the technology and cost of 49 flue gas desulfurization systems currently under design or construction by 12 of the United States' largest utilities. The base cost of a flue gas desulfurization system was \$243 per kilowatt hour. The survey found that flue gas desulfurization retrofit projects are increasing rapidly, even during the phased construction of similar units within a single utility. Overall cost increases were attributed to the rising costs of alloy steels and materials handling systems. Construction labor and concrete costs contributed least to these increases."

The EPA requested the TCEQ provide a detailed cost accounting for the numbers in Appendix 10-1 on Table 4: *Summary of Additional Point Source Controls Considered for Reasonableness*, which summarizes the estimated annualized costs for sulfur dioxide and NO_x controls on 24 sources.

A detailed summary of the costs listed in Appendix 10-1 on Table 4 are in Table 6: *Proposed SO₂ Controls Based on CENRAP Modeling*; Table 8: *Proposed SO₂ Control for Carbon Black Units*; and Table 9: *Proposed NO_x Controls Based on CENRAP Modeling*. Changes were made in Appendix 10-1 Section 1.5 in response to the comment.

The FS suggested that when looking at cost effectiveness of controls for sources, additional consideration should be given to those sources within the area of influence of more than one Class I area.

The commission revised Appendix 10-1 with a summary of the area of influence analysis for ten Class I areas. The analysis for visibility impairment was based on each Class I area and costs of potential controls within that Class I area impact. Once a source was identified with a potential control, the cost of the control to the site remained the same, regardless of the number of areas of influence in which the source is located. A four factor analysis of source categories including cost effectiveness is included in Appendix 10-1.

The FS commented that without analysis of sources in northeastern Texas and Class I areas affected by these sources, Appendix 10-1 is of limited value. Texas should show the four factor analysis by which it determined no further controls on cement kilns for NO_x was reasonable.

In July 2006, a report entitled *Assessment of Nitrogen Oxide Emissions Reduction Strategies for Cement Kilns - Ellis County: Final Report* was submitted to the TCEQ by ERG (www.tceq.state.tx.us). This study evaluated the applicability, availability and cost effectiveness of potential nitrogen oxide control technologies for the ten cement kilns located at three Ellis County sites. The report focused on selective catalytic reduction (SCR), selective non-catalytic reduction (SNCR), and low temperature oxidation (LoTOx). Based on the results of the study, the TCEQ conducted modeling sensitivity analyses at two levels of control to evaluate potential ozone reduction benefits from possible cement kiln control strategies. A reduction in nitrogen oxide as part of the ozone control strategies has haze control co-benefits. One modeling sensitivity run assumed a range of 35 to 50 percent nitrogen oxide control on cement kilns depending upon kiln type; the second assumed a range of 80 to 85 percent. After reviewing the report of the kiln study, the modeling sensitivity results, and all other available information, the commission determined that the 35 to 50 percent control range was the most appropriate control level to address ozone in the Dallas Fort Worth area.

The commission developed a source cap that will require a reduction of approximately 9.69 tpd of nitrogen oxide emissions from the cement kilns in Ellis County starting March 2009. The source cap approach does not require a specific technology, but provides flexibility for kiln operators to comply in the most effective, technically sound, and expeditious manner possible, while forcing sizeable nitrogen oxide emission reductions from all cement kilns in the area. In most cases, the commission anticipates that the limitations will be attainable with selective non-catalytic reduction and will not require costly and time consuming research and development of other technologies. Pilot testing of selective non-catalytic reduction on wet and dry kilns in 2006 demonstrated that 30 to 40 percent reductions were achievable without hazardous by-product formation. In response to comments, two sections were revised: 1) Chapter 10 Section 10.4.2 and 2) Appendix 10-1 Section 10-1.3. The references were also updated to include the cement kiln report.

The FS commented that the TCEQ provided no source-by-source determinations to identify sources that individually may have had a relatively high visibility impact on a particular Class I area(s). By eliminating consideration of additional point source controls for those Class I areas such as Breton, Wichita Mountains, and White Mountain that are not predicted to meet the uniform rate of progress, Texas does not justify how it contributed to its proportion of controls necessary to help these states work toward the uniform rate of progress.

Impacts of emissions on those Class I areas are included in the SIP narrative, Section 10.3. Texas has updated this SIP and lists significant sources in each of ten Class I's area of influence, including those mentioned in the comment. Potential additional controls were

evaluated for significant sources that may have an impact on a Class I area based on their emissions and distance to the Class I area. A four factor analysis was done for each source category. As part of the consultation process, this information was sent to other states with an impacted Class I area (see Appendix 10-1 and Appendix 4-3).

The commission performed category level reviews as allowed by the federal Regional Haze Rule. The non-air environmental impacts were considered on a source category basis. Most of these impacts, because they would be detrimental to any consideration of implementing a control, did not dissuade the original conclusion that the proposed control cost did not justify the limited benefit. The commission asserts the application of additional controls is unreasonable because the insufficient improvement of visibility of 0.05 deciview is achieved (see Tables 10-4 and 10-5). Based on the impact and cost of over \$300 million, the commission concluded that additional controls beyond those already on the books are not cost effective at this time (see Table 10-4).

The NPS and FWS stated that although the narrative portion of Appendix 10-1 presented an argument to conclude that additional controls are not reasonable, supporting information on how the controls were tested is neither provided nor described. Tables 6-10 of the Appendix 10-1 appear to include information that is not relevant to the narrative description. The NPS and FWS requested the tables include information on sources likely to impair visibility at Class I areas other than Guadalupe Mountains and Big Bend and present cost estimates that are in the range of those quoted in the narrative.

Appendix 10-1, Tables 6 through 10 are the detailed proposed controls for nitrogen oxide and sulfur dioxide sources that were discussed in Section 10-1.4 Proposed Controls. The summary of controls in Table 4 is a consolidation of those listed in Tables 6 through 10. The tables include the costs associated with those controls for all Class I areas impacted, not just Big Bend and Guadalupe Mountains. The commission evaluated all potential controls regardless of the Class I impacted, as required under the EPA haze regulations. In response to comments, Chapter 10 Section 10.4.2 and Appendix 10-1 Section 10-1.5 has been revised to clarify that visibility impairment for all Class I areas was assessed.

Appendix 10-2: Estimating Visibility Impacts from Additional Point Source Controls

The FS suggested Appendix 10-2: *Estimating Visibility Impacts from Additional Point Source Controls* should estimate impacts to the other Class I areas listed, both in and out of state.

The commission revised the SIP with a summary of the area of influence analysis for ten Class I areas, including eight out-of-state sites. Emissions and impacts from emissions on those Class I areas is included. Texas has listed emissions from significant sources in a Class I's area of influence. In response to this comment, two tables were expanded to include all 10 Class I areas that Texas impacts: Table 2: *Projected Visibility Benefit from CENRAP Control Set* and Table 5: *Modeled Visibility Benefit from the Texas Control Set*. In addition, several paragraphs were added to explain Texas impacts at these 10 sites.

The FS is uncertain if the additional point source controls were the same as those in the Base G modeling for the future year 2018c conducted by CENRAP.

The additional controls considered by the commission were beyond those listed in the CENRAP Base G modeling. They were developed with the assistance of the EPA's PC-based AirControlNet program and took into consideration the controls that were on the books or that would be in place by 2018. No changes were made to the SIP revision in response to this comment.

Chapter 11: Long-Term Strategy

The FS commented that it would be very informative and helpful if Texas would show the PSAT results for the 20 percent best days as well as the 20 percent worst days.

The commission agrees with this comment and has added graphs showing the PSAT results for the 20 percent best days for each Class I area analyzed in Chapter 11.

An individual commented that the CAIR reductions projected for NO_x are only 28.5 percent and for SO₂ are 61.1 percent. The commenter was concerned that Texas needs much greater reductions than these to increase visibility and reduce ozone precursors.

Based on the four factor analysis, the commission has adopted all reasonable controls for the period to 2018. Sulfur dioxide reductions of more than 60 percent in the first of five ten-year planning periods are substantial. The reason the NO_x control percentage is not as high is that NO_x point sources have already been controlled in the last six years for ozone reduction purposes. (The four factor analysis considers the cost of reducing air pollution emissions, the time necessary for compliance, the energy and non-air quality environmental impacts of reducing emissions, and the remaining useful life of existing sources that contribute to visibility impairment.) No changes were made in response to this comment.

One individual commented that TCEQ took credit for SO₂ reductions that the federal government required.

Section 51.308(d)(3)(v) of the federal Regional Haze Rule requires each state to include all federal or state rules and legally enforceable requirements in its 2018 projections of the visibility improvements. The commission works with the federal EPA to improve the air across Texas. In the case of Big Bend and Guadalupe Mountains, SO₂ is a primary component of haze in western Texas. Approximately one-third of sulfate pollutants come from the Ohio Valley and other states according to the BRAVO study.

One individual commented that the TCEQ says CAIR “is expected to reduce regional haze impact.” The individual commented that Texas' CAIR makes no improvements for particulate matter, ozone, or regional haze, and the TCEQ reduced NO_x emissions due to the ozone non-attainment in Texas, especially Houston, and not because reductions were made for regional haze.

The commission agrees that the HGB region NO_x reductions were adopted to reduce ozone pollution. The commission notes that these reductions also reduce Texas' contribution to regional haze due to air chemistry and the formation of ozone and particulate matter. The commission disagrees that CAIR makes no improvements for particulate matter, ozone, or regional haze. The projected CAIR reductions in NO_x and SO₂ emissions are substantial. Because NO_x and SO₂ react in the atmosphere to form nitrate and sulfate, which are components of particulate matter and regional haze, the NO_x and SO₂ reductions will lower concentrations of PM_{2.5} and regional haze. The further NO_x reductions will produce lower ozone concentrations.

Several individuals were disappointed in this SIP revision that will not result in reasonable progress toward meeting the national goal of achieving natural visibility in our national parks by 2064. The inadequacy of Texas' Regional Haze SIP means that Guadalupe Mountains would not reach natural visibility until 2081, and Big Bend would not achieve natural visibility until 2155. Moreover, national parks and/or wilderness areas in nearby states will be affected by lack of adequate air pollution control on Texas sources.

The commission disagrees with these comments. The commission notes that the federal Regional Haze Rule requirement to project dates for meeting the goal of natural conditions

is unreasonable for Class I areas like Big Bend and Guadalupe Mountains National Parks that are heavily impacted by international transport of regional haze. This is particularly so given EPA's acknowledgement in the rule's preamble that international transport has not been sufficiently addressed by their rule. Because the anthropogenic portion of the international transport cannot be expected to approach zero, it is not realistic to project a date for zero anthropogenic haze impacts at such Class I areas. Since there are substantial international transport impacts at Texas' two Class I areas and there is not a reliable basis for projecting decreases in these impacts, Texas and other states would have to over control to compensate for the international impacts if the affected Class I areas were to have reasonable progress goals as low as the uniform rate of progress. The EPA's preamble to the federal Regional Haze Rule and EPA guidance clearly state that states are not expected to or required to impose such over control. No changes were made in response to this comment.

The FS and one individual commented that the second paragraph of Chapter 11 refuted the argument that Texas made later that assumed 100 percent of coarse mass was natural. Although the FS agreed that the majority of coarse mass likely is natural, some portion of it is likely anthropogenic. Therefore, Texas should consider treating some percentage determined in consultation with the FLMs and EPA as anthropogenic. The TCEQ must determine how much of the coarse mass and fine soil "comes primarily from natural dust storms and dust blowing from the Chihuahuan Desert" since much of this dust may be due to historical overgrazing or farming and therefore is human caused. Ecosystem restoration and reform of grazing and farming practices may be needed to reduce this human caused dust.

The commission agrees that there is some anthropogenic contribution to coarse mass and fine soil at both Big Bend and Guadalupe Mountains National Parks. In response to recent discussions with the FLMs, Chapter 5 and Appendix 5-2 now compare the impact of an 80 percent and 100 percent natural approximation for coarse mass and fine soil. The commission is not currently aware of an adequate, workable methodology for developing a well-founded estimate of the proportion of coarse mass and fine soil that is anthropogenic at the two Texas Class I areas. The commission has chosen to use the approximation that 100 percent of the coarse mass and fine soil are natural for this first Regional Haze SIP revision. *The Assessment of the Principal Causes of Dust-Resultant Haze at IMPROVE Sites in the Western United States: Final Report*, prepared for WRAP in 2006 by the Desert Research Institute and Marc Pitchford of the National Oceanic and Atmospheric Administration includes a map that shows the areas of the Chihuahuan Desert in West Texas to be moderately-to-highly wind erodible shrub land and grassland areas. The map does not show erodible areas from human activity. The areas of the Chihuahuan Desert in northern Mexico are not categorized and are outside United States control.

The commission plans to consult with the FLMs and work to develop more refined scientifically supportable estimates of the actual percentages of natural and anthropogenic portions of coarse mass and fine soil at Big Bend and Guadalupe Mountains for the five-year assessment and future revisions.

The FS requested the SIP address the reason the time of compliance was not considered and points to the need for a source by source analysis. No calculations are provided to justify the conclusion. The concept that instituting controls near the 2018 date would reduce the cost effectiveness in cost per ton is not convincing. The cost per ton is determined at a fixed rate at a fixed time, independent of any year except that used in the determination.

The commission has revised the SIP with a summary of a four factor analysis. A four factor analysis of source categories has been added to Chapter 10. The cost of controls and improvements to visibility impairment are summarized for each Class 1 area. The

statement referencing timing of controls impacting the cost per ton has been removed from the SIP Appendix 10.1, Time for Compliance.

The NPS and FWS were concerned the SIP revision proposal indicated that attribution from Texas emissions not only contribute to visibility impairment at Class I areas outside the Texas boundary, but these Texas emissions were clearly contributing at levels greater than the host state, like at Salt Creek, White Mountain, Wichita Mountains, and Caney Creek. The NPS and FWS requested that Texas demonstrate progress towards visibility goals in these out-of-state Class I areas (as part of the Texas plan's reasonable progress discussion), and also show more detailed consulting and planning with these neighboring states. Oklahoma, New Mexico, and Arkansas received even larger percent of total attribution to visibility impairment at their Class I areas from Texas sources than Texas' Class I areas receive from international sources. Texas should provide additional documentation on efforts to not only discuss impacts, but ways that the states planned to work together to make progress in Class I areas where Texas is the majority contributor. Because the state is not only a contributor, but the majority contributor, additional efforts should be shown to demonstrate multi-state controls. This should be further extended to demonstrate consistent control levels.

The commission acknowledges that emissions from Texas do produce a significant minority of the visibility impairment at Salt Creek, White Mountain, Wichita Mountains, and Caney Creek Wilderness areas. In the 2002 base period year, the respective percentages of extinction contributed by Texas on the 20 percent worst days for these four areas are included in the following table:

2002 Contributions to Extinction on the 20 Percent Worst Days

	Salt Creek	White Mountain	Wichita Mountains	Caney Creek
Texas'	25.5%	22.5%	28.1%	11.1%
Host State's	28.3%	17.7%	14.7%	10.1%

The highest Texas contribution to extinction at one of these sites is 28.1 percent. The commission disagrees with the comment that Texas contributes a majority of the 20 percent worst days extinction to any Class I area in another state. Texas agrees that the PSAT modeling results show that Texas contributes more than the host state to extinction on the 20 percent worst days at White Mountain, Wichita Mountains, and Caney Creek.

The commission agrees with displaying the details of Texas' impact reductions at these Class I areas and other Class I areas impacted by Texas' emissions. The tables showing Texas' pollutant-by-pollutant impacts on extinction for both the 2002 base period and the 2018 planning year are now included in the consultation section of Chapter 11. These tables show the modeled impact of multi-state efforts to reduce visibility impairment at these sites. The commission disagrees with the suggestion to place this information in Chapter 11 on reasonable progress chapter. The Regional Haze rule requires Texas to develop RPGs for Class I areas in Texas.

The EPA, NPS, FWS, FS, and one individual commented that just because Texas has not received a formal invitation for consultation from Colorado, Louisiana or New Mexico does not mean that these states accept Texas' long term strategy as adequate for producing Texas' share of emissions reductions to help meet reasonable progress goals at each state's respective Class I area(s). New Mexico has not completed their reasonable progress goal analysis and is further behind in the process. This lack of consultation should be noted in the SIP, and Texas should display its present and projected impacts to those state's Class I areas. The commenters would like better documentation in the SIP to explain the pertinent issues discussed and agreements reached through consultation activities to address all Class I areas where Texas' emissions are important contributors to visibility impairment.

As the commenters acknowledge, each state may not have completed its reasonable progress goals. The consultation process in the federal Regional Haze rule is not proscriptive precisely because of the differences in each state's SIP development and regulatory programs. The proposed SIP revision indicated the state of consultations at the time it was published. The commission concurs that the adopted SIP revision include documentation that it meets the requirements of §51.308(d)(3)(i) – (iii). The commission has sent individual letters to Louisiana, Arkansas, Missouri, Oklahoma, Colorado, and New Mexico to ask each to confirm in writing that Texas' emissions reductions strategy is adequate to meet Texas' apportioned reductions in impact at the impacted Class I areas. The commission also requested that recipients of the letters confirm they are not expecting any additional emission reductions from Texas sources. Formal replies were requested of the adjoining states within 30 days for inclusion in this SIP revision. The states that responded have documented letters in Appendix 4-3.

The NPS and FWS agreed that Mexican emissions contained within the boundaries of the CENRAP modeling domain are important contributors to visibility impairment at Big Bend and Guadalupe Mountains. The NPS and FWS requested that Texas acknowledge the work contained in the final Big Bend Regional Aerosol and Visibility Observational (BRAVO) study. This extensive BRAVO study indicated sources in Mexico, Texas, and the eastern United States all play a role in sulfate conditions at Big Bend. The NPS and FWS look forward to working with Texas to solicit EPA action with its sister agencies to address the Mexican portion of sulfate impairment at Big Bend. The NPS and FWS also requested that the SIP discuss the Texas contribution to sulfate found in the BRAVO field study in the long term strategy and reasonable progress sections.

The commission agrees with this comment that the BRAVO results and their relationship to the CENRAP PSAT results warrant more discussion. The added discussion is included in Chapter 11.

The EPA is concerned about the potential of the American Smelting and Refining Company (ASARCO) El Paso to affect visibility in Texas and New Mexico Class I areas. On February 13, 2008, the commission approved the renewal of Air Quality Permit No. 20345 for ASARCO Incorporated. The EPA stated that with the Regional Haze SIP revision, the commission should ensure that ASARCO's impact assessment will be included in Texas' BART, reasonable progress goals, and long term strategy.

On February 13, 2008, the TCEQ approved the renewal of Air Quality Permit Number 20345 for the American Smelting and Refining Company (ASARCO) El Paso copper smelter. On February 6, 2009, the TCEQ received confirmation from ASARCO LLC that it intends to close the smelter and requests that TCEQ void all air permits and pending applications for the plant. The TCEQ voided these permits and applications on February 9, 2009 (See Appendix 11-4: ASARCO El Paso). The TCEQ will continue to consult with affected states and Federal Land Managers on surrounding Class I areas of concern.

~~On February 13, 2008, the TCEQ approved the renewal of Air Quality Permit Number 20345 for the American Smelting and Refining Company (ASARCO) El Paso smelter. As of the date this SIP revision was finalized, the TCEQ has not yet made a final determination regarding the BART status of ASARCO's facilities. Due to this and other permitting and operational readiness issues raised by ASARCO in their status report required by TCEQ order, there is uncertainty about the amount of allowable emissions the ASARCO El Paso facility would have should it begin operation. Because of this uncertainty in addition to time limitations, it is not possible for the TCEQ to account for possible future ASARCO El Paso emissions in this Regional Haze SIP revision. When the TCEQ has determined the~~

~~allowable emissions from the ASARCO El Paso facility, the TCEQ will model the visibility impacts of these emissions at affected Class I areas. The TCEQ plans to consult with affected states and Federal Land Managers and include ASARCO's emissions and impacts in its next Regional Haze SIP revision.~~

The NPS and FWS commented on the uncertainty of CAIR implementation. The NPS and FWS requested that the commission be more proactive in response to the uncertainty associated with implementation of CAIR. Although Texas identifies clear conflicts with emission inventories developed by CENRAP, with the Integrated Planning Model predictions of large electric generating unit growth results, and with the unwillingness of participating CAIR sources to commit to particular emission levels, it is concerning that Texas has elected to wait and see how the uncertainty unfolds as part of the required five-year review. The federal Regional Haze Rule mandates that each state develop a plan to make progress toward visibility impairment at Class I areas. Although the commission concludes that the already planned controls between now and 2018 are reasonable, it fails to address how multiple issues that prevent Texas from accurately determining future emissions to address Texas' substantial contribution to visibility improvement at Class I areas inside and outside of its territory. The NPS and FWS requested that Texas develop areas of influence and associated major source lists within these zones as a precursor to a focused five-year review. The NPS and FWS requested Texas establish in the SIP a process for ongoing discussions and consultations with neighboring states and FLMs on the progress of CAIR.

The commission recognizes that the electric generating units are contributors to visibility for the Class I areas and that these electric generating units are covered by the provisions of CAIR as well as other state requirements. There are uncertainties associated with prediction because of the cap and trade provisions of the program. The predicted levels used in the model were from the EPA's Integrated Planning Model, a tool widely used in regional planning. The predictions are based on assumptions applicable at the time the model is constructed, including fuel prices, fuel availability, and regulatory policies. The commission acknowledges the uncertainty in the emissions projections. The commission is not aware of a better emissions prediction tool for electric generating units and believes the predictions provide a valid planning tool. The difference in inventories between CENRAP's and the TCEQ's was in industrial and residential boilers, not in electrical generating units addressed by CAIR or its replacement.

In response to comments, Texas has developed a list of significant industrial sources, including the electric generating units, based on the area of influence analysis developed by CENRAP for each Class I area, which progress can be evaluated during the CAIR time frame or equivalent time. The list of sources can be found in Appendix 10-1, Tables 6 to 10, and the area of influence maps are in Appendix 4-3. The commission will continue to consult with FLMs and states through the SIP consultation process on the implementation of CAIR.

The NPS, FWS, FS, and one individual commented that the TCEQ needed to elaborate on how the New Source Review (NSR) and Prevention of Significant Deterioration (PSD) permitting programs will be used by TCEQ as part of its long term strategy for meeting reasonable progress goals. One individual commented that the Environmental Defense and the Sierra Club have requested that until these deficiencies in the PSD permitting program are resolved that EPA should prohibit construction of new sources in Texas and/or impose sanctions. As part of these written comments, the individual attached a copy of the Environmental Defense and Sierra Club petition that documents the inadequacy of the TCEQ's PSD permitting program. The NPS and FWS requested Texas establish in the SIP a process for ongoing discussions and consultations with neighboring states and FLMs on the progress of PSD/NSR efforts.

The commission has a SIP-approved, PSD permitting program. The commission is committed to working with the FLMs to attempt to develop mutually acceptable procedures that allow adequate opportunity for FLM review of permit applications. In the five-year and ten-year reviews for the Regional Haze SIP revision, the commission plans to consider the cumulative impact of PSD permitting actions on the projected visibility impairment at the Class I areas that Texas' emissions affect. The commission will continue to consult with FLMs and states through the Regional Haze consultation process on the implementation of PSD/NSR permitting. Changes were made in Chapter 11, Section 11.6.3 in response to comments.

The FS commented that Texas has been providing notification to the FLMs only for major-source actions within 100 km of Class I areas. In a letter dated August 21, 2007, the FS requested that Texas reconsider that policy and work with the FLMs to come up with a mutually acceptable policy of notification to the FLMs and surrounding states regarding NSR. Including resolution of this issue in the SIP would greatly strengthen the position that clean days are being maintained.

The commission has commented on EPA rulemaking about PSD review that nationally uniform guidance is needed for review of particulate matter impacts. Also, the Executive Director in a letter to his counterpart in the Oklahoma Department of Environmental Quality has committed "to working with the FLMs on mutually acceptable criteria for determining when a proposed PSD source should conduct a Class I review" (see Appendix 4-3).

Fire

The NPS, FWS, and FS recommend that TCEQ reference fire and smoke plans in a way that does not require a SIP revision each time a fire or smoke plan is updated. The FS is concerned that linking the smoke management plans to the SIP will reduce the FS's ability to maintain flexibility in updating smoke management provisions and suggested these documents not be included in the SIP or its appendixes. The FS inquired if agricultural burning occurs in Texas and if it is regulated.

According to discussion with EPA Region 6, the EPA prefers inclusion of the smoke management plans in the appendix. The smoke management plans contained in the Regional Haze SIP revision are for reference purposes. The commission considers the FS's flexibility to update the smoke management plans unhindered by inclusion in the Texas SIP. Agricultural burning does occur in Texas. Local and state ordinances regulate burning through fire permits. Texas has rules regulating outdoor burning in 30 Texas Administrative Code (TAC) §111, Subchapter B: Outdoor Burning. These rules cover a wide variety of burning, including prescribed burning. The Texas Forest Service tracks burning in Texas.

The NPS and FWS commented that it is appropriate for the TCEQ to declare smoke plans as a contributing program for visibility protection, but neither the state or CENRAP evaluated performance resulting from this or any specific smoke management component. If the state wants to speak to not making a change to the smoke management plan, it should simply state that it is unreasonable to make modifications due to the low smoke apportionment or low priority of pollutant selection.

The commission agrees with this comment. The commission has revised the Chapter 11 discussion of smoke management plans to state that it is unreasonable to make modifications to the smoke management plans due to the low smoke contribution from Texas to regional haze at the Class I areas that Texas' emissions impact.

The NPS and FWS requested Texas indicate whether it intends to certify its Smoke Management System as provided for by the 1998 EPA *Interim Air Quality Policy on Wildland and Prescribed Fire*.

The commission does not intend to certify its smoke management system.

The NPS and FWS commented that the proposed SIP and the smoke management plans described in its Chapter 11 should identify appropriate nearby Class I areas (both the two within Texas as well as those located in neighboring states) as smoke sensitive areas. The commenters suggested that prescribed burners should be required to apply the appropriate smoke management techniques to minimize smoke impacts.

Such an additional designation of Class I areas as smoke sensitive areas is not required under the federal Regional Haze Rule or is a necessary part of this SIP revision because of the minimal impact of smoke from fires on regional haze in Texas. State rules under 30 TAC §111, Subchapter B: Outdoor Burning, already require all prescribed burning in Texas to apply appropriate smoke management techniques to minimize smoke impacts.

The NPS and FWS commented that the proposed SIP stated that wildfire emissions are assumed to remain the same looking forward over the ten-year planning period. However, the SIP should identify if prescribed burning emissions are proposed to decline, stay the same, or increase.

The commission does not determine how much prescribed burning occurs. The commission's role is to regulate prescribed burning to minimize smoke impacts. The manager or owner of land determines whether to conduct prescribed burning. Concerning the estimate of change in impact, the general increase in use of well controlled prescribed burning to prevent catastrophic wildfire may increase low concentration impacts and reduce high impact events. The commission does not have sufficient information to produce a more refined estimate than the no-change estimate used in the modeling to project conditions in 2018.

One individual suggested that Chapter 11 should also list a smoke management plan for the national forests and grasslands in Texas (Davy Crockett, Sam Houston, Sabine, Angelina National Forests and Caddo and LBJ National Grasslands). The individual commented that more prescribed burning was being conducted than in the past due to increased emphasis on improving woodpecker habitat.

The commission agrees that there are additional smoke management plans besides those listed as examples in Chapter 11. The plans referenced in the SIP include Class I areas in Texas and a number of larger jurisdictions. The commission does not consider an exhaustive listing of specific plans necessary as part of the Regional Haze SIP revision given the minimal impact fires are expected to have on visibility.

One individual noted that the modeling indicated that primary organic carbon at Big Bend comes overwhelmingly from boundary conditions, which included the areas of the Yucatan and Central America with extensive agricultural burning and sometimes wildfire emissions each April and May. The individual wondered if TCEQ has correlated the actual burning and other sources with carbon concentrations and if the TCEQ knows where the problems exist. Since CENRAP modeling did not differentiate between boundaries, the commenter suggested that the TCEQ acknowledge that some of the air pollution coming from boundary conditions may be due to Texas' and other states' emissions that are re-circulated.

For a decade, the commission has been watching satellite images of smoke from the spring agricultural burning and wild fires in Southern Mexico and Central America as winds

transport it to Texas. The satellite fire channel data clearly show the locations of the fires. This is the only major source the TCEQ has observed for smoke being transported into Texas from areas outside the United States and affecting Class I areas in Texas and other states. Occasionally, smoke from marsh grass or crop stubble fires along the Texas and Louisiana coastal areas moves directly to impact nearby areas. Sometimes the trajectory takes the smoke a relatively short distance over the Gulf of Mexico. Marsh grass or crop stubble fires are not a significant source of smoke affecting Class I areas in Texas. While transport of continental haze from the United States can occasionally reach the boundary conditions domain, under such circumstances the air masses are usually associated with rapidly moving cool or cold fronts and are moving too quickly to accumulate much haze. Although re-circulation occurs, the commission notes it is a minor issue. No change was made in response to this comment.

Chapter 12: Plan Revisions

The FS requested that Chapter 12 should specifically mention that the SIP review and revision will involve consultation with the FLMs.

The suggested change was made to the SIP. The commission looks forward to a continued and collaborative consultation process with the FLMs regarding haze reduction.

General Comments

Several individuals commented that although half of the air pollution sources at Big Bend and Guadalupe Mountains are from other states and countries, Texans want to clean up the part that comes from Texas. Many individuals commented that no new air pollution control strategies were added to this SIP revision and requested controls be added specifically to reduce regional haze.

The commission notes that the Texas BART rule, adopted in January 2007, was a TCEQ rule specifically adopted for the Regional Haze SIP revision (see 30 TAC §116, Subchapter M or Appendix 9-2). The commission agrees that Chapter 11 does cite rules and programs that have been in place that have reduced regional haze as well as other pollution impacts. The commission was reducing Texas' impact on visibility impairment long before issuance of the federal Regional Haze Rule. These long-standing rules and programs continue to be effective. The commission notes that the national goal established by Congress and the EPA is to achieve natural visibility conditions in the Class I areas by 2064, with a requirement for five ten-year planning periods that end in 2018, 2028, 2038, 2048, and 2058. Further, EPA guidance recognizes that states that have adopted CAIR requirements may already have sufficient reduction requirements on the books for the first ten-year planning period, which is to 2018. Based on the four factor analysis for each Class I area Texas impacts, Texas has adopted all reasonable controls for this first planning period. The four factor analysis considers the cost of reducing air pollution emissions, the time necessary for compliance, the energy and non-air quality environmental impacts of reducing emissions, and the remaining useful life of existing sources that contribute to visibility impairment.

One individual commented that additional progress on cleaning up Texas' dirty air is possible if legislators from Texas use their clout in Congress to force Mexico to comply with its obligations to control emissions from coal-fired plants in Mexico.

The commission considers that the request (see Chapter 11) for federal efforts to reduce international transport is the appropriate action for the TCEQ.

The EPA, NPS, FWS, and FS requested the TCEQ combine the three sections of Texas, used for CENRAP modeling purposes, be added together to show the state's contribution as a whole and

providing a better comparison with other states. The commenters requested this be done throughout the document.

The commission has added tables showing Texas' total extinction contribution to each Class I area where Texas impacts visibility in other states. Several chapters and tables have been amended. Chapter 7 discusses the emissions inventory from Texas for each category. Only the figures break out the emissions by the three geographic areas in the tables in this section. Refer to Table 7-2: *Summary of 2002 Annual Emissions for the Nine-State CENRAP Region* and Table 7-5: *Nine-State CENRAP Total Emissions by Category* for a state level comparison of the emissions. For a discussion on impacts, the reader is referred to Chapter 10. Impacts from emissions on the Class I areas are discussed in Chapter 10 and are discussed from the state as a whole, not by geographical region.

One individual commented that this Regional Haze SIP revision should be withdrawn and revised to incorporate reductions in regional haze emissions over the next five years. If this is not done, the EPA should start the sanctions clock and in 18 months EPA should apply highway sanctions and require 2:1 offsets for regional haze emissions until an acceptable SIP is approved.

The commission disagrees with these comments. The commission is submitting a Regional Haze SIP revision that meets the requirements of 40 CFR §51.308.

One individual commented that with the uncertainty that the modeling provides it seems prudent that Texas make reductions now so that there will not be delayed regional haze attainment. There is no doubt that reductions must be made since on page 10-6, TCEQ implies that at least 48 percent for Big Bend and 75 to 80 percent for Guadalupe Mountains of the visibility impairment comes from Texas or other states, not foreign sources.

The commission disagrees with the commenter's interpretation of Table 10-7 in Chapter 10 and associated text and the commenter's solution. Haze reduction is a national issue with a long-term goal of natural visibility conditions. At this time, the commission is working on the impact that Texas has on haze in Texas and other known states. The EPA and other federal agencies are working with other states and international governments to reduce haze causing pollutants. The commission acknowledges that the public can improve visibility in Class I areas by an individual commitment to pollution reduction and appreciates groups that actively encourage the public to reduce the human contribution.

The Sierra Club commented that the commission was missing an opportunity to demonstrate a commitment to air quality cleanup in one of the most culturally, historically, and naturally important parts of our state. The failure to clear the air in Big Bend and Guadalupe Mountains translates into continued regional haze problems for state-owned lands such as Big Bend Ranch State Park, Davis Mountains State Park, and other such areas, which increasingly are of interest for outdoor recreation for Texas urban populations. The Sierra Club saw no real commitment on the part of the commission to address the deficiencies in the proposal.

This SIP revision addresses significant controls and programs that Texas and EPA are undertaking that will reduce haze in Big Bend and Guadalupe Mountains as well as neighboring state public lands. As EPA anticipated when it developed the Regional Haze and BART rules, natural visibility conditions will take many years to achieve in any Class I area. The reduction of haze will require all states to reduce pollutants. Future revisions and possible additional controls are anticipated.

The FS appreciated that Texas documented coordination with the FLMs and abandoned one approach based on FLM recommendations. The FS looks forward to continued consultation in the future.

The commission appreciates the comment and looks forward to a continued and collaborative relationship with the FLMs in the future.

The NPS and FWS appreciated the discussion of relative response factors and the two methods of applying relative response factors created by the CENRAP organization. The commenters welcomed the summary of these concepts in the main body of the SIP. It is very important to inform the non-technical reader how these complex models are applied in a relative sense.

The commission appreciates the comment and looks forward to a continued and collaborative relationship with the NPS and FWS in the future.

The FS commented that while Big Bend and Guadalupe Mountains, Class I areas within Texas, are identified in Chapter 1, other Class I areas identified elsewhere in the SIP as being impacted by Texas sources were not identified in this chapter. The commenter suggested including a summary of those other impacted Class I areas to provide balance to Chapter I.

Chapter 1 is devoted to background information and an overview of regional haze and describes those Class I areas within Texas that are impacted. The commission addressed Class I areas located in other states within Chapters 4, 10, and 11. The commission made no changes to this SIP revision.

The NPS and FWS commented that the Executive Summary says, "This SIP revision contains a list of BART-eligible sources and the determination of BART for each source that is reasonably anticipated to contribute to visibility impairment (BART-subject)." The NPS and FWS find this statement misleading, since the narrative stated that there were no sources subject to BART in Texas, and therefore no BART determinations were provided.

The BART process is fully explained in Chapter 9 of the SIP. According to EPA Region 6 training and flow charts, Texas understands the BART rule to be at least a three tiered process. Texas went through at least 2 tiers of the process. The first step of BART is determining eligibility; all BART-eligible sources are listed in Chapter 9 and Appendix 9-13. In addition, there is a list of sources that reduced their potential to emit through permit amendments, or shut down units in order to avoid being subject to BART controls. At this time, all BART-eligible sources have modeled emissions impacts to be below the BART determination threshold in some extent due to past emission reductions required by state law not anticipated when the federal BART rule was developed.

The FS commented that within the Executive Summary, the TCEQ should quantitatively summarize its reasonable progress goals and associated rationale for each Class I area addressed in the SIP revision.

The commission added summaries of reasonable progress goals and associated rationale for each Class I area in Chapter 10. In response to this comment, no changes were made in the Executive Summary. However, more information was added to Chapter 10.

The Sierra Club expressed disappointment that several generations of Texans will not be able to experience clear skies on a regular basis at these exceptional natural heritage parks. One individual commented that he hikes in Big Bend and Guadalupe Mountains and requested the commission take action to reduce haze for those who come after us. One individual commented that Big Bend has the honor of being a Biosphere Reserve under the United Nations Educational, Scientific and Cultural Organization (UNESCO) Man and Biosphere Program accentuating the need for the commission to do all it can to reduce haze at this special global site.

This SIP revision addresses significant controls and programs that Texas and the EPA are undertaking that will reduce haze in Big Bend and Guadalupe Mountains as well as neighboring states' public lands. As the EPA anticipated when it developed the Regional Haze and BART rules, natural visibility conditions will take many years to accomplish in any Class I area. This goal will ultimately be achieved through the efforts spelled out in this revision, as well as future revisions that may include additional controls and programs not yet created. The commission acknowledges that Big Bend National Park has been designated an international Biosphere Reserve. The commission made no changes in response to these comments.

The NPS and FWS commented that the Executive Summary stated that "TCEQ used a refined estimate of natural conditions for Class I areas in Texas and other states as permitted by EPA." However, there is no evidence in the SIP that any other states have adopted Texas' alternative natural conditions calculation approach. The commenters requested that this SIP revision specifically agree with the natural conditions adopted by Texas' neighboring states for said states' Class I areas.

The commission has no substantive disagreement with the natural conditions estimates used by any other state at this time. Texas fully respects the right of all states to determine the natural conditions for their respective Class I areas. The phrase "and other states" has been removed from the referenced sentence in response to this comment.

The NPS and FWS pointed out that the Cooperative Institute for Research in the Atmosphere, or CIRA (www.cira.colostate.edu) may have updated the baseline calculations found on the Visibility Information Exchange Web System (VIEWS) since the time of Texas' SIP proposal.

On January 2, 2008, the latest data was downloaded from the VIEWS Web site. The results have not changed for Big Bend or Guadalupe Mountains. The commission made no changes in response to this comment.

One individual commented he was excluded from the consultation and stakeholder process since he submitted comments on BART and spoke with staff but was not contacted about regional haze.

The commission issued public announcements on the BART and SIP list server, published numerous announcements in newspapers across the state, and regularly updated the commission's regional haze Web site to reflect upcoming meetings and hearings open to the public. The commission does not automatically place an individual on its list server without their permission, but encourages the commenter to sign up with all the e-mail updates on SIP hot topics; over 30 topics are now available through the new GovDelivery service as of Fall 2007 (www.tceq.state.tx.us).

The EPA commented that the TCEQ should ensure that it has specifically addressed each requirement of Section 51.308. The EPA requested the checklist EPA developed be used.

The commission has completed the EPA checklist that was provided to states giving references to specific chapters and appendices where each applicable requirements of Section 51.308 are addressed in the SIP revision. The commission will submit the checklist to the EPA with the adopted SIP package.

The EPA requested that the TCEQ make sure all graphs and charts originally produced with color-coded lines and bars be reproduced in color, as black and white reproduction does not allow the identification of the individual items. This should be ensured in both printed and electronic versions of the SIP, including all appendices.

The commission acknowledges that, where appropriate, graphs and charts produced in color should be reproduced in color. The print copies and files available electronically will be issued as originally produced.

The EPA was not able to conduct a thorough review because of time, resource constraints, and because the TCEQ did not submit a paper copy of the SIP. The Sierra Club found it difficult to justify any significant expenditure of time or resources to do a thorough critique of the proposed Regional Haze SIP revisions because the commission did not address the deficiencies in the proposal.

This SIP revision had a longer comment period than most as the 60 days for the FLMs was added to the 30-day public comment period, which made the comment period 90 days. As with other SIP revisions, Texas has provided EPA the ability to access and print revisions from the agency website. The commission was not made aware of the EPA's need for paper versions prior to the close of this comment period. Upon submission for review and approval, the EPA will receive paper copies of this SIP revision. The commission understands the time and resource constraints of both groups as the commission and its staff have similar limitations, however, no change was made in response to this comment.

As required by Section 51.308(d)(4)(v), the EPA requested the commission include in the Regional Haze SIP revision a commitment to update the emissions inventory of pollutants that are reasonably anticipated to cause or contribute to visibility impairment in its Class I areas periodically.

The commission remains committed to updating its emissions inventory. This commitment was included in Appendix 7-1, Section 7-5. "The Texas Commission on Environmental Quality (TCEQ), in compliance with the Clean Air Act Amendments and operating under the authority of the Texas Clean Air Act, Texas Health and Safety Code §382.014, and 30 TAC §101.10, conducts annual inventories of air emissions from point sources and periodic inventories of emissions from area, non-road mobile, and on-road mobile sources. The periodic inventory is updated statewide for all sectors every three years and submitted to EPA per the requirements of the Consolidated Emissions Reporting Rule, 40 CFR 51. The most recent, available inventory is for 2005 and is summarized in Table 7-4: *Non-EGU Point Source Controls*. The inventory will next be updated for 2008."

The EPA Region 6 has submitted general comments on the Texas BART analysis with the intention of addressing the more significant issues that could be identified considering the review time available. The EPA was involved in review of much of the CAMx modeling done for screening out sources, but due to time and resource constraints, the EPA has not been possible to conduct a completely thorough review, particularly with regard to modeling. It is possible that additional concerns, not discovered during the review of this draft, will surface during the review of the final version of this SIP revision.

The commission notes that the comment period was three times longer than usual. In addition to the standard 30-day public comment period, the FLMs were given 60 more days as required by the haze rule. Therefore, the comment period was 90 days. The commission understands time and resource constraints by government environmental agencies. The commission notes that EPA will have additional review after submittal.

The NPS and FWS noted that appendices were available upon request. Since significant portions of the rationale for the commission's proposed Regional Haze SIP revision are contained within the appendices, these should be posted for public examination along with the SIP narrative document.

The commission considers the SIP revision published for comment was complete and appropriate for public review and comment. As stated by the commenters, appendices were available upon request if needed. The appendices are currently available on the agency Web site.

The FS asked Texas to explain what is meant by the terms, Elevated Point and Low Level Point in the modeling inventory.

Pollutant emissions are treated in two basic ways within CAMx: low-level (gridded) emissions that are released into the lowest (surface) layer of the model; and elevated stack-specific (point) emissions with buoyant plume rise that can be emitted into any model layer. As shown in Table 8-2: *MM5 34 Vertical Layer Definitions* of the SIP, the surface layer is 36 meters and lower. The elevated layers are 36 meters and above. No changes were made in response to this comment.

The Sierra Club commented that it is disappointed that natural visibility was not a high priority issue to the commission. Many of the same sources of pollution that affect the skies of the national parks in West Texas affect the air in cities elsewhere in the state. Aggressive cleanup of these sources will certainly benefit both, and the failure to take protective actions to clean up air quality from these sources will harm both.

The commission is currently working to maintain health-effect standards as demonstrated by the state's current attainment for PM fine standards. Current nitrogen oxide and sulfur reductions obtained by programs such Senate Bill 7 benefit both the health-effect standards and visibility across the state. Any additional controls implemented for purposes of visibility only are not considered cost effective at this time.

The Sierra Club, City League for Environmental Action Now (CLEAN) Houston, and over 300 individuals commented that the SIP is inadequate and want the commission to add control strategies. The Sierra Club acknowledged that significant air pollution affecting parks are coming from sources outside of Texas; however, the commission can do more to control those sources in Texas that are contributing to the problem. CLEAN agreed with the Sierra Club that the commission should reduce emissions from coal-fired power plants, which would make improvements in visibility within as little as five years; the commission should revise this SIP. One individual commented that the SIP revision explained several important reasons why controls were delayed but requested the commission do some controls. Another individual suggested that the commission was not making reasonable progress because it delays action for five years; five years is not reasonable.

The commission is not delaying improvements in visibility impairment. Current control strategies are anticipated to decrease sulfur dioxide emissions by over 225,000 tpy and nitrogen oxides emissions by over 670,000 tpy by 2018. Chapter 10 has been updated with a more detailed discussion of the four factor analysis, including an updated cost-effectiveness analysis.

In addition to Senate Bill 7 that the Texas Legislature implemented in 1997, emissions from coal-fired power plants are being controlled by the provisions of CAIR, which is to be implemented by 2015, with the first phase by 2009. Emissions reported from electric utilities have been decreasing annually with a decrease of over 80,000 tpy of nitrogen oxides and 27,000 tpy of sulfur dioxide between 2002 and 2005.

Significant cost-effective control strategies are already being implemented in Texas to control ozone. These strategies have been included in Texas' ozone SIP modeling. In addition to controlling ozone formation, the planned emissions reductions will also have a

co-benefit of improving visibility impairment in Class I areas in Texas and nearby states by the reduction of sulfur dioxide and nitrogen oxides.

Because of the timing of various rule adoptions, not all of the following rules listed are in CENRAP's 2018 model. Those strategies included in CENRAP modeling are identified with an asterisk. Due to more recent adoption dates, other control strategies listed are not modeled by CENRAP but are expected to have emissions reductions by 2018. Control strategies that were effective after 2002 and prior to 2018 are listed as follows.

Point Source Controls - Electric Generating Utilities

Houston-Galveston-Brazoria

*nitrogen oxide Mass Emission Cap and Trade (MECT)

Dallas-Fort Worth

*30 TAC §117 nitrogen oxide unit specific limits

*30 TAC §101 system-wide averaging caps

Beaumont-Port Arthur

*30 TAC §117 nitrogen oxide unit specific limits

*30 TAC §101 system-wide averaging caps

East and Central Texas

Clean Air Interstate Rule (CAIR)

*30 TAC §117 nitrogen oxide unit specific limits

*30 TAC §101 system-wide averaging caps

West Texas

*30 TAC §101 SB7 nitrogen oxide caps with trading

Point Source Controls - Non-Electric Generating Units

Statewide

*Site specific Refinery Consent Decree sulfur dioxide levels

Houston-Galveston

*nitrogen oxide Mass Emissions Cap and Trade (MECT)

*Highly-Reactive VOC (HRVOC) Emission Cap and Trade (HECT)

Beaumont-Port Arthur

*30 TAC §117 controls (process heaters, industrial boilers, engines)

Dallas-Fort Worth

*30 TAC §117 controls for select

Kilns (including cement, lime, brick and ceramic)

Furnaces (reheat, smelting, blast, reverb, glass, fiberglass, and mineral wool)

Heaters and ovens

Industrial Boilers

Engines

Increment of Progress (IOP) engine nitrogen oxide controls

Increment of Progress (IOP) surface coating VOC controls

East Texas

*30 TAC §117 Cement Kiln nitrogen oxide limits

*Agreed Orders/Consent decree sites specific reductions at Alcoa and Eastman

30 TAC §117 engine nitrogen oxide controls in specified counties

Area Source Controls

Statewide

*30 TAC §117 nitrogen oxide emissions limits to water heaters, small boilers, and process heaters

Dallas-Fort Worth

IOP for Ellis, Johnson, Kaufman, Parker, Rockwall counties

VOC reductions from Stage I vapor recovery

VOC reductions from surface coating processes

On-Road Mobile Source Controls

Statewide

- *sulfur dioxide reductions from low sulfur diesel fuel
- nitrogen oxide reductions from TxLED

Nonattainment areas

- *Vehicle inspection and maintenance
- TERP nitrogen oxide reductions

Non-road Mobile Source Controls

East Texas Counties (including nonattainment counties)

- TxLED nitrogen oxide reductions

Houston-Galveston and Dallas-Fort Worth

- *nitrogen oxide reductions from California Large Spark Ignition Engine Standards
- TERP nitrogen oxide reductions

A proposed control strategy for regional haze with a limiting cost for controls, equivalent to the CAIR program of \$2,700 per ton, results in a negligible improvement projected in visibility with a cost over \$300 million (Table 10-4). The commission's analysis concludes that additional controls for regional haze are not reasonable at this time. This will be reconsidered in future SIP revisions.

The Sierra Club and many individuals urged the commission to withdraw its proposed Regional Haze SIP and develop a new plan for addressing the regional haze problem to submit to the EPA. The Sierra Club found the proposed Regional Haze SIP revisions inadequate and insisted that the commission take responsibility to address the visibility issues at Big Bend and Guadalupe Mountains. Many individuals urged the commission to include specific air pollution control measures that go beyond existing rules so that Texas can move closer toward the national goal to clear the air in Texas and national parks in neighboring states.

The commission does not plan to withdraw the proposed Regional Haze SIP revision. Significant cost-effective control strategies are already being implemented in Texas to control ozone. As part of these strategies, nitrogen oxides emissions will be reduced. State control measures required under Senate Bill 7 reduce both sulfur dioxide and nitrogen oxides at electric generating units. These control strategies will also reduce the emissions that contribute to visibility impairment in Class I areas. These strategies are anticipated to decrease these sulfur dioxide emissions by over 225,000 tons and nitrogen oxides emissions by over 670,000 tpy by 2018. The commission's analysis concludes that additional controls for regional haze are not reasonable at this time. This will be reconsidered in future SIP revisions.

The Sierra Club requested the commission develop a new plan to reach the 2064 goal; cast the net wider for the active involvement of a much more diversified set of interests for input and collaboration on plan development, including especially bringing into the process much greater representation of interests that have a strong commitment to the protection of areas such as Big Bend and Guadalupe Mountains, rather than an over-reliance on industries with a interest in avoiding new air pollution control strategies.

The commission made significant effort to contact interested parties during both the Texas BART Rule and Regional Haze SIP developments. Public notices were sent to update interested parties and solicit input in the regional haze process. Regional haze notices were sent to six newspapers: Austin American-Statesman, El Paso Times, Fort Worth Star-Telegram, Houston Chronicle, Midland Reporter-Telegram, and the Alpine Avalanche. Notices were also sent to twelve Councils of Government and Metropolitan Planning Organizations, and seven local programs throughout the state. Representatives from six

adjacent state's environmental departments were also notified. A list server of over 200 participants was established for BART developments. After the BART rule was finalized, the SIP list server with over 500 participants was used for regional haze outreach. Among the notices were announcements for two informational meetings on the BART Rule and one meeting on the Regional Haze SIP. In addition, the Texas Regional Haze SIP was published in the Texas Register on December 21, 2007.

In addition to the health concerns in the areas of Dallas, Houston, San Antonio, and El Paso, one individual is concerned with the effects of air pollution on the investments in McDonald Observatory that will be seriously impacted by continued inaction.

Although the Regional Haze SIP revision addresses haze impacts only at Class I areas in Texas and neighboring states, the commission anticipates that reduction in haze-causing emissions and activities will also benefit visibility in other parts of Texas, including the McDonald Observatory.

The Sierra Club, CLEAN, and four individuals were concerned that the commission does not meet the goal of natural visibility by 2064. The Sierra Club was disappointed with the inadequacy of the Regional Haze SIP revisions being proposed by the commission at this time. One individual questioned if TCEQ is protecting and advocating for industry or the public.

The commission remains committed to clean air and reducing haze in public wilderness areas, national parks, and throughout Texas. Texas has significant cost-effective control strategies to reduce nitrogen oxides and sulfur dioxide to control ozone. In addition to controlling ozone formation, the planned emission reductions will also have a co-benefit of improving visibility impairment in Class I areas in Texas and nearby states. The strategies in place are anticipated to decrease these sulfur dioxide emissions by over 225,000 tpy and nitrogen oxides emissions by over 670,000 tpy by 2018. The commission considers the strategies in place are a cost-effective, reasonable approach to reducing visibility impairment. The commission's analysis concludes that additional controls for regional haze are not reasonable at this time. This will be reconsidered in future SIP revisions.

Corrections

The EPA commented that Tables 8, 9, and 10 of Appendix 10-1 were truncated. The FS commented that in Chapter 8, Figures 4 and 5; the captions indicate that these figures used the 2002 Base F emission inventory, however, the headings for the graph say that they used the 2002G typical emission inventory. The FS asked the commission to correct this error. The NPS, FWS, and EPA commented that the folder for Appendix 11-1: *Fire Management Plans* was empty on the CD. The FS indicated park name corrections for Badlands, Bandelier, and Great Sand Dunes to national parks. The NPS and FWS noted that within Appendix 5-1 an ftp site was referenced for further information. The commenters noted that the ftp link was password protected and not publicly available.

The commission thanks the EPA, FS, NPS, and FWS for identifying these errors. The corrections to Appendix 10-1 were made to the SIP revision and posted on the TCEQ regional haze Web site in February 2008. The Chapter 8 figure caption has been corrected to indicate that model results are from the Typical 2002G or Typ02G inventory. The commission corrected the error in the CD's missing Appendix 11-1 and e-mailed the materials as soon as staff was made aware of the omission. The park names were correct throughout the document. The ftp site is not a state Web site and the reference is not critical for the appendix, so the link has been deleted due to problematic access.